

# 2nd Mediterranean Plant Conservation Week

"Conservation of Mediterranean Plant Diversity: Complementary Approaches and New Perspectives"

La Valetta, Malta, 12-16 November 2018



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# 2nd Mediterranean Plant Conservation Week

“Conservation of Mediterranean Plant Diversity: Complementary Approaches and New Perspectives”

All the information [here](#).

Main organizers: CARE-MEDIFLORA project & IUCN-MED

12-16 November 2018, La Valetta, MALTA



The Mediterranean is worldwide recognized biodiversity hotspot in terms of its plant diversity. However, plant diversity is often overlooked in the conservation agenda and the dialogue between plant scientists, site managers, local populations and civil society organizations is often fragmented.

The Mediterranean Plant Conservation Weeks represent an opportunity to develop framework for dialogue among stakeholders, to share successful examples of plant conservation initiatives with local communities, and to enhance capacity building.

This event aims at becoming a gathering point for botanists; civil society institutions working in the plant conservation field; community members; and for those interested in including plant conservation programs into their conservation or sustainable development projects.

The “2nd Mediterranean Plant Conservation Week” included a combination of presentations, workshops and discussion panels. This event also represents a fantastic networking and learning opportunity for all the participants.

## Website

<http://www.medplantsweek.uicnmed.org>

All the photos of the 2nd Mediterranean Plant Conservation Week: [http://bit.ly/IIMPCW\\_photos](http://bit.ly/IIMPCW_photos)

## Scientific committee:

- Gianluigi Bacchetta (Chair) (Hortus Botanicus Karalitanus, University of Cagliari Sardinia, Italy)
- Emily Caruso (Global Diversity Foundation)
- Charalambos Christodoulou (Department of Forests, Cyprus)
- Bertrand De Montmollin (Mediterranean Plants Specialist Group, IUCN/SCC)
- Giuseppe Fenu (Centro Conservazione Biodiversità, University of Cagliari Sardinia, Italy)
- Christini Fournaraki (Mediterranean Agronomic Institute of Chania, Crete, Greece)
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- Marcos Valderrabano (IUCN Centre of Mediterranean Cooperation)
- Magdalena Vicens Fornes (Jardí Botànic de Sóller, Balearic Islands, Spain)

## Organizing committee:

- Bertrand De Montmollin (Chair) (Mediterranean Plants Specialist Group, IUCN/SCC)
- Marcos Valderrabano (IUCN Centre of Mediterranean Cooperation)
- Panagiota Gotsiou (CARE-MEDIFLORA project, Mediterranean Agronomic Institute of Chania, Crete, Greece)
- Emily Caruso (Global Diversity Foundation)
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- Pilar Valbuena (Independent international consultant, Spain)

## Organisers:



## Our sponsor:

This event was supported by MAVA Foundation.



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**The CARE-MEDIFLORA project**, "Conservation Actions for Threatened Mediterranean Island Flora: *ex situ* and *in situ* joint actions", is a main organiser of the 2nd Mediterranean Plant Conservation Week (2MPCW) together with IUCN-MED.

CARE-MEDIFLORA aims to improve the conservation status of threatened Mediterranean plant species. It is implemented by institutions of six Mediterranean islands and the IUCN/SSC Mediterranean Plant Specialist Group.

The institutions involved are jointly working to address both short-term and long-term conservation needs, including: i) *in situ* conservation of some of the most endangered plant species of the Mediterranean islands through *in situ* management actions; ii) *ex situ* conservation of the most endangered plant species through the collection, seed banking and duplication of accessions representative of the overall diversity of selected taxa; iii) the reinforcement and enlargement of the 'GENMEDA - Network of Mediterranean Plant Conservation Centres'.

The project results are presented at the 2MPCW and disseminated to conservation plant specialists from countries all around the Mediterranean, in order to increase collaboration among institutions dealing with *in situ* and *ex situ* conservation, as well as to local stakeholders and environment-related agencies, in order to raise awareness about the vulnerability of the local flora.

The project started in April 2016 and ends in June 2019. It is 80% funded by the MAVA Foundation.

#### **Project Coordination**

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#### **Lead Partner**

CIHEAM Mediterranean Agronomic Institute of Chania

#### **Website**

<http://www.care-mediflora.eu/>

## PARTNERS



Mediterranean Plant Specialist Group – IUCN/SSC



Sóller Botanical Garden Foundation, Balearic Islands

Conservatoire Botanique National



C O R S E

Office of the Environment of Corsica, Conservatoire Botanique National de Corse



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CIHEAM Mediterranean Agronomic Institute of Chania, Crete









Agricultural Research Institute, Cyprus



Department of Forests, Cyprus

You can find further information on the following links:

	Mediterranean Plant Conservation Weeks	<a href="http://www.medplantsweek.iucnmed.org">http://www.medplantsweek.iucnmed.org</a>
	CARE-MEDIFLORA project	<a href="http://www.care-mediflora.eu">http://www.care-mediflora.eu</a>
	IUCN Centre for Mediterranean Cooperation (IUCN-Med)	<a href="https://www.iucn.org/regions/mediterranean">https://www.iucn.org/regions/mediterranean</a>
	MAVA Foundation	<a href="http://mava-foundation.org">http://mava-foundation.org</a>
	The Critical Ecosystem Partnership Fund (CEPF)	<a href="https://www.cepf.net">https://www.cepf.net</a>
	Global Diversity Foundation (GDF)	<a href="https://www.global-diversity.org">https://www.global-diversity.org</a>
	CIHEAM MAICH	<a href="https://www.iamc.ciheam.org">https://www.iamc.ciheam.org</a>
	Mediterranean environmental journalist network	<a href="http://medgreenjournalism.net">http://medgreenjournalism.net</a>
	Conserving wild plants in the south and east Mediterranean region	<a href="https://portals.iucn.org/library/node/47910">https://portals.iucn.org/library/node/47910</a>

2nd Mediterranean Plant Conservation Week  
 "Conservation of Mediterranean Plant Diversity: Complementary Approaches and New Perspectives"

Monday, November 12	Tuesday, November 13	Wednesday, November 14	Thursday, November 15	Friday, November 16
<p>8.00-8.30 Registration for GENMEDA</p> <p>8.30-12.00 GENMEDA meeting (closed for members only)</p>	<p>8.30-12.00 S2- <i>In situ</i> plant species conservation: technical aspects, methodology, monitoring <a href="#">More information here.</a> <b>KN: Vernon Heywood &amp; Simone Orsenigo</b></p> <p>12:00-12:30 Launch of the 'SimaSeed' Italia Malta INTERREG project</p> <p>12.30-13.30 Lunch break</p>	<p>8.30-12.00 S4- Science for action. Mapping tools to incorporate plant data into decision tools for management. More information here. <a href="#">More information here.</a> <b>KN: John Thompson</b></p> <p>12.00-13.30 Lunch break</p>	<p><b>Field Trip</b> (departure 9.15 from Victoria hotel) <a href="#">More information here.</a></p>	<p>8.30-12.00 S6- Site based approaches for plant conservation: Micro-reserves, and habitat restoration <a href="#">More information here.</a> <b>KN: Emilio Laguna and Magda Bou Dagher Kharrat</b> <b>Closure of the Week</b></p>
<p>12.00-13.30 REGISTRATION</p>	<p>13.30 - 17.00 S3- <i>Ex situ</i> and <i>in situ</i> plant species conservation : collaborations, strategies, communication <a href="#">More information here.</a> <b>KN: Frederic Medail</b></p>	<p>13.30 - 17.00 S5- Disruptive ethnobotany in blasted landscapes: rethinking people-plant relationships in the Mediterranean <a href="#">More information here.</a> <b>KN: Gary Martin</b></p>	<p>Estimated finish 16.00</p>	
<p>13.30 <b>Opening of the week</b></p> <p>14.00 - 17.30 S1- <i>Ex situ</i> plant species conservation <a href="#">More information here.</a> <b>KN: Costas A. Thanos</b></p>	<p>17.30 - 19.00 CEPF side event (Critical Ecosystem Partnership Fund) <a href="#">More information here.</a></p>	<p>17.30 - 19.00 Presentation of publication "Conserving wild plants in the south and east Mediterranean region" <a href="#">More information here.</a></p>	<p><b>Gala dinner</b></p>	
<p>17.30 - 19.00 'MedisWet' project (Conservation of Mediterranean Islands Wetlands) <a href="#">More information here.</a></p>	<p><b>Coffee breaks</b> will take place at: 10.00-10.30 and 15.00-15.30</p>			





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S1 - Ex situ plant species conservation

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## S1 - Ex situ plant species conservation

### **Description**

This session deals with the state of ex situ plant conservation in the Mediterranean. Ex situ plant conservation is a complementary rather than alternative strategy to in situ plant conservation and this is highlighted through the actions of the CARE-MEDIFLORA project and GENMEDA network. Various issues related to the methods used and the existing networks in the Mediterranean region will be underlined. In addition, separate technical issues concerning collections, curation, germination and storage methods will be discussed which contribute to the more effective conservation of collections.

The state of conservation of target plants in the Mediterranean region, their use in recovery and restoration projects, in view of the Global Strategy for Plant Conservation as well as the implementation of the Nagoya Protocol are issues that will arise.

### **Topics to address**

- Population genetic issues in ex situ plant conservation
- Manage collections for ex situ conservation (collection, curation, storage, documentation, etc.)
- Dormancy breaking and germination of Mediterranean plants
- Plants production for restoration and recovery projects
- Global strategy for plant conservation towards 2020 (Target 8,9) – Mediterranean bioregion
- International laws for duplicates: agreements within Countries or between ex situ Collections
- CARE-MEDIFLORA ex situ project actions and goals / results / lessons learned / good practices
- Networks in the Mediterranean for ex situ plant conservation

### **Chair of the session**

Fournaraki Christini (Mediterranean Agronomic Institute of Chania, Crete, Greece).

### **Co-Chair of the session**

Vicens Fornes Magdalena (Jardí Botànic de Sóller, Balearic Islands, Spain).

### **Keynote**

Costas A. Thanos (Faculty of Biology, National and Kapodistrian University of Athens).

## Presentations

TYPE	Title	Authors	PRESENTER	E_mail
14.00-14.30	<b>Keynote</b>	Recent advances in seed germination research of Mediterranean plants	Thanos Costas	Konstantinos Thanos cthanos@biol.uoa.gr
14.30-15.00	<b>CARE-MEDIFLORA presentation</b>	Ex situ conservation actions of the project "CARE-MEDIFLORA"	Kyrtzis Angelos (on behalf of all CARE-MEDIFLORA project)	Kyrtzis A. a.kyrtzis@ari.gov.cy
15.00-15.15	<b>Short presentation</b>	How to save a self-incompatible species from a unique pure specimen found worldwide: the case of the Cartagena's rockrose	Emilio Laguna, P. Pablo Ferrer-Gallego, Inmaculada Ferrando, Francisco J. Albert & Víctor Martínez Granell.	Emilio Laguna laguna_emi@gva.es
15.15-15.30	<b>Short presentation</b>	Ex-situ studies on biology of endangered oromediterranean plant as a first step towards successful in-situ conservation actions	Boštjan Surina, Živa Fišer Pečnikar, Manica Balant, Peter Glasnović	Boštjan Surina bostjan.surina@prirodoslovni.com
15.30-16.00	<b>Coffee break</b>			
16.00-16.15	<b>Short presentation</b>	RIBES, the Italian network of seedbanks: first data on the ex situ conservation of the endemic taxa	Magrini S., Bacchetta G., Bedini G., Borzatti A., Carasso V., Casavecchia S., Ceriani R., Cristaudo A., Di Cecco V., Di Martino L., Fabrini G., Gasparri R., Gratani L., Guglielmo F., Mariotti M., Negri V., Porceddu M., Salmeri C., Scialabba A., Villani M., Zappa E., Bonomi C.	S. Magrini magrini@unitus.it
16.15-16.30	<b>Short presentation</b>	The Native Tree Flora of Greece: a database essential for conservation actions	Evangelia N. Daskalaku, Katerina Koutsovoulou and Costas A. Thanos	Evangelia N. Daskalaku edaskalaku@fria.gr
16.30-16.45	<b>Short presentation</b>	To promote germination and remove dormancy in seeds of Mediterranean vascular plants: a learned lessons by studying the Sardinian flora	Porceddu Marco, Picciau Rosangela, Cuenca Lombrana Alba, and Bacchetta Gianluigi	Rosangela Picciau <a href="mailto:rosangela.picciau@gmail.com">rosangela.picciau@gmail.com</a>
16.45-17.30	<b>Discussion closure of the session</b>			

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## S1- Ex situ plant species conservation

**TITLE:** Recent advances in seed germination research of Mediterranean plants

**AUTHORS:** Thanos Costas

**INSTITUTION:** 1 Department of Botany, Faculty of Biology, National and Kapodistrian University of Athens, Panepistimiopolis, Athens 15784, Greece

**CORRESPONDING AUTHOR:** cthanos@biol.uoa.gr

**ABSTRACT:**

The Mediterranean Basin is a well known hot spot of plant diversity as it encompasses a large flora of ca. 25.000 species with a considerable degree of endemism (>50%). Knowledge of seed germination characteristics for each particular taxon is an indispensable complement to the 'collection-handling-storage' working chain scheme of seed banking; it can also prove a valuable ecological tool for predicting, supporting and enhancing the in situ conservation of fragile plant populations.

Research on seed germination of the Mediterranean plants has been a rather neglected topic in the not too distant past; however, it gained considerable momentum in the 80s and 90s while, during the last decade, an increasing number of teams throughout the region have furnished a wealth of new information and generated fresh and interesting insights. This presentation will try to showcase, in a balanced way, the progress accomplished recently and to attempt an overall quantitative and qualitative assessment.

The Mediterranean climate is characterised by marked seasonality of drought and, to a lesser degree, frost. Recruitment of seedlings (and hence germination behaviour) is favoured by the selective forces of water availability and non-freezing temperatures. Therefore, by adopting various mechanisms, the two major fundamental types of seed germination among Mediterranean plants correspond to the strategies of either making full use of the wet period or avoiding the frost season, i.e. autumn and spring germination, respectively.

Furthermore, based on both the established dormancy categories and the ecophysiological approach of seed germination requirements, we will apply the concept of 'germination characters' and will attempt to estimate the relative contribution of each of the 5 groups: postdeveloners, afterripeners, hardcoaters, stratificationers and temp-probers. We will also examine several other factors that may affect germination, such as light, phylogeny, habitat type, seed mass, plant life history and climate change.

Finally and despite the substantial progress achieved already, there still exist knowledge gaps that remain to be tackled; therefore, by making use of an analysis on both the taxonomic and functional group levels, we will put forward a prioritised list of significant gaps that need to be filled in.

**KEY WORDS:** Ex situ/in situ conservation, seed germination, dormancy, germination character, seedling recruitment



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## S1- Ex situ plant species conservation

**TITLE:** Ex situ conservation actions of the project "CARE-MEDIFLORA"

**AUTHORS:** Kyrtzis Angelos (on behalf of all CARE-MEDIFLORA project)

**INSTITUTION:** CARE-MEDIFLORA project [Agricultural Research Institute, Ministry of Agriculture, Rural Development and Environment, Cyprus]

**CORRESPONDING AUTHOR:** a.kyrtzis@ari.gov.cy

**ABSTRACT:**

Although in situ conservation measures are the best methods for preserving plant diversity, ex situ conservation provides an alternative and complementary method for preventing immediate extinction (Godefroid et al. 2011). As a precautionary measure, more importance should be given to ex situ conservation in seed banks, which may support further interventions, such as translocations. One of the most effective ways to preserve plant diversity through ex situ conservation is the storage in seed banks, which allows conserving large amounts of genetic material in a small space and, under suitable conditions, for a long time with minimum risk of genetic damage.

The CARE-MEDIFLORA project, an initiative implemented by institutions of six Mediterranean islands and the IUCN/SSC Mediterranean Plant Specialist Group with a long lasting experience in the field of plant conservation, promotes the use of ex situ collections to experiment with in situ actions for threatened island plants (Fenu et al. 2017). Ex situ measures, such as seed collection, curation and storage, are an integral part of the project and represent a further step of the activities carried out in a previous project named "Ensuring the survival of endangered plants in the Mediterranean".

Germplasm collection and curation are carried out according to the national and international regulations and standards. Based on a set of common criteria, a preliminary list including 706 taxa of target plants, for which ex situ activities were planned, was created, mainly selected by the regional responsibility criterion and/or assessed as threatened in the global and/or regional IUCN RedList.

For a selected group of target threatened species, ex situ conservation has been guaranteed in seed banks.

Germination tests are carried out to assess the germination requirements and plants are produced for the species selected for in situ actions. As a precautionary measure, aiming to ensure the conservation of the collected germplasm, accessions are duplicated in the seed banks of other partners of this project or, if appropriate, with other institutions. In addition to the long term seed conservation, each institution guarantees seed availability for future recovery or restoration programmes.

The results of the CARE-MEDIFLORA project significantly contribute to the achievement of Target 8 of the Global Strategy for Plant Conservation for 2020 (GSPC 2008) aiming that 'at least 75% of threatened plant species are conserved in ex situ collections, preferably in the country of origin, and at least 20% available for recovery and restoration programmes'

**KEY WORDS:** Ex situ conservation, Mediterranean islands, threatened plants, storage, germination tests, duplications

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## S1- Ex situ plant species conservation

**TITLE:** How to save a self-incompatible species from a unique pure specimen found worldwide: the case of the Cartagena's rockrose

**AUTHORS:** Emilio Laguna<sup>1</sup>, P. Pablo Ferrer-Gallego<sup>1,2</sup>, Inmaculada Ferrando<sup>1,2</sup>, Francisco J. Albert<sup>1,2</sup> & Víctor Martínez Granell<sup>1,2</sup>

**INSTITUTION:** 1 Servicio de Vida Silvestre-CIEF, Generalitat Valenciana.  
2 Vaersa, Generalitat Valenciana.

**CORRESPONDING AUTHOR:** laguna\_emi@gva.es

### **ABSTRACT:**

*Cistus heterophyllus* subsp. *carthaginensis*, the Spanish representative of the Ibero-Northafrican endemic *C. heterophyllus*, is considered as the most threatened species in Spain and Europe. This is the unique plant species legally appointed as 'Species in Critical Situation' in Spain, a special category only reserved for taxa in imminent risk of extinction, among the previously protected in the highest Spanish category 'In Danger of Extinction'. The species *C. heterophyllus* is also distributed -through the vicariant subspecies *heterophyllus*- from Morocco to Algeria. Although this subspecies was discovered near Cartagena (Region of Murcia), all the Murcian population is considered genetically polluted by introgression of *Cistus albidus*. In 1985 a unique pure specimen of *C. heterophyllus* subsp. *carthaginensis* was found in Poble de Vallbona (Valencia, region of Valencian Community), close to 230 km far from Cartagena, and considered as the unique pure individual worldwide for this subspecies. It deals with a reproductive self-incompatible species, so seed production of this unique specimen was not expected. Thus, the unique enabled option for its conservation since early 1990's was in vitro propagation. However, in vitro specimens never produced new viable seeds, and as recently discovered, they show chromosomal mutation. After more than 25 years monitoring the unique pure specimen, a unexpected production of 142 seeds was detected in 2013, caused by some failure of the self-incompatibility system. Additionally, in 2012, new clonal specimens had been obtained directly from cuttings, without chromosomal alterations. Combining the new specimens obtained from seeds and cuttings, a hand-made pollination programme started in 2015, yielding more than 5.000 new seeds that year, and more than 20.000 in 2016. The seeds show a high viability (78-95%) and a long-term programme to produce new seeds has been established. 2 plantation campaigns have been already performed (autumn 2016 and winter 2018). Both in orchard and in field the new plants have high rates of fruit and seed production, so the door to save this species from its formerly expected sure extinction, is definitely opened. The actions here indicated have been developed by CIEF (Centre for Foresty Research and Experimentation, Generalitat Valenciana), co-financed by the Operative Programme of European Funds FEADER/EAFRD 2013-2020.

**KEY WORDS:** *Cistus heterophyllus*, Unique specimen, Self-incompatibility, Ibero-Northafrican, Endemism

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## S1- Ex situ plant species conservation

**TITLE:** Ex-situ studies on biology of endangered oromediterranean plant as a first step towards successful in-situ conservation actions

**AUTHORS:** Boštjan Surina<sup>1,2</sup>, Živa Fišer Pečnikar<sup>2</sup>, Manica Balant <sup>2</sup>, Peter Glasnović<sup>2</sup>

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**CORRESPONDING AUTHOR:** bostjan.surina@prirodoslovni.com

### **ABSTRACT:**

*Cerastium dinaricum* (Caryophyllaceae) is an oromediterranean plant of conservation priority in European Union (Annex II of the Habitat Directive, Natura 2000) due to small and low-numbered populations and highly fragmented distribution range spanning Dinaric Alps from Slovenia to Albania. Phylogeographical split and genome size separates the populations into two vicariant groups - northwestern and southeastern, the second being genetically more diverse. Modelling suggested significant reduction of viable habitat by the end of the century. In Slovenia, for example, since its discovery in 1994, only 14 specimens continue to thrive on a single, some 20 m<sup>2</sup> large scree. Here, the first steps of short and long-term ex-situ conservation are presented, focused on seed and reproduction biology of the species. Higher temperature, dark treatment and a period of cold-wet stratification significantly improved the germination of seeds, while the addition of GA<sub>3</sub> increased the final germination only in non-stratified seeds. Seeds that successfully germinated were planted in pots and one year after germination, the plants started flowering. The first in-situ conservation measures will be presented and planned population reinforcement will be discussed.

**KEY WORDS:** Seed germination, population reinforcement, Balkan Peninsula, pollination ecology

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## S1- Ex situ plant species conservation

**TITLE:** RIBES, the Italian network of seedbanks: first data on the ex situ conservation of the endemic taxa

**AUTHORS:** Magrini S.\*, Bacchetta G., Bedini G., Borzatti A., Carasso V., Casavecchia S., Ceriani R., Cristaudo A., Di Cecco V., Di Martino L., Fabrini G., Gasparri R., Gratani L., Guglielmo F., Mariotti M., Negri V., Porceddu M., Salmeri C., Scialabba A., Villani M., Zappa E., Bonomi C.

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**CORRESPONDING AUTHOR:** magrini@unitus.it

### **ABSTRACT:**

RIBES is the Italian national seed-bank network for native species conservation. It was established in December 2005 and today it includes 17 members representing 14 Italian regions. It is also a member of other wider networks such as ENSCONET (European Native Seed Conservation Network) and INSR (International Network for Seed-based Restoration) so providing an active connection with the international context.

The ultimate goal of the network is the general improvement of the quality and safety of the germplasm reserves of native plant species in Italy to ensure the long-term conservation and protection of the endangered and/or endemic flora. Currently, more than 10,000 accessions of seeds and spores of about 3,200 taxa are conserved in RIBES seed-banks, representing approx. 40% of the Italian native vascular flora.

Here, we focus particularly on the conservation status of the 1,340 Italian narrow endemic taxa (Bartolucci et al., 2018), presenting the first assessment of the Italian ex situ collections. Currently, accessions of 550 endemic taxa, 41% of the Italian endemic flora, are conserved in RIBES seed-banks, particularly in Sicily (> 200 taxa), Sardinia and Tuscany (with >100 each).

The most represented families (>30 taxa) that include Italian endemics are: Asteraceae (120 taxa), Brassicaceae (44), Caryophyllaceae (42), Fabaceae (42), and Plumbaginaceae (38). It is noteworthy that the network banked 88% of the endemic taxa of *Saxifraga* (15), 59% of *Genista* (17), 54% of *Silene* (15), 52% of *Dianthus* (14), and 48% of *Centaurea* (35).

If assessed against the recent Red List of the Italian endemic plants (Orsenigo et al., 2018), RIBES accessions include 48% of the threatened Italian endemics (143 out of 300 taxa with status CR, EN, or VU), in particular, 52% of the Critically Endangered taxa, especially in the genus *Limonium*, and 46% of both Endangered and Vulnerable taxa. Taxa endemic to a country are key elements for setting up national conservation priorities and for driving conservation actions considering that their survival is under the full national responsibility and entirely dependent on national policy. These results provide a key contribution toward the development of a RIBES conservation strategy at the national level, aiming at an effective ex situ conservation of the Italian flora, e.g. supporting the definition of a priority list for collection, banking, and duplication programmes.

**KEY WORDS:** Endemic taxa, ex situ conservation, Italian flora, national responsibility, seed-banks



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## S1- Ex situ plant species conservation

**TITLE:** The Native Tree Flora of Greece: a database essential for conservation actions

**AUTHORS:** Evangelia N. Daskalaku\*<sup>1</sup>, Katerina Koutsovoulou<sup>2,3</sup> and Costas A. Thanos<sup>2</sup>

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**CORRESPONDING AUTHOR:** edaskalaku@fria.gr

### **ABSTRACT:**

In the framework of an on-going study on the reproductive biology of the native tree flora of Greece (Daskalaku & Thanos 2014, Koutsovoulou et al. 2015), data for all native trees, comprising 2.6% of the Greek flora and 0.3% of the tree taxa globally, are being collected and regularly enriched with new information on reproductive biology, including phenology (flowering and fruiting seasons), masting, dispersal, seed/fruit biometry, seed germination, timing of seedling emergence in the field and seed storability. Furthermore, data regarding the conservation status according to IUCN criteria have been collected, even though the conservation status has not been assessed for all taxa. The database comprises 170 taxa, including 20 gymnosperms, that belong to 31 plant families and 57 genera, classified as trees according to the definition by Beech et al. (2017) 'a woody plant with usually a single stem growing to a height of at least 2 m, or if multi-stemmed, then at least one vertical stem 5 cm in diameter at breast height'. The limited available scientific information on seed germination and seed storage behaviour for a considerable number of species as well as the lack of data for plant material collected from Greece, makes their ex situ (seed banks, arboreta) and in situ conservation a challenging but worth pursuing target. Obviously, further research is needed so that this database might develop into an essential management tool for tree conservation in Greece, which could additionally contribute to several relevant applications, such as urban forestry, habitat restoration after wildfires or other disturbances and nursery practice.

**KEY WORDS:** Tree flora, reproductive characteristics, conservation, database

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## S1- Ex situ plant species conservation

**TITLE:** To promote germination and remove dormancy in seeds of Mediterranean vascular plants: a learned lessons by studying the Sardinian flora

**AUTHORS:** Porceddu Marco<sup>1,2</sup>, Picciau Rosangela\*<sup>1,2</sup>, Cuenca Lombraña Alba<sup>1,3</sup>, and Bacchetta Gianluigi<sup>1,2</sup>

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### **ABSTRACT:**

The germination of seeds represents a high-risk period in the life cycle of many plant species, and the (important adaptation named) "dormancy" acts in preventing germination when the environmental conditions do not remain favourable long enough for seedlings to become established and thus survive (Baskin and Baskin, 2014). Under Mediterranean climate, characterised by a considerable unpredictability of temperature, precipitation and high seasonality with hot dry summers and cold wet winters, seeds belonging to coastal and mountain species may have different requirements for their dormancy release and germination.

In general, seed germination of the typical Mediterranean coastal species occurs in the wet season (mid to late autumn), reaching an optimum at relatively low temperatures (5-15°C; Thanos et al., 1989). Conversely, the Mediterranean mountain species, facing specific environmental and climatic constraints, may need thermal/physiological requirements that usually promote an early spring germination. Over the years, different studies were carried out by the researchers of the Sardinian Germplasm Bank (Porceddu et al., 2017) to quantitatively assess the thermal requirements for seed dormancy release and germination of Mediterranean species. A preliminary analysis of the germination results obtained from Sardinian species, allowed us to identify a general trend from the coastal species, which required short time (< 30 days) for germination being non-dormant or showing physical dormancy (PY), to mountain species, which seeds usually needed long time (> 30 days) to germinate due to the presence of physiological (PD) and morphophysiological dormancy (MPD) up to epicotyl MPD ones. Several of these aspects, specifically the time needed for seed germination and seedling growth from species which present dormant seeds as well as the possibility of failure when studying little-known species, should be taken into consideration during the elaboration of a project idea. Accordingly, in a strategic project management perspective mainly based on plant multiplication through ex situ activities to implement in situ conservation measures, a thorough reasoning should be preventively done by analysing both the species under study and the intervention areas, applying the lessons learned during previous experiences.

**KEY WORDS:** Ex situ conservation; seed dormancy; best germination protocol; native species.

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S2 - In situ plant species conservation: technical aspects, methodology, monitoring

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## S2 - In situ plant species conservation: technical aspects, methodology, monitoring

### **Description**

*In situ* conservation actions in existing plant populations of the Mediterranean region are essential to conserve plant diversity in general, and to enhance the conservation status of threatened and endemic plants in particular.

One of the most relevant approaches is plant translocations (including reintroduction and/or reinforcement), also in conjunction with complementary active management measures such as passive defense measures (e.g. fencing the area where the threatened species/populations occur), eradicating or controlling pest plants, or restoring the natural vegetation within or around the area, thus reconnecting isolated remnants.

It is essential to share experiences across the region to co-develop technical aspects, to refine methodologies and to implement successful *in situ* conservation actions. Mid- and/or long-term monitoring is also fundamental as it ensures the sustainability of *in situ* conservation actions and helps to safeguard threatened Mediterranean flora.

This session will explore existing experiences and knowledge developed in the Mediterranean territories, with a peculiar focus on the insular context. Participants will be invited to share their experiences.

### **Topics to address**

- Successful and unsuccessful *in situ* species conservation actions in the Mediterranean area
- Technical and methodological approaches to *in situ* species conservation actions in the Mediterranean area
- Good practices in the Mediterranean area
- Medium- and/or long-term sustainability of *in situ* conservation actions: monitoring activities (technical and methodological aspects)
- CARE-MEDIFLORA *in situ* project actions and goals (technical aspects) / results / lessons learned / good practices

### **Chair of the session**

Kyrtzios Angelos (Agricultural Research Institute, Cyprus).

### **Co-Chair of the session**

Silvia Pinna (Centro Conservazione Biodiversità, University of Cagliari Sardinia, Italy)

### **Keynote speakers**

Simone Orsenigo (PhD in Experimental Ecology and Geobotany, University of Pavia)  
Professor Vernon Heywood (University of Reading)



## Presentations

	TYPE	Title	Authors	PRESENTER	E_mail
8.30-9.00	Keynote	The challenges of in situ plant conservation in the Mediterranean	Vernon Heywood	Vernon Heywood	<a href="mailto:v.h.heywood@reading.ac.uk">v.h.heywood@reading.ac.uk</a>
9.00-9.30	Keynote	The role of translocations in conservation of wetland-dependent plant species	Orsenigo Simone, Graziano Rossi, Thomas Abeli	Orsenigo Simone	<a href="mailto:simone.orsenigo@unimi.it">simone.orsenigo@unimi.it</a>
9.30-9.42	Short presentation	Contribution of translocations to enhance the conservation status of the threatened Mediterranean island flora: the CARE-MEDIFLORA project	Fenu Giuseppe (on behalf of all CARE-MEDIFLORA project)	Giuseppe Fenu	<a href="mailto:gfenu@unica.it">gfenu@unica.it</a>
9.42-9.54	Short presentation	Invasive alien species in the Mediterranean islands: the CARE-MEDIFLORA project	Gian Pietro Giusso del Galdo (on behalf of all CARE-MEDIFLORA project)	Gian Pietro Giusso del Galdo	<a href="mailto:g.giusso@unict.it">g.giusso@unict.it</a>
9.54-10.05	Short presentation	Continuous monitoring of the threatened flora of Menorca as a source for the creation of long-term management tools	Pere Fraga i Arguimbau	Pere Fraga	<a href="mailto:pere.fraga@gmail.com">pere.fraga@gmail.com</a>
10.05-10.30	Coffee break				
10.30-10.42	Short presentation	In situ conservation of a rare plant ( <i>Dictamnus albus</i> L.) and its pollinator community	Alessandro Fisogni, Gherardo Bogo, Laura Bortolotti, François Massol, Mathilde Dufay, Marta Galloni	Marta Galloni	<a href="mailto:marta.galloni@unibo.it">marta.galloni@unibo.it</a>
10.42-10.54	Short presentation	The importance of monitoring translocations in a long-time period. The case of a hybridization of a narrow endemic species from Balearic Islands, <i>Helosciadium bermejoi</i> .	Juan Rita, Miquel Capó, Joana Cursach	Juan Rita	<a href="mailto:jrita@uib.es">jrita@uib.es</a>
10.54-11.06	Short presentation	An update on translocation activities of the climate relict tree <i>Zelkova sicula</i> (Sicily, Southern Italy)	Giuseppe Garfi, Loredana Abbate, Stéphane Buord, Francesco Carimi, Angela Carra, Caterina Catalano, Laurence Fazan, Catherine Gautier, Alessandro Silvestre Gristina, Gregor Kozłowski, Salvatore Livreri Console, Antonio Motisi, Salvatore Pasta, Giancarlo Perrotta	Giuseppe Garfi	<a href="mailto:giuseppe.garfi@ibbr.cnr.it">giuseppe.garfi@ibbr.cnr.it</a>
11.06-11.18	Short presentation	Assisted reproduction' as a tool in restoration of threatened plant populations	Gargano Domenico	Gargano Domenico	<a href="mailto:domenico.gargano@unical.it">domenico.gargano@unical.it</a>
11:18-11:30	Short presentation	Overgrazing by ungulates affects <i>Euphorbia dendroides</i> L. population stability in Mallorca landscape (Balearic Islands, Spain)	Miquel Capó, Chiara Engelbrecht, Marta Ramoneda, Carles Cardona, Juan Rita, Elena Baraza	Miquel Capó	<a href="mailto:miquelcposervera@gmail.com">miquelcposervera@gmail.com</a>
11.30-12.00	Discussion				

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## S2 - In situ plant species conservation: technical aspects, methodology, monitoring

**TITLE:** The challenges of in situ plant conservation in the Mediterranean

**AUTHORS:** Vernon Heywood\*1

**INSTITUTION:** 1 School of Biological Sciences, University of Reading, UK

**CORRESPONDING AUTHOR:** v.h.heywood@reading.ac.uk

**ABSTRACT:**

The conservation of plant species in the Mediterranean region presents many challenges because of the large number of species in need of conservation action and the lack of suitable facilities and resources in many of the countries concerned. In too many cases, there is undue reliance on the presence of threatened species in protected areas as a means of conservation whereas very often additional management intervention at the species and population level is needed to address the specific threats to which they are subjected. The emphasis should be on persistence not just presence in protected areas. Of course, proper management of protected areas is essential for species recovery and reintroduction strategies but the management of such areas may often need to be adapted to the conservation needs of the threatened species they contain. In addition, it is essential to ensure that a full threat assessment is made of target species so that an effective conservation management may be drawn up and implemented for effective species recovery. There is often a failure in Mediterranean countries to distinguish between species recovery and species reintroduction which are quite distinct approaches although with much in common. Species recovery refers to the procedures whereby species, or targeted populations of species, that have become threatened or endangered, for example through loss of habitat, decrease in population size, or loss of genetic variability, are recovered in their present habitat to a state in which they are able to maintain themselves without further human intervention. The kind of conservation actions required for species recovery will depend on the scale and degree of threat facing them and this will be reflected in the extent of management intervention needed. It is essentially an in situ process although ex situ material is often required for population reinforcement (augmentation). It is multidisciplinary and involves many different actors. Species reintroduction is the deliberate movement (translocation) of individuals of a species to parts of its natural range from which it has been lost with the aim of establishing a new population. While there are obvious advantages of conserving species in protected areas, very many threatened species in the Mediterranean only occur outside such areas and much more effort needs to be paid to addressing the conservation needs of such species. The recently published (May 2018) BGCI and IABG's Species Recovery Manual (Heywood et al., 2018) provides a detailed account of these issues.

**KEY WORDS:** In situ conservation, species recovery

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## S2 - In situ plant species conservation: technical aspects, methodology, monitoring

**TITLE:** The role of translocations in conservation of wetland-dependent plant species

**AUTHORS:** Orsenigo Simone<sup>1</sup>, Graziano Rossi<sup>2</sup>, Thomas Abeli<sup>2</sup>

**INSTITUTION:** 1 Department of Agricultural and Environmental Sciences - Production, Landscape, Agroenergy, University of Milan, Milan, Italy; 2 Department of Earth and Environmental Sciences; University of Pavia, Pavia, Italy

**CORRESPONDING AUTHOR:** [simone.orsenigo@unimi.it](mailto:simone.orsenigo@unimi.it)

### **ABSTRACT:**

The primary aim of any translocation is the restoration of the long-term viable and self-sustaining population of the target species (IUCN 2013). Factors that contribute to success or failure of a translocation project are manifold and distinct (i.e. demography, ecology, genetics, reproductive biology etc.); the partial lack of knowledge even in one of these factors may prevent the success of the intervention. For these reasons, pre-release considerations are crucial for translocation success (Abeli & Dixon 2016, Godefroid et al. 2016). For example, the preliminary evaluation of threats and the possibility of their removal, the genetic structure of source populations or the conditions experienced by individuals during cultivation may affect the performance of plants once released in new sites. Here, some examples of pre-release considerations to reintroduce and to reinforce wetland-dependent plant species in Italy are illustrated. *Stratiotes aloides* (water soldier) is a dioecious keystone species that is declining in its European range. The species, once abundant in the wetlands of North-Eastern Italy, is currently extinct in the wild (EW) in Italy. Only female Italian plants have been saved from extinction in a private nursery. To assess the feasibility of the reintroduction of *Stratiotes aloides* in Italy we investigated the water quality and the genetic diversity in Europe. High concentrations of surface water inorganic nitrogen (especially nitrates) were identified as the likely cause of decline and extinction of *S. aloides*. After a comparison with current sites of occurrence of the species, identified reintroduction sites resulted unsuitable for the release of the species, moreover, the analyses of genetic diversity revealed the presence of different genetic patterns across Eurasia, that make difficult the selection of source populations for the male population. *Kosteletzkya pentacarpos* (seashore mallow) is a perennial halophytic herb listed both in the 92/43/CEE Habitats Directive (Annex II) and in the Bern Convention (Annex I), and is classified in Italy as Critically Endangered (CR) and in Europe as Vulnerable (VU). We evaluated the direct effects of cultivation practices and the maternal effects produced by fertilizer and salt treatments on the performance of seashore mallow in experimental translocations. Results demonstrated that pre-release investigation may be crucial to understand causes of extinction and drive translocation actions, increasing the chances of survival, the performance of translocated plants, and their competitive ability in the recipient community, and last but not least to save time and money.

### **KEY WORDS:**

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## S2 - In situ plant species conservation: technical aspects, methodology, monitoring

**TITLE:** Contribution of translocations to enhance the conservation status of the threatened Mediterranean island flora: the CARE-MEDIFLORA project

**AUTHORS:** Fenu Giuseppe (on behalf of all CARE-MEDIFLORA project)

**INSTITUTION:** CARE-MEDIFLORA project [1 Centre for the Conservation of Biodiversity (CCB), Life and Environmental Sciences Department, University of Cagliari, Viale S. Ignazio da Laconi 13, 09123 Cagliari, Italy.  
2 Hortus Botanicus Karalitanus (HBK), University of Cagliari, Italy]

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### **ABSTRACT:**

Mediterranean islands represent a center of plant diversity featured by an endemic richness rate higher than mainland areas. However, such plant richness is threatened by several physical and biological factors and, consequently, many plants of these islands require urgent protection measures. The CARE-MEDIFLORA project, an initiative implemented by institutions of six Mediterranean islands and the IUCN/SSC Mediterranean Plant Specialist Group with a long lasting experience in the field of plant conservation, work to address both short-term and long-term needs for these threatened plants by implementing specific translocation programs (Fenu et al. 2017). The project promotes the use of ex situ collections to experiment with in situ active actions for threatened island plants since the importance of translocations is particularly relevant when it is part of an integrated ex situ and in situ conservation approach: the tight connection between in situ and ex situ conservation strategies is the emerging tool in the conservation of plant diversity (Cogoni et al. 2013; Volis 2016).

Based on a set of common criteria, a preliminary list of target plants, for which translocation programs were planned, included 167 taxa, mainly selected by the regional responsibility criterion and/or assessed as threatened in the global and/or regional IUCN Red List.

A total of 43 translocations have been implemented in all six islands, focused on plants with different biological cycles and ecological requirements (plants growing in different habitats). Different methodological protocols, which included different origin of the genetic material, type of propagative material (seeds or cuttings) and/or planting methods, were tested. For each translocation a specific mid- and long-term monitoring protocol was planned and implemented in order to ensure its sustainability.

During several meetings in all islands, the different project experiences are shared among partners to co-develop technical aspects, to refine methodologies and to plan successful in situ conservation actions. In order to make the translocations more effective, they were implemented in collaboration with the local and regional authorities, and local stakeholders were actively involved in the monitoring activities.

The CARE-MEDIFLORA project represents the first attempt to develop common strategies and a great opportunity to join and harmonize methods and methodologies focused on threatened plant conservation in unique natural laboratories such as the Mediterranean islands; in addition, the results of the project significantly contribute to the achievement of the GSPC targets in the Mediterranean islands.

**KEY WORDS:** Translocations, threatened plants, Mediterranean Islands, Monitoring activities, in situ conservation

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## S2 - In situ plant species conservation: technical aspects, methodology, monitoring

**TITLE:** Invasive alien species in the Mediterranean islands: the CARE-MEDIFLORA project

**AUTHORS:** Gian Pietro Giusso del Galdo (on behalf of all CARE-MEDIFLORA project)

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### **ABSTRACT:**

Eradication of alien species is globally acknowledged as a key management option for mitigating the impacts caused by biological invasions. The Convention on Biological Diversity (CBD) calls for a hierarchical approach, primarily based on the prevention of unwanted introductions, but considering eradication as the best alternative when prevention fails.

The Mediterranean islands are particularly vulnerable to biological invasions since climatic conditions may favour the establishment of (sub-)tropical plants introduced accidentally or as ornamental species (Turbelin et al. 2017). The Mediterranean Basin could be severely affected by the impacts caused by invasive alien plants, and therefore there is an urgent need to gather, analyse and share lists of invasive alien plants and control options, including eradication strategies and success indicators, as well as to establish priorities for action and management of species pathways in different regions or habitats.

The CARE-MEDIFLORA project, an initiative implemented by institutions of six Mediterranean islands and the IUCN/SSC Mediterranean Plant Specialist Group with a long lasting experience in the field of plant conservation, promote the in situ conservation of the threatened island flora by eradicating or limiting the diffusion of the alien plant species (Fenu et al. 2017).

Several eradication actions were carried out in all islands, often linked to translocation actions. In each island different methodological protocols have been followed, chiefly depending on the alien target species and the local environmental conditions. For each eradication action, a specific mid- and long-term monitoring plan is implemented in order to ensure its sustainability.

During the project meetings carried out in all islands, the different local experiences are shared among partners and local managers in order to highlight criticisms and refine methodologies, information exchange being well recognised as a key component for an effective response to biological invasions.

Management of plant invasions (Early et al. 2016), and particularly eradications, requires a level of public awareness and support; thus, promoting education and increasing public awareness about this issue is particularly relevant.

**KEY WORDS:** Mediterranean islands, invasive alien species, in-situ conservation, eradication, natural habitat restoration

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## S2 - In situ plant species conservation: technical aspects, methodology, monitoring

**TITLE:** Continuous monitoring of the threatened flora of Menorca as a source for the creation of long-term management tools

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### **ABSTRACT:**

The Consell Insular de Menorca has been developing a long-term biodiversity monitoring program for four years, which aims to verify the conservation status of different biological groups. For the threatened flora, this initiative aims to be a continuation of the conservation actions that took place in the framework of three consecutive LIFE Natura projects (Estaún et al., 2015). Using the criteria established by the IUCN an annual assessment of threat category is made. The main objective of this ongoing monitoring is to detect possible worsening of conservation status. It also serves to generate information on the behaviour of taxa and the evolution of threats that affect them. The collected data also is useful to verify if the conservation actions carried out previously have produced positive results. From this information, management actions and tools should be designed to improve the conservation status and to reduce threat category.

Thus, in the 17 endemic taxa evaluated there are significant differences in the evolution of the threat category and the possible causes of this situation. In three taxa, a negative tendency was observed: *Malva minoricensis* (EN), *Rhamnus ludovici-salvatoris* (CR) and *Urtica atrovirens* subsp. *atrovirens* (CR), based on the criteria of population decrease and reduction of distribution area. Habitat alteration is the most important threat for all three and also for the majority of taxa evaluated (85%). The opposite situation occurs in six endemic plants that have met an improvement of threat category: *Anthyllis hystrix*, *Cymbalaria fragilis*, *Femeniasia balearica*, *Limonium fontqueri*, *Vicia bifoliolata* and *Viola stolonifera*, all of them have benefited at some degree from actions for threat control, habitat recovery or knowledge improvement, developed in the framework of the LIFE Natura projects. For threatened non-endemic flora, the set of monitoring taxa is higher (> 60) and the data collected so far also show numerous cases of negative tendency. The information collected is already being used to develop a direct management tool; this consists on the delimitation of sensitive areas for each taxon. It is integrated in a geographic information system (GIS), and will be implemented through its inclusion in the territorial planning of the island (PTI). It will also be accessible for local technicians with responsibilities on land management, agriculture, nature conservation, etc.

**KEY WORDS:** Endangered flora, threat categories, continuous evaluation, management tools

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## S2 - In situ plant species conservation: technical aspects, methodology, monitoring

**TITLE:** In situ conservation of a rare plant (*Dictamnus albus* L.) and its pollinator community

**AUTHORS:** Alessandro Fisogni \*1,2, Gherardo Bogo1,3, Laura Bortolotti3, François Massol2, Mathilde Dufay4, Marta Galloni1

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### **ABSTRACT:**

*Dictamnus albus* L. (dittany) is a long-lived perennial herb, typically found in fringes between xerothermic woodlands and (semi)natural grasslands and in clearings in open oak forests in the southern, warm temperate regions of Europe and Central-Eastern Asia (Hensen & Oberprieler 2005). It becomes increasingly rare towards the Mediterranean area, where it reaches its southern distribution limit and faces different threats, being often locally protected.

An integrated approach was proposed for the in situ conservation of dittany, considering not only habitat requirements but also the interaction with its pollinators (wild bees). From 2011 to 2014 we implemented practical conservation actions through the EU funded Project "PP-ICON" (LIFE09/NAT/IT000212) to restore the ideal habitat of dittany and reinforce the community of its main pollinators, in an isolated population near Bologna (Italy).

To maintain the ecotonal habitat of *D. albus*, two clearings were created in wooded areas, through selective cutting of shrubs and wild trees, and the effects on plant reproductive fitness and population renewal were observed during subsequent monitoring. The main positive result was represented by the increased flowering and seedling occurrence in the artificial clearings.

Based on previous studies on the efficiency of dittany's flower visitors (Fisogni et al. 2016), we performed three related actions to improve the presence of the most efficient pollinators in the area: (i) we provided artificial nests for bumblebees and solitary bees; (ii) we reared and released bumblebee colonies from wild queens collected in the area, and (iii) we added native bee plants to support local populations of pollinators throughout their life cycle (Bortolotti et al. 2016). Artificial nests were occupied at high rates by cavity nesting species such as mason bees, leafcutter bees and carpenter bees, while we did not observe any ground nesting bees. Artificial nests for bumblebees did not attract any wild queens. In three consecutive years we reared and released several colonies of buff-tailed bumblebees, which survived through the flowering season but only one developed new gynes. The bee plants established at different rates: transplanted adult individuals survived better than seeds directly sown at the site. We observed a positive effect of flowering abundance on pollinator visits.

The effects of conservation actions have been checked with periodic monitoring throughout the entire project duration, considering the specific interactions between *D. albus* and its pollinators, as well as the temporal variation of pollination networks in the surrounding of the study population.

**KEY WORDS:** Habitat restoration, plant-pollinator interactions, population dynamics, wild bees, monitoring

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## S2 - In situ plant species conservation: technical aspects, methodology, monitoring

**TITLE:** The importance of monitoring translocations in a long-time period. The case of a hybridization of a narrow endemic species from Balearic Islands, *Helosciadium bermejoi*.

**AUTHORS:** Juan Rita<sup>1</sup>, Miquel Capó<sup>1</sup>, Joana Cursach<sup>1</sup>

**INSTITUTION:** 1 Department of Biology. University of Balearic Island

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### **ABSTRACT:**

Conservation translocations are management techniques commonly used to guarantee the demographic and genetic conservation of threatened species. The IUCN/SSC (2013) considers them a good management for conservation benefits though their success is difficult because of it entails many risks, such as the hybridization with related taxa. *Helosciadium bermejoi* (L. Llorens) Popper and M.F. Watson is a Critically Endangered plant from Menorca (Balearic Islands) which lives in a unique locality of the islands. In order to increase the population and reduce the environmental stochastic threats, three introductions were made in 2008 in different localities of the island with similar habitats. To assess the results of the introductions we monitored the covering area and patches number of natural and introduced subpopulations during 2015 and 2016. Our data show that all the new subpopulations maintain their demographic viability (available data in Rita and Cursach, 2013). Furthermore, in the natural population (Cap Negre) the tendency of the cover area is to increase, especially since 2009. Moreover, in one introduced subpopulation (Mongofre Vell), we detected the convergence of *H. bermejoi* with its related species *Helosciadium nodiflorum* (L.) Koch and some individuals showing intermediate traits. Thus, we proceed to obtain plant material of both species and intermediate forms to execute rDNA ITS and rps6-trnK sequences analysis to confirm a possible hybridization event. The hybrid was confirmed by molecular analysis –formally described as *Helosciadium* × *clandestinum* Rita, Capó & Cursach (Rita et al. 2016)– and the chloroplast sequences indicated bidirectional flux between pollen and ovules. In collaboration with the environmental authority, the introduced subpopulation of Mongofre Vell was eradicated and the hybrid individuals were cultivated in controlled conditions at the experimental greenhouse of the University. From the eradication timing until now (May 2018), *H. bermejoi* did not reappear in Mongofre Vell, but new hybrids were detected probably through asexual propagation. All the new individuals found (only one in 2018) were eradicated. In order to avoid genetic disturbance of the natural subpopulation of *H. nodiflorum* in Mongofre Vell, the continuous monitoring at this location needs to be taken into account. This example illustrates the importance of the long-term monitoring when performing conservation translocations.

**KEY WORDS:** Narrow Endemism, Conservation Translocations, Hybridization, Long-term monitoring



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## S2 - In situ plant species conservation: technical aspects, methodology, monitoring

**TITLE:** An update on translocation activities of the climate relict tree *Zelkova sicula* (Sicily, Southern Italy)

**AUTHORS:** Giuseppe Garfi\*<sup>1</sup>, Loredana Abbate<sup>1</sup>, Stéphane Buord<sup>3</sup>, Francesco Carimi<sup>1</sup>, Angela Carra<sup>1</sup>, Caterina Catalano<sup>1</sup>, Laurence Fazan<sup>4</sup>, Catherine Gautier<sup>3</sup>, Alessandro Silvestre Gristina<sup>1</sup>, Gregor Kozłowski<sup>4,5</sup>, Salvatore Livreri Console<sup>1</sup>, Antonio Motisi<sup>1</sup>, Salvatore Pasta<sup>1,4</sup>, Giancarlo Perrotta<sup>2</sup>

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### **ABSTRACT:**

Several recent studies provide models forecasting the poleward or upslope shift of many habitats as a response to global warming. Accordingly, to colonize suitable environments organisms will need to either migrate or be moved. Assisted colonization, involving intentional moving of species to climatically suitable locations outside their current range, may be an effective approach to mitigate the impact of climate change on biodiversity conservation. *Zelkova sicula*, a rare climate relict tree from Sicily, survived all along its evolutionary history only in isolated enclaves of almost suitable micro-environments surrounded by areas with hostile climate or unsuitable habitats acting as barriers against its dispersal. Therefore, assisted colonization could represent the last resort to secure its survival in the future.

Based on several biogeographical and paleoecological criteria, and taking into account the good growth performances of some plants of *Z. sicula* cultivated under cooler climate, four new pilot sites were selected, three of which located 600-800 m higher than the two known populations. The first translocation activities were started in June 2016 and continued throughout 2017. At present 45/46 plantlets in each site have been planted and the survival rate is almost 100%. A multi-year monitoring has been started in order to evaluate the success through time and the correctness of site selection. Plants are currently healthy and showed an unexpected high growth rate.

**KEY WORDS:** Assisted colonization, clonal plants, endangered species, climate change

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## S2 - In situ plant species conservation: technical aspects, methodology, monitoring

**TITLE:** Assisted reproduction' as a tool in restoration of threatened plant populations

**AUTHORS:** Gargano Domenico\*1

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**ABSTRACT:**

The long-term persistence of small plant populations is often threatened by an array of reproductive constraints, which can include quantitative (i.e. amount of delivered pollen) as well as qualitative (e.g. frequent mating among relatives, enhanced selfing, weak purging, fixation of deleterious mutations) restrictions. Such limitations can result in a progressive loss of offspring amount and viability, which in turn can propel the population into an extinction vortex (Leimu et al. 2006).

In situ conservation measures facilitating immigration from foreign units (i.e. reinforcement) can improve the viability of these threatened populations. Nonetheless, plant reintroduction/reinforcement trials are often unsuccessful, as a possible consequence of maladaptation and outbreeding depression in transplanted plants and their offspring. Moreover, the reproductive benefit induced by translocated plants can also be low if rates of pollinator service remain ineffective in the recipient site. For instance, this can happen when the current habitat structure does not allow the correct functioning of plant biotic interactions (Gargano et al. 2017).

The experimental approach commonly used for studying plant reproductive processes and mating systems (e.g. controlled pollinations, fitness comparison between lineages obtained by different pollination protocols) can substantially help in understanding the origin of the recruitment constraints affecting the target population (e.g. pollen limitation, inbreeding depression), and in overcoming provisional reproductive inefficiency. For instance, assisted interpopulation mating has been proved to induce a significant benefit in plant populations on the brink of extinction (Oakley and Winn 2012), because the immigration of genes from unrelated populations can promote a consistent and long lasting genetic rescue effects in severely depleted units. In addition, such an approach can be more cost-effective than traditional translocations, because a few immigrants may be enough to supply significant genetic variation, and increase viability of severely inbred populations, and translocating pollen can be less onerous than transplanting whole plants.

Unfortunately, in spite of their great potential, fitness analyses after controlled pollinations remain little used in practical conservation frameworks. Here, I would highlight the usefulness of 'assisted reproduction' techniques in plant population restoration, through the evaluation of (at least) three major aspects: 1) effectiveness of pollination processes within target populations, 2) potential for fitness improvement of intra-population assisted mating, and 3) potential for fitness improvement of inter-population assisted mating.

**KEY WORDS:** Experimental pollinations, genetic rescue, plant reproduction, population restoration

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## S2 - In situ plant species conservation: technical aspects, methodology, monitoring

**TITLE:** Overgrazing by ungulates affects *Euphorbia dendroides* L. population stability in Mallorca landscape (Balearic Islands, Spain)

**AUTHORS:** Miquel Capó<sup>1</sup>, Chiara Engelbrecht<sup>2</sup>, Marta Ramoneda<sup>1</sup>, Carles Cardona<sup>1,3</sup>, Juan Rita<sup>1</sup>, Elena Baraza<sup>1</sup>

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### **ABSTRACT:**

The exponential increment of ungulate herbivores in Mallorca landscape during the recent years has supposed significant changes in the vegetation composition. Concretely, in specific places with a high density of herbivores (Alcúdia, Balearic Islands) the population of *E. dendroides* has completely disappeared. To test herbivores influence on the *E. dendroides* population loss, two plantations of *E. dendroides* were executed. One was made in La Victoria, where the level of overgrazing is high. The second was made in Mortitx, where a reduction of ungulates population is being doing by the administration. A total of 96 individuals were planted randomly in each area, half protected by individual fences and half exposed to herbivores. Furthermore, a demographical analysis of twelve populations -with different density of herbivores- around Mallorca and adjacent islets were assessed. Parameters as height, diameter of the plant, diameter of the trunk and flowering percentage were obtained in each population by 3 replicates of 10x10 m plots to characterize all individuals therein using size index (De Cáceres et al. 2013). Our results indicated that the individuals exposed to herbivores in both plantation areas were mostly eaten, despite the percentage of predation was lower where ungulates population control is executed. For the demographical study, populations without goats showed higher density of individuals (from 0.97 to 1.37 individuals per square meter), mostly represented by the juvenile category. In contrast, areas with ungulates illustrated lower values of density (from 0.23 to 0.26 individuals per square meter) and populations were mainly represented by old adults category. Our conclusion in that despite *E. dendroides* can coexist with ungulates herbivory, an uncontrolled increment of herbivores can commit the demographical structure stability and even led to the population disappearance.

**KEY WORDS:** Euphorbiaceae, Mediterranean, Herbivory, Conservation, Demography

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S3 - Ex situ and in situ plant species conservation: collaborations, strategies, communication

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## S3 - Ex situ and in situ plant species conservation: collaborations, strategies, communication

### **Description**

The lack of institutional and political frameworks under which adequate land management choices can be developed and efficiently implemented may hamper the achievement of ex situ and in situ conservation targets. Successful plant conservation depends on effective strategies and collaborations among countries, regions, local administrations, the scientific community, NGOs, and other stakeholders.

In particular, robust national-level programmes that focus on the relationship between ex situ and in situ plant conservation activities are urgently needed. In addition, plant conservation in the Mediterranean would be significantly enhanced through effective dissemination of plant conservation research outcomes, development of local conservation networks to foster long-term co-operation, strengthening of regional networks among Mediterranean countries, and sharing of experiences and lessons learned in different projects.

The session will include one hour dedicated to CEPF and the strategy for plant conservation in Mediterranean Hotspots.

### **Topics to address**

- CARE-MEDIFLORA collaborations, strategies, communication / results / lessons learned / good practices
- Examples of other collaborations, strategies, communications in the Mediterranean

### **Chair of the session**

Giusso Del Galdo Gianpietro (Dept. of Biological, Geological and Environmental Sciences, University of Catania, Sicily, Italy).

### **Co-Chair of the session**

Hugot Laetitia (Conservatoire Botanique National de Corse - Office de l'Environnement de la Corse, France).

### **Keynote speakers**

Frédéric Médail (Professor of plant ecology and biogeography at the Aix-Marseille University).

## Presentations

	TYPE	Title	Authors	PRESENTER	E_mail
13.30-14.00	<b>Keynote</b>	Conservation biogeography, a relevant challenge for plant conservation in the Mediterranean Basin hotspot	Frédéric Médail	Frédéric Médail	frederic.medail@imbe.fr
14.00-14.15	<b>Short presentation</b>	CARE-MEDIFLORA project, experiences with stakeholders and collaborations with administrations and private proprietaries	Magdalena Vicens and Carole Piazza (CARE-MEDIFLORA project)	Vicens M.	mvicens@jardibotanicdesoller.org
14.15-14.30	<b>Short presentation</b>	New tools for plant diversity conservation planning	Joana Magos Brehm, Shelagh Kell, Imke Thormann, Hannes Gaisberger, Ehsan Dulloo and Nigel Maxted	Joana Magos Brehm	joanabrehm@gmail.com
14.30-14.45	<b>Short presentation</b>	Hierarchisation of species and prioritisation of conservation actions: towards a conservation strategy for flora, from biogeographical to regional level	M. Le Berre, K. Diadema, V. Noble, M. Pires, G. Casazza, L. Minuto, M. Mariotti, S. Abdulhak, N. Fort & F. Médail	M. Leberre	m.leberre@cbnmed.fr
14.45-15.00	<b>Short presentation</b>	Plant genetic resources in the Euro-Mediterranean region: building a new collaborative conservation network	Shelagh Kell, Nigel Maxted and Joana Magos Brehm	Shelagh Kell	s.kell@bham.ac.uk
15.00-15.30	<b>Coffee Break</b>				
15.30-15.45	<b>Short presentation</b>	Collaboration between public administrations and research centers: a key element for guarantee the success of translocation actions	Pinna M.S., Cogoni D., Fenu G., Bacchetta G.	Pinna M.S.	m.silviapinna@gmail.com
15.45-16.00	<b>Short presentation</b>	Integrated Conservation Approach in the Moroccan High Atlas	Hassan Rankou, Rachid Ait Babahmad, Soufiane M'Sou, Ugo D'Ambrosio, Emily Caruso & Gary Martin	Hassan Rankou	h.rankou@gmail.com
16.00-16.15	<b>Short presentation</b>	Simaseed Project: Protecting Plant Biodiversity in Sicily - Malta Natura 2000 Sites	A. Cristaudo, J. Buhagiar, G. Perrotta, A. Zammit	Joseph Buhagiar	joseph.buhagiar@um.edu.mt
16.15-16.30	<b>Short presentation</b>	LIFEorchids (LIFE17NAT/IT/000596): a 5- years project for the conservation of orchids and their habitats	Samuele Voyron, Alessandro Portigliatti, Jacopo Calevo, Fernando Monroy, Annalisa Giovannini, Laura Cornara, Paolo Giordani, Alberto Girani, Dario Zocco, Luca Cristaldi, Paola Palazzolo, Simona Colombo, Marzio Marzorati, Jan Moravec, Silvia Perotto, Mariangela Girlanda	Jacopo Calevo	jacopo.calevo@unito.it

	<b>TYPE</b>	<b>Title</b>	<b>Authors</b>	<b>PRESENTER</b>	<b>E_mail</b>
<b>16.30-16.45</b>	<b>Short presentation</b>	An update on the in situ conservation of <i>Zelkova abelicea</i> in Crete	L. Fazan, D. Ghosn, I. Remoundou, P. Gotsiou, P. Sklavaki, H. Kargiolaki, E. Flouris, E. Siligardos, P. Petrakis, C. Thanos, G. Garfi, G. Kozlowski, S. Pasta	Salvatore Pasta	salvatorepasta45@gmail.com
<b>16.45-17.00</b>	<b>Session closure</b>				

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## S3 - Ex situ and in situ plant species conservation: collaborations, strategies, communication

**TITLE:** Conservation biogeography, a relevant challenge for plant conservation in the Mediterranean Basin hotspot

**AUTHORS:** Frédéric Médail

**INSTITUTION:** Aix Marseille Université, Institut Méditerranéen de Biodiversité et d'Ecologie marine et continentale (IMBE), UMR AMU, CNRS, IRD, UAPV. Technopôle de l'Environnement Arbois-Méditerranée, BP 80, 13545 Aix-en-Provence cedex 04, France

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### **ABSTRACT:**

Conservationists should better consider the biogeographic dimension of biodiversity by developing trans-national actions of conservation biogeography defined as the «Application of biogeographical principles, theories, and analyses, being those concerned with the distributional dynamics of taxa individually and collectively, to problems concerning the conservation of biodiversity» (Whittaker et al., 2005).

In the Mediterranean Basin Hotspot (MBH), one of the 36 terrestrial biodiversity hotspots of the world, the complicated historical biogeography and the profound environmental heterogeneity explain the high diversity of landscapes, vegetation types and plants. These floras are characterized by the persistence of unique and relictual elements mainly located in refugia, but also by taxa originating from more recent diversification events.

In this context, the framework of conservation biogeography of plants within the Mediterranean Basin Hotspot should encompass several key topics: (i) to perform a global and comprehensive taxonomical index and a biogeographical regionalization of the MBH, in order to properly compare diversities' levels and biotic originalities between the various administrative and biogeographical entities; (ii) to develop species distribution modelling including key processes (persistence, dispersal, or range expansion), models of community dynamics and of population viability, and the diverse facets (taxonomic, evolutionary, functional) of biodiversity; (iii) to develop studies of genetic diversity structure using phylogeographical inference for defining conservation units of rare and vulnerable plants; (iv) to better estimate current and future extinction rates, notably for narrow endemic taxa, at the global (EX taxa) and regional (RE taxa) levels; (v) to identify more rigorously biodiversity hotspots at different spatial scales and for the different facets of diversity; (vi) to increase systematic conservation planning using explicit conservation targets, in order to develop a robust and complementary network of protected areas and to identify the most vulnerable and irreplaceable sites.

Most of these tasks should be performed on the global biogeographical scale of the Mediterranean Basin Hotspot and on the regional scale (biogeographical provinces or sectors, regional biodiversity hotspots).

Cooperative networks between stakeholders should be also implemented, notably between the European conservationists and those from the Southern and Eastern parts of the Mediterranean Basin.

### **KEY WORDS:**



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## S3 - Ex situ and in situ plant species conservation: collaborations, strategies, communication

**TITLE:** CARE-MEDIFLORA project, experiences with stakeholders and collaborations with administrations and private proprietaries

**AUTHORS:** Magdalena Vicens\*1 and Carole Piazza2 (on behalf of all CARE-MEDIFLORA project)

**INSTITUTION:** CARE-MEDIFLORA project [1. Jardí Botanic de Sóller, Mallorca, Balearic Islands, Spain  
2. Office de l'Environnement de la Corse - Conservatoire Botanique National de la Corse, France]

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### **ABSTRACT:**

Mediterranean islands plants are threatened by several physical and biological factors and, consequently, several plants of these islands require urgent protection measures. Although the number of researchers has increased rapidly in the last years, few effective conservation actions have been carried out on the threatened Mediterranean flora. Among other reasons, this situation is due to the fact that to realize an in situ conservation action, several actors must be involved (e.g. researchers, managers, stakeholders, public authorities, etc.).

The main objective of the CARE-MEDIFLORA project, an initiative implemented by institutions of six Mediterranean islands and the IUCN/SSC Mediterranean Plant Specialist Group with a long lasting experience in the field of plant conservation, is to promote in situ conservation actions for some threatened island plants (Fenu et al. 2017).

Different authorizations are needed in the different project islands for the implementation of works in situ depending on the legal status for each land in each country as well as the status of the institution that intends to do the in situ action.

The ex situ collections data and skills of the partners of CARE-MEDIFLORA has been essential to carry out the in situ actions, but the contact with stakeholders and involved institutions or persons on the land has also been essential. When the project ends, in December 2018, the information transferred to the local actors and the training of the managers carried out will be very important to guarantee the sustainability of the actions. Examples will be given of how the CARE-MEDIFLORA team has worked in close cooperation with foresters, scientists, conservationists, landscape managers, private companies, national and local administrations, etc. tackling some important cases of collaborations and agreements and also the contacts with the local GSPC focal points to contribute to national reports for targets 5, 7 and 8

### **KEY WORDS:**

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## S3 - Ex situ and in situ plant species conservation: collaborations, strategies, communication

**TITLE:** New tools for plant diversity conservation planning

**AUTHORS:** Joana Magos Brehm\*<sup>1</sup>, Shelagh Kell<sup>1</sup>, Imke Thormann<sup>2</sup>, Hannes Gaisberger<sup>2</sup>, Ehsan Dulloo<sup>2</sup> and Nigel Maxted<sup>1</sup>

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### **ABSTRACT:**

Conservation planning is an essential step if we are to effectively conserve plant diversity. Crop wild relatives (CWR) are wild plant species specifically valuable for being a source of traits for crop improvement due to their genetic proximity to crops. They are vital to ensure food, nutrition and economic security. The development of National Strategic Action Plans (NSAPs) for the conservation and sustainable use of CWR is an effective means of setting out a coordinated, systematic and integrated approach to the in situ and ex situ conservation of a country's CWR diversity. In the context of the SADC Crop Wild Relatives project (<http://www.cropwildrelatives.org/sadc-cwr-project/>) we developed five tools to guide and facilitate countries in CWR national conservation planning as well as in their NSAP development. The tools are: the 'Interactive Toolkit for CWR Conservation Planning', a 'Template for the Preparation of a NSAP for the Conservation and Sustainable Use of CWR', a 'Template for the Preparation of a Technical Background Document for a NSAP for the Conservation and Sustainable Use of CWR', a 'CWR Checklist and Inventory Data Template' and an 'Occurrence Data Collation Template'. These tools have been prepared for CWR but can be used with other wild plant groups and to plan their conservation in any country. In this presentation, we briefly explain what these tools are, how they were developed, how they can be used and where they can be found.

**KEY WORDS:** Conservation planning, Crop wild relatives, Ex situ, In situ, National Strategic Action Plans

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## S3 - Ex situ and in situ plant species conservation: collaborations, strategies, communication

**TITLE:** Hierarchisation of species and prioritisation of conservation actions: towards a conservation strategy for flora, from biogeographical to regional level

**AUTHORS:** M. Le Berre\*<sup>1</sup>, K. Diadema<sup>1</sup>, V. Noble<sup>1</sup>, M. Pires<sup>1</sup>, G. Casazza<sup>2</sup>, L. Minuto<sup>2</sup>, M. Mariotti<sup>2</sup>, S. Abdulhak<sup>3</sup>, N. Fort<sup>3</sup> & F. Médail<sup>4</sup>

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### ABSTRACT:

The Maritime and Ligurian Alps, located at the interface between the Alps and the Mediterranean region, are one of the regional biodiversity hotspots of the Mediterranean basin. Biodiversity hotspots are areas where exceptional concentrations of endemic species undergo exceptional loss of habitat. In fact, many low altitude species are critically threatened of extinction because of the population increase and tourism boom. Refuge areas, containing a great biodiversity, are also threatened by human impacts because they are submitted to heavy pressures. Many of these endemic species have very restricted distribution areas shared between two countries, France and Italy. Most conservation actions are funded at the national or regional level; however, in most cases this doesn't match species distribution. Moreover, resources are usually too limited to implement conservation actions for all species. This is why a hierarchisation of species and a prioritisation of their conservation actions are required, at both cross-border (or biogeographical) and administrative scales. The strategy we propose here can be synthesised in four steps: (1) to list and hierarchise species; (2) to list the different management projects; (3) to prioritise management projects; and (4) to choose a set of projects to implement. A hierarchisation of species was carried out according to three criteria: biogeographical rarity, local rarity and threats. This last criterion included two sub-criteria, habitat vulnerability and artificialisation. This hierarchisation enabled us to classify species into four conservation concerns: very high, high, medium and low. Then, a management project is assigned to each very high or high conservation concern species according to several criteria. The efficiency of each project is then assessed in terms of costs, benefits and likelihood of success. Finally, we choose a set of projects to implement, according to their efficiency, but also according to available financial and human resources, legislation, and other contextual factors. This strategy should enable us to head resources towards species which need them the most and towards projects with a high success probability.

**KEY WORDS:** Conservation priorities, threatened flora, endemic flora, biogeography, conservation strategy

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## S3 – Ex situ and in situ plant species conservation: collaborations, strategies, communication

**TITLE:** Plant genetic resources in the Euro-Mediterranean region: building a new collaborative conservation network

**AUTHORS:** Shelagh Kell\*, Nigel Maxted and Joana Magos Brehm

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### **ABSTRACT:**

The Euro-Mediterranean region is important for its diversity of crop species and their wild relatives—including several cereals and legumes (e.g., wheat, oat, chickpea, lentil, pea and faba bean), fodder and forage crops (e.g., lucerne, white clover and sugarbeet), and many vegetables, fruits, nuts, herbs and oils (e.g., brassicas, lettuce, grape, almond, pistachio, sage and olive). Local varieties of crops (or landraces) and populations of crop wild relatives (CWR) are essential for food, nutrition and economic security, both due to their importance for farmers and local communities and as sources of genetic diversity for crop improvement. This diversity is of particular value as insurance against the impacts of global change, while at the same time being threatened by the same impacts. These include: loss, modification or fragmentation of natural habitats; intensive and unsustainable farming practices; the wide-ranging impacts of climate change on the environment; and the cultivation of modern cultivars to the exclusion of local crop varieties. To increase food production sustainably in the face of these challenges requires significant additional plant diversity beyond that currently conserved ex situ. To achieve this, strategies for systematic in situ conservation of these plant genetic resources (PGR) need to be implemented throughout the region. The EU-funded project, 'Farmer's Pride' ([www.farmerspride.eu](http://www.farmerspride.eu)) is meeting this challenge by establishing a network for in situ conservation of PGR that brings together stakeholders and sites across the region and coordinates actions to conserve diversity for crop enhancement and adaptation in the future. As part of this work we are: a) defining and promoting best practices for the management of plant diversity in wild and cultivated populations; b) showcasing how in situ and ex situ conservation actions can be effectively integrated; c) creating tools to manage the complex information associated with in situ conservation; d) engaging with plant breeders, farmers and other PGR users to identify the most important traits to meet future agricultural and market needs; e) undertaking analyses to predict which populations are most likely to contain these traits; f) creating an infrastructure to promote and facilitate access to in situ conserved diversity; g) building stronger and long-lasting local, national and international seed networks; h) investigating the suitability of the current policy environment to support the governance structure of the network; i) identifying cost-effective strategies and policies to improve PGR conservation and use in the region; and j) establishing a dialogue to communicate our recommendations to policy-makers.

**KEY WORDS:** Plant genetic resources, In / ex situ conservation, Conservation networks, Crop improvement, Food security

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## S3 - Ex situ and in situ plant species conservation: collaborations, strategies, communication

**TITLE:** Collaboration between public administrations and research centers: a key element for guarantee the success of translocation actions

**AUTHORS:** Pinna M.S.\*1, Cogoni D.1, Fenu G1, Bacchetta G1,2

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### **ABSTRACT:**

To prevent the extinction risk of known threatened species and to improve their conservation status, translocation actions became increasingly important in management worldwide. However, this represents only an ideal scenario although it is not often practicable (Godefroid et al. 2011), since many limits remain in the implementation of these conservation actions, such as the high economic and time costs, the availability of the optimal sites, the difficulties in the implementation of these actions on private areas and the high uncertainty of success mainly connected to natural stochastic events. Therefore, considering all these limitations, it is necessary to involve the skills of several institutions that contribute (each with own expertise) to the translocation actions. In particular, the collaboration between public administrations and research centres, although sometimes complicated, could represent an optimal solution to solve several criticisms related to the translocation actions.

A good example of this collaboration was the translocation program of *Dianthus morisianus* carried out in Sardinia. *Dianthus morisianus* is an endemic and highly threatened perennial herb which only grows in a single population on the Portixeddu coastal dune system (South-West Sardinia). The translocation program, started ten years ago, was implemented in collaboration between the University of Cagliari, for the scientific aspects and the ex situ plant multiplication, and the Forestas Agency, the public administration responsible of the management of the site where the natural population grows.

The program included three different translocation actions carried out in different sites near to the wild population, and followed by the erection of protective fences (Cogoni et al. 2013; Fenu et al. 2017). The results of these combined actions were relevant and the collaboration between the two institutions involved helped to minimize the economic costs of the program.

A successful translocation requires special and long-lasting efforts which conflict with the usually limited amount of available financial and human resources, therefore reintroduction efforts cannot succeed without the participation of public administrations.

We believe that this reintroduction project provides a model for the reintroduction of other threatened species in Sardinia and, more widely, in the Mediterranean area.

**KEY WORDS:** Conservation actions, *Dianthus morisianus*, Mediterranean islands, threatened species, translocations

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## S3 – Ex situ and in situ plant species conservation: collaborations, strategies, communication

**TITLE:** Integrated Conservation Approach in the Moroccan High Atlas

**AUTHORS:** Hassan Rankou<sup>1,2</sup>, Rachid Ait Babahmad<sup>1,2</sup>, Soufiane M'Sou<sup>1,2</sup>, Ugo D'Ambrosio<sup>1</sup>, Emily Caruso<sup>1</sup> & Gary Martin<sup>1</sup>

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### **ABSTRACT:**

Global Diversity Foundation and Mediterranean Biodiversity and Livelihoods Association address current conservation and development challenges in one of the Mediterranean biodiversity hotspots, the Moroccan High Atlas. We have developed an integrated in situ-ex situ conservation approach that combines research and action to address the interconnected threats to biodiversity loss from climate change, water mismanagement, plant overharvesting, overgrazing, market integration and the loss of indigenous conservation practices. Our integrated conservation approach embraces a number of innovative techniques and research methods from both the social and the natural sciences, and is founded on community participation and a collaborative action-research process. The integrated in situ and ex situ conservation actions comprise the establishment and management of community herbaria, seed banks and nurseries to conserve and produce endemic, useful and threatened plants for enrichment planting, reintroduction to the wild and distribution to local communities to reduce the pressure of plant overcollection from the wild. These actions are supported by participatory action research on cultural practices of conservation and communal landscape governance and management; capacity-building across scales; and the promotion of community leadership to ensure the programme's sustainability. In order to implement this integrated approach, we engage with national, regional and local authorities, communities and their representatives and cooperatives, research institutions, and non-governmental organisations. This is a challenging process as we navigate complex bureaucracies, historical mistrust and occasionally a limiting policy environment. We also actively share and disseminate learned lessons, challenges and outcomes of this integrated approach via a multi-pronged dissemination strategy: locally through biocultural diversity fairs, local media and community meetings and workshops; nationally through the organisation of and participation in workshops, meetings and policy-making processes; and internationally through participation in conferences, publications and Web 2.0 media. As participants in a regional partnership for cultural landscapes, we contribute to a nascent campaign that brings public attention to people-nature relationships and how they continue to sustain the iconic Mediterranean landscapes and biodiversity. Our presentation discusses challenges, opportunities and lessons learned in the creation of this integrated programme, merging ex situ and in situ approaches, and establishing and maintaining the multiscale partnership that ensures its success. We also describe our efforts to devise communication and collaboration strategies that are community-centred and ensure broad engagement and interest.

**KEY WORDS:** integrated conservation, in situ conservation, ex situ conservation, participatory action, biodiversity threats, dissemination strategy.

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## S3 – Ex situ and in situ plant species conservation: collaborations, strategies, communication

**TITLE:** Simaseed Project: Protecting Plant Biodiversity in Sicily - Malta Natura 2000 Sites

**AUTHORS:** A. Cristaudo<sup>1</sup>, J. Buhagiar<sup>2</sup>, G. Perrotta<sup>3</sup>, A. Zammit<sup>4</sup>

**INSTITUTION:** 1 Dipartimento di Scienze Biologiche, Geologiche e Ambientali, Università di Catania, Italy.

2 Department of Biology & Argotti Botanic Gardens and Resource Centre, University of Malta.

3 Dipartimento Regionale Sviluppo Rurale e Territoriale. Servizio per il territorio di Siracusa, Italy.

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### **ABSTRACT:**

SiMaSeed is a transborder project funded under INTERREG V IT-MT with an operational budget of 1.88 million euros and has as its main aim the protection of plant biodiversity in Malta and Sicily Natura 2000 sites. The project forms part of the Programme's Priority Axis III – preserving and protecting the environment and promoting resource efficiency. Objective 3.1 specifically deals with efforts that contribute towards the arrest of the loss of terrestrial and marine biodiversity in the area, maintain and reactivate the ecosystem and protected areas such as Natura 2000 sites. SiMaSeed has four partners, with the University of Catania (DSBGA - Dipartimento di Scienze Biologiche, Geologiche e Ambientali) as project leader while Argotti Botanic Gardens and Resource Centre (ABGRC) of the University of Malta, the Germplasm Center of Marianelli (DRSRT - Dipartimento Regionale Sviluppo Rurale e Territoriale, Regione Siciliana) and the Ministry of Gozo are partners.

The Mediterranean basin represents a hotspot of biodiversity with many species being lost or on the brink of extinction. The Island of Malta is home to over 1100 vascular plant species, while Sicily has over 3000 vascular plant species, with about 20% being endemic. However, both Islands are presently sharing environmental (fragile habitats and overexploitation of natural resources) and policy concerns arising from inadequate land management practices. The need to find and share common strategies and interventions to arrest the biodiversity loss led to SiMaSeed. It proposes a combined approach of conservation strategies: “ex situ” with renovation and technological upgrading of existing Seed Banks in Sicily and in Malta and the creation of a new Seed Bank in Gozo thus ensuring long-term storage under controlled conditions (based on agreed and shared protocols); and “in situ” with the population reinforcement in pilot sites within habitats of Natura 2000 network. This will contribute to arresting loss of biodiversity and promoting a transborder sustainable development, thus going beyond the limits that the two methods offer if used separately.

The most ambitious part of the SiMaSeed project seeks to carry out scientific studies on how to reduce the loss of important but endangered plant species from selected Natural 2000 sites in Malta and Sicily through in situ conservation. This will help to reinforce plant populations of rare and endangered species by growing plants in nurseries that will then be used for habitat restoration and reinforcement. Two partners are each involved in the production of 20,000 plants that will be planted out in Natura 2000 sites in Malta and Sicily as part of reinforcement and site rehabilitation efforts. This will help to bridge the gap between ex situ and in situ conservation strategies. The project will also assist in cooperation with other entities both in Malta and Sicily to improve scientific understanding and promote greater awareness and education on the use of native plants in habitat restoration, landscaping and nursery practice.

### **KEY WORDS:**

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## S3 - Ex situ and in situ plant species conservation: collaborations, strategies, communication

**TITLE:** An update on the in situ conservation of *Zelkova abelicea* in Crete

**AUTHORS:** L. Fazan<sup>1</sup>, D. Ghosn<sup>2</sup>, I. Remoundou<sup>2</sup>, P. Gotsiou<sup>3</sup>, P. Sklavaki<sup>4</sup>, H. Kargiolaki<sup>5</sup>, E. Flouris<sup>6</sup>, E. Siligardos<sup>7</sup>, P. Petrakis<sup>8</sup>, C. Thanos<sup>9</sup>, G. Garfi<sup>10</sup>, G. Kozłowski<sup>1,11</sup>, S. Pasta\*<sup>1</sup>

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### ABSTRACT:

The *Zelkova abelicea* conservation project ([www.abelitsia.gr](http://www.abelitsia.gr)) is a participatory effort between the CIHEAM-Mediterranean Agronomic Institute of Chania, the University of Fribourg Switzerland and the four Forest Directorates of Crete (Chania, Rethymno, Iraklio and Lassithi), with scientific support from the National Kapodistrian University of Athens, the Italian National Council of Research and the Hellenic Agricultural Organization - Demetra, Institute of Mediterranean Ecosystems. The overall objective of this project is to support the long-term conservation of *Z. abelicea* in Crete by coupling in situ and ex situ conservation actions with communication and outreach activities. During the last decades, pastoral activities have drastically changed on Crete, with an increase in animal numbers and a cessation of traditional seasonal transhumance practices leading to strong (over)browsing and (over)grazing of mountain vegetation. The most important threat to this Cretan endemic tree species is overbrowsing by goats and trampling by flocks of sheep and goats. *Z. abelicea* is protected by the Greek legislation (Presidential Decree 67/1981) forbidding the use of any plant parts, browsing included. All forested areas where it grows are legally considered public land belonging to the Greek state. However, due to the lack of a regional official cadaster regulating land property and use, conflicts with local stakeholders and users (e.g. shepherds) exist and can strongly hamper conservation actions. This particular issue turned to be the most important challenge for an effective in situ conservation of *Z. abelicea* and its plant community. One of the reasons behind the current success of the project is that for the first time in Crete, the conservation of *Z. abelicea* led to an intense collaboration and exchange between scientific institutions (both local and international) and the regional forest directorates who are responsible for forest management and conservation. This cooperation is crucial not only for immediate conservation goals but also to ensure the long-term success of conservation efforts. Furthermore, localized and regular public awareness activities triggered the involvement of local communities and stakeholders through the transfer of knowledge about the species and the project. On-going monitoring activities point out that the response of *Z. abelicea* to the removal of browsing pressure is not uniform at a species and community level. Abiotic factors such as climate and soil characteristics might also play a substantial role in growth responses in some areas. Nevertheless, *Z. abelicea* always



shows a better growth performance when browsing is removed, although significant differences occur along its distribution range.

**KEY WORDS:** *Zelkova abelicea*, in situ conservation, over-browsing, Crete

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## S3 - Ex situ and in situ plant species conservation: collaborations, strategies, communication

**TITLE:** LIFEorchids (LIFE17NAT/IT/000596): a 5-years project for the conservation of orchids and their habitats

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### ABSTRACT:

Orchid-rich semi-natural grasslands (such as habitat 6210\*, assigned to habitat E1.2a Semi-dry perennial calcareous grassland), present in almost the entire European continent, are among the most species-rich plant communities in Europe and contain a large number of rare and endangered species, thus bearing high nature conservation importance. Such grasslands are currently among the most threatened plant communities in Europe, due to their inherent sensitivity to land use changes (Calaciura, Spinelli 2008). The long-term preservation of these orchid communities cannot be achieved without the application of measures aimed at stabilizing the environments that host them. However, the reinforcement of declining orchid populations and the reintroduction of native orchid species that have previously disappeared from the target area(s) additionally require a specific approach complying with the unique biology of these plants.

The strategic objective of the project (which involves Italian and Czech beneficiaries) is to apply best practices to develop an ad hoc approach, based on the combination of rehabilitation of degraded orchid habitats, reinforcement/reintroduction of selected orchid species and implementation of the land stewardship approach, to strengthen and secure orchid-rich grassland habitats, with a focus on habitat 6210\* (ISPRA; Rossi et al. 2013). Specific aims are: 1) to expand the surface area of the target habitat in two different geographic and ecological contexts in Northwestern Italy (the Regional Park of Portofino in Liguria and the Regional Park of Po and Orba in Piedmont) by selective shrub-clearing, tree cutting, elimination of invasive alien species and sowing of typical species, as well as implementation of land stewardship in adjacent areas; 2) to undertake orchid reinforcement and reintroduction in both Parks; 3) to establish within both Parks "orchid micro-reserves" (OMRs) given over to long-term monitoring of orchids and associated vegetation types (Kadis et al. 2013); 4) to provide enduring protection of orchid communities in the project areas through management, land purchase and land stewardship; 5) to transfer the project solutions in other European regions (Czech Republic); 6) to draw up ad hoc propagation protocols for nine endangered orchid species; 7) to encourage other European stakeholders to use the techniques and methods demonstrated in the project; 8) to increase community awareness and public engagement on the importance of the target habitats, SCIs and local orchid species, in both Italy and the Czech Republic.

**KEY WORDS:** Orchid conservation, LIFE project, Habitat restoration

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S4 - Science for action: Mapping tools to incorporate plant data into decision tools for management

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## S4 - Science for action: Mapping tools to incorporate plant data into decision tools for management

### **Description**

This session will explore how to translate plant information (species, populations, habitats, threats...) into concrete plant conservation actions, or plant conservation planning.

Plant information at site level is often dispersed, unavailable, or out-of-date. In addition, translating existing wild plant information into decision-making is not a straightforward process. This session will gather examples from around the Mediterranean where the results of field survey studies or other plant data may successfully translate into site-based conservation actions.

The session will explore in more detail how mapping tools can provide managers with the means to transform plant data into useful formats. It will explore possible avenues for collaboration between scientists and decision-makers at site level, with a view to developing conservation policies and site-based actions involving local populations.

Stories and case studies of coordination between managers, scientists, and communities or local users will be presented, and different types of tools developed around the region will be explored.

### **Chair of the session**

Marcos Valderrabano (IUCN Med)

### **Keynote speakers**

John D. Thompson (CNRS, Centre d'Ecologie Fonctionnelle et Evolutive, Montpellier, France).

## Presentations

	TYPE	Title	Authors	PRESENTER	E_mail
8:30-8:40	Introduction	Presentation of session objectives (Marcos Valderrabano and John Thompson)			
8:40-9:20	Keynote	Towards a process-based conservation strategy for Mediterranean plant diversity	John Thompson	John Thompson	john.thompson@cefe.cnrs.fr
9:20-9:30	Short presentation	Geospatial analysis to assess distribution patterns of the critically endangered species <i>Euphorbia fontqueriana</i> Greuter	Joana Cursach, Antoni Josep Far, Maurici Ruiz	Joana Cursach	joana.cursach@uib.es
9:30-9:35	Introduction to terra lemnia Project	Introduction to terra lemnia Project		Georges Dimitropoulos	
9:35-9:45	Short presentation	Humans, landscapes and plant diversity - first results from the Terra Lemnia project on Lemnos island (North Aegean, Greece)	Maria Panitsa, Erwin Bergmeier, Stefan Meyer, Penelope Bebeli, Danae Sfakianou, Nicos Georgiadis, George Dimitropoulos	Maria Panitsa	mpanitsa@upatras.gr
9:45-9:55	Short presentation	Segetal plant diversity on Lemnos Island (Greece) - status quo and implications for conservation efforts within the TerraLemnia-project	Stefan Meyer, Erwin Bergmeier, Maria Panitsa, Danae Sfakianou, Nicos Georgiadis, George Dimitropoulos	Stefan Meyer	smeyer1@gwdg.de
10:00-10:30	Coffe break				
10:30-10:40	Short presentation	Classifying the changes in vegetated Mediterranean coastland of South-eastern Europe using new approach of remote sensing analysis for modelling vegetated land change dynamics: A case study of Albania, Bosnia and Hercegovina, Croatia, Montenegro and Slovenia	Kuenda Laze	Kuenda Laze	m1.laze@outlook.com
10:40-10:50	Short presentation	Conservation of Lebanese Coastal Plants: Mission Impossible?	Mohammad S. Al-Zein, Hicham Elzein, Jean Stephan, Magda Bou Dagher-Kharrat, Carla Khater	Mohammad S. Al-Zein	ma73@aub.edu.lb
10:50-11:00	Short presentation	Diachronic cartography within an Important Plant Area : case study of Mount Chenoua (Tipasa, Algeria). Methodological approach and preliminary results.	Nassima Souyad , Roger Manière et Nassima Yahi	Nassima Yahi	nyahi@hotmail.fr
10:50-11:00	Short presentation	Implementing GIS tools to analyse geospatial distribution factors to the reproductive success of sexual deceptive orchids: <i>Ophrys balearica</i> P. Delforge as an example	Joshua Borràs, Joana Cursach	Joshua Borràs	joshua.rieraborras@gmail.com
11:00-11:10	Short presentation	Assessing the conservation status of Monocots in the Mediterranean region: reflections from a recent IUCN Red List evaluation	Errol Vêla, David Allen, Violeta Barrios, Richard Lansdown, and Catherine	Errol Vela	errol.vela@cirad.fr
11:10-12:30		Questions posed by the speakers followed by a General discussion			

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## S4 - Science for action: Mapping tools to incorporate plant data into decision tools for management

**TITLE:** Towards a process-based conservation strategy for Mediterranean plant diversity

**AUTHORS:** John Thompson

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**ABSTRACT:**

In this talk I will discuss and present examples of two main themes that cross the science - action interface. First I will focus on the development of arguments for the integration of knowledge on ecological and evolutionary processes into plant conservation management in relation to an ever-increasing human footprint. The here is the need to conserve evolutionary potential and the processes of ecological adaptation will be illustrated by examples of monitoring studies, spatial assessments of vulnerability, the development of protocols for reintroduction of impacted populations, fine-scaled studies of the ecological niche, and the assessments of sites of hybridization and ongoing diversification. Second, I present the conceptual basis and illustrate the application of the notion of ecological solidarity to the production of strategy and action for conservation management of protected areas and their surrounding territory. This notion emphasises the need to conserve the processes that underlie ecological and socio-ecological interdependencies.

**KEY WORDS:**

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## S4 - Science for action: Mapping tools to incorporate plant data into decision tools for management

**TITLE:** Geospatial analysis to assess distribution patterns of the critically endangered species *Euphorbia fontqueriana* Greuter

**AUTHORS:** Joana Cursach<sup>1</sup>, Antoni Josep Far<sup>1</sup>, Maurici Ruiz<sup>2</sup>

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### **ABSTRACT:**

*Euphorbia fontqueriana* Greuter is a narrow endemic species from Mallorca Island (western Mediterranean basin) that just occurs in a single location in the Serra de Tramuntana, a protected region catalogued as Cultural Landscape and declared as World Heritage by UNESCO. The species is Critically Endangered on the Red List Spanish Vascular Flora, and it is protected by law. It is a perennial rhizomatous herb, with branches about 10 cm in length; it blooms in mid spring and disperses seeds in early summer. It occurs in clearing of mountain scrubs and stony dry slopes, in an area with difficult access (circa 2 hours on foot and 500 m of altitude difference) but very crowded by hikers. Unfortunately, the demographic status of the natural population and many basic aspects of the biology of the species, such as the reproductive biology, remains unknown. Geographic information technologies are very useful tools for the analysis and management of biodiversity. In this study, spatial distribution analysis tools (Maxent software) have been supported with spatial statistics tools (Geoda) to improve the knowledge of the ecology of this species and its relation with environment variables. The individuals of the species have been georeferenced integrally using differential GPS. In addition, a set of environmental variables of the zone have been collected, including topography (based on LIDAR data) and derived variables (orientation, insolation, roughness, hydrological connectivity, etc.), as well as information related to the habitat (NDVI, NWDI) and anthropic impacts. The patterns of spatial autocorrelation in the distribution of the species have been analysed using Global and Local Moran's indexes to detect level of concentration of the individuals. Likewise, the bivariate autocorrelation relationships with the different environmental variables considered have been analysed. In addition, a prediction model of the presence of the species has been generated (Maxent model) for a wider area of the Serra de Tramuntana that can serve as an instrument to support the expansion and growth of the population. The results of the study can be checked through an on-line cartographic viewer that has been created to support research and conservation tasks. The interdisciplinary work carried out constitutes a pioneering experience in the management of endemic plant species in the Balearic Islands, whose results are relevant at a methodological and experimental level. The experience could be exported to other areas.

**KEY WORDS:** Mallorca Island, Narrow Endemism, Threatened Species, Autocorrelation Analysis

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## S4 - Science for action: Mapping tools to incorporate plant data into decision tools for management

**TITLE:** Humans, landscapes and plant diversity – first results from the Terra Lemnia project on Lemnos island (North Aegean, Greece)

**AUTHORS:** Maria Panitsa\*<sup>1</sup>, Erwin Bergmeier<sup>2</sup>, Stefan Meyer<sup>2</sup>, Penelope Bebeli<sup>3</sup>, Danae Sfakianou<sup>4</sup>, Nicos Georgiadis<sup>4</sup>, George Dimitropoulos<sup>4</sup>

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### **ABSTRACT:**

The island of Lemnos (North Aegean, Greece) may be assigned high-level ecological value and habitat diversity, despite its vascular plant flora of currently known 756 taxa (Panitsa et al., 2003; Thomas et al., 2012) being rather low compared to other Aegean islands of comparable size. While this is probably due to the lesser geomorphological diversity and low altitude of the island, by far the majority of plant species are known to occur in human-made pastoral, arable and ruderal habitats. As elsewhere in the Mediterranean, humans have actually (re-) engineered the Aegean ecosystems, modifying both plant and animal composition and landscape structure (through settlement, cultivation, animal husbandry, exploitation, etc.), (Sfenthourakis & Triantis 2017). The Terra Lemnia project seeks to develop scientifically solid and socio-economic viable guidelines for biodiversity-friendly well-adjusted low-input farming methods in Lemnos, focusing on good practices customary in the island. Terra Lemnia approaches this by surveying representative agro-pastoral areas and by assessing positive and negative impacts of different land use practices on biodiversity. A focus is on rare plant species and species indicators for land-use intensity and conservation status of habitat types.

In 2018, collection of biodiversity baseline data on agropastoral lands of selected areas, including farmlands and rangelands of the Natura 2000 site "Chortarolimni, wider area of Lake Alyki and Fakos Peninsula", not only augmented significantly the number of plant species recorded on the island but also revealed distinct biodiversity patterns brought about by land abandonment, pastoral and arable intensification, continuity and land-use change.

**KEY WORDS:** Biodiversity, Aegean, indicator species, cultural landscape, conservation



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## S4 - Science for action: Mapping tools to incorporate plant data into decision tools for management

**TITLE:** Vegetal plant diversity on Lemnos Island (Greece) – status quo and implications for conservation efforts within the TerraLemnia-project

**AUTHORS:** Stefan Meyer\*<sup>1</sup>, Erwin Bergmeier<sup>1</sup>, Maria Panitsa<sup>2</sup>, Danae Sfakianou<sup>3</sup>, Nicos Georgiadis<sup>3</sup>, George Dimitropoulos<sup>3</sup>

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### **ABSTRACT:**

Since millennia, civilizations have interacted with the exceptionally high biodiversity in the Mediterranean. Cultural history and land use development are interdependent. Arable farming is closely linked with the history of the Mediterranean cultural landscape (Halstead 2000). More than other Aegean islands, Lemnos (North Aegean, Greece) with its extensive fertile plains has been a focus of arable farming since historic times and was an important part of the so-called “grain-route” across the Aegean (Braund 2007). The arable landscapes of Lemnos combine high ecological and cultural history value but are endangered by intensification and gradual replacement of sustainable land use practices. This, combined with land abandonment and aggravated by the effects of global change, have resulted in locally severe land degradation, compromising the functionality of the island’s cultural landscape ecosystems. Segetal plants (accompanying annual crops), rapidly vanishing due to arable farming intensification all over Europe, are excellent bioindicators for the type and intensity of arable farming (Bergmeier & Strid 2014). As they occur with viable populations on Lemnos, one of the aims of the Terra Lemnia project, supported by the MAVA foundation, has been to record the segetal plant diversity of the island.

During a spring 2018 survey, we recorded 49 arable field interiors (100 m<sup>2</sup>) in five different study areas with paired plots of contrasting management encountered on the island (e.g. sprayed vs. non-sprayed cereals, winter cereals vs. winter legumes, use of local varieties vs. non-local varieties).

Not surprising, diversity in non-sprayed cereal fields was higher than on sprayed fields. Local farmers often use mixtures of mainly local varieties of cereals to improve the yield and quality for animal fodder. Each year some of the fields are used for the production of own crop seeds and it is on those fields where species adapted to the traditional re-seeding of grains, such as *Agrostemma githago* or *Lolium temulentum*, were found. The use of foreign sowing grain involves the risk for the farmers of introducing foreign weeds like *Alopecurus myosuroides*.

Fieldwork showed that biodiversity-friendly low-input farming methods such as already practiced in Lemnos today, may also be economically viable. As farmers have acknowledged this, there is room for optimism that the diversity of Lemnian agroecosystems can be maintained and even enhanced.

**KEY WORDS:** Agrobiodiversity, agroecosystem, arable plants, indicator species, management techniques

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## S4 - Science for action: Mapping tools to incorporate plant data into decision tools for management

**TITLE:** The priceless role of collaborative networks for monitoring plant diversity

**AUTHORS:** María B García\*1, Manuel Pizarro1, Pablo Tejero1, Jose Luis Silva1, Daniel Gómez1

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**ABSTRACT:**

Biodiversity faces the largest risk ever recorded, and new approaches are needed to deal with such a huge problem. The fast development of technical devices allows scientists to monitor environmental variables associated to biodiversity changes, whereas the biological inventoring carried out by traditional botanists fades as a consequence of scientific specialization. The "human infrastructure", however, seems necessary when the goal is to assess the effects of global changes on overall biodiversity. As part of a LIFE project designed to evaluate the conservation status of plants and habitats of Community Interest, and other research projects focused on threatened or indicator species and populations at the limit of distribution, we have launched and promoted different actions to arrange a network of experts and non-experts volunteers and rangers. On the one hand, they keep assisting with the prospection of new populations in order to better determine species distribution and occurrence, contributing significantly to the enlargement of the herbarium. This kind of contribution can now be improved and accelerated with the use of specific apps for smartphones. On the other hand, participants monitor plant abundance within populations as a first alert of species decline or habitat deterioration, according to the novel program "Adopt a plant". In this study we quantify and assess the role of participants for improving the knowledge of the distribution area of plant species and their dynamics in two ways: 1) by analyzing the amount of records and percentage provided by volunteers since the '50s, out of about 600.000 records stored in our database, and 2) by calculating the number of fieldwork days they spent recording plant density within permanent areas over the last five years, in order to estimate population growth trends. Altogether, our results clearly show that the contribution of non-scientists is not only important, but irreplaceable if we want to deal with the challenge of biodiversity loss.

**KEY WORDS:** Citizen science, vulnerability, species distribution, threatened plants, population trends, LTER: long-term ecological research

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## S4 - Science for action: Mapping tools to incorporate plant data into decision tools for management

**TITLE:** Classifying the changes in vegetated Mediterranean coastland of South-eastern Europe using new approach of remote sensing analysis for modelling vegetated land change dynamics: A case study of Albania, Bosnia and Hercegovina, Croatia, Montenegro and Slovenia

**AUTHORS:** Kuenda Laze\*1

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### **ABSTRACT:**

The low-lying coastal areas are threatened by unsustainable use as well as by the future climate change consequences based on the findings of the International Panel of Climate Change (IPCC). There are studies on the changes in forest cover for some Eastern Mediterranean countries and the effects of these changes on the (animal) species habitats. Due to data availability, forest types were partly included in these studies. Yet, the changes in land cover and use on coastal surface is occurring in many parts of Southeastern Mediterranean countries. Also, the changes in coastal areas may indeed require good estimation studies at local level to uncover regional diversity of the changes in land cover and ecosystem. Much can be learned by inferring the effects of the decision-making on land in the past. The aim is to understand the changes in vegetated land on coastal surface at regional level by retrieving spatial data from remote sensing using new approach by reducing errors in data processed. These spatial data will be used for the spatially explicit analysis to define factors that plausibly explain spatial and temporal changes of vegetated land in the Mediterranean coastal study region in South-eastern Europe including Albania, Bosnia and Hercegovina, Croatia, and Montenegro and Slovenia. An innovative integrated database will be composed of remote sensing data that may be grouped into bio-physical, socioeconomic and policy data. These data will be analysed using well-established regression-based modelling to explain spatial and temporal landscape dynamics from roughly 1970 to 2018. The expected main result is a new methodological approach of remote sensing spatial data analysis. It is aimed to classify vegetated land into the natural vegetation, urban vegetation and vegetated-agricultural land use reducing errors in data. The findings will serve to understand the effects of land management and land use on the changes in vegetated land-use on coastal surfaces which can be investigated as potential biodiversity metrics in terms of plants and forests. Variables of this study can then be used for the plant conservation and decision-making of land management on the coastal areas for the study area.

**KEY WORDS:** Coast, data error, decision-making, Eastern Mediterranean countries, vegetation

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## S4 - Science for action: Mapping tools to incorporate plant data into decision tools for management

**TITLE:** Conservation of Lebanese Coastal Plants: Mission Impossible?

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### **ABSTRACT:**

The Lebanese coast (ca. 220 km) is home to more than 550 plant species, of which only three (*Limonium mousterdei*, *L. postii* and *Matthiola crassifolia*) are national endemics. Despite the designation of two coastal nature reserves (Tyre Coast and Palm Islands Nature Reserves) and at least five coastal Important Plant Areas (IPAs), and despite national strategies and action plans, much of the coast's vegetation remains to be conserved. Conservation of coastal plants is hindered by the absence of a revised and updated checklist of the country's flora, a national Red List, and a nationally accepted classification of habitats and ecosystems. Moreover, the increasing demand on un-built natural, semi-natural and disturbed areas, coupled with limited funding, makes in situ conservation efforts along the coast practically very difficult, even next to impossible. In this study, we generate and analyze a revised and updated list of the Lebanese coastal flora based on Post (1932), Mouterde (1966-1984), Hepper and Zahreddine (2000) and Tohme and Tohme (2015; updated in MOE/GEF 2016) and ongoing fieldwork. We also generate, for the first time at the national level, a classification system for coastal ecosystems and habitats inspired by the European Nature Information System (EUNIS) habitat classification, and produce a list for terrestrial coastal habitats. We then revisit coastal plant conservation in the light of this updated list of species and habitats, as well as red listed coastal plant species, assessing existing, and proposing new in situ and ex situ strategies and approaches. These approaches advocate, in addition to collaboration among the different stakeholders, a major shift from red listing and conserving species to red listing and conserving ecosystems.

**KEY WORDS:** Habitat classification, red listing, coastal vegetation, conservation strategies

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## S4 - Science for action: Mapping tools to incorporate plant data into decision tools for management

**TITLE:** Diachronic cartography within an Important Plant Area : case study of Mount Chenoua (Tipasa, Algeria). Methodological approach and preliminary results.

**AUTHORS:** Nassima Souyada<sup>1</sup> , Roger Manière<sup>2</sup> et Nassima Yah<sup>1</sup>

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### **ABSTRACT:**

Habitat conservation is a pivotal challenge in nature conservation. Working in Important Plant Areas (IPAs) for the management of species recognized as a priority for conservation and considering these IPAs as a territorial management tool for the administrations and users concerned means :

- the identification of the selected species concerned by this problematic, their precise location in the field and their ecological characterization;
- the establishment of a typology to describe the habitats where these species are likely to develop;
- the choice of levels of perception and data adapted to the problem pursued in all its dimensions.

An original methodological approach for mapping multi-scalar natural habitats (regional, local and focal) likely to be applied to ZIPs (Manière, 2017) is being tested on Mount Chenoua, a coastal mount of the Tellien Atlas located west of Algiers, extending over approximately 8,000 ha and culminating at 905m above sea level. This mountain is classified Important Zone for Plants (Yah et al., 2010) and protected area by the Ministry of the Environment since 2017. The pressures are numerous (tourist overcrowding, pollution, fires).

The cartographic approach adopted has a twofold objective: to identify and map natural and semi-natural habitats using the Quantum Gis software and to carry out a diachronic mapping of the vegetation based on the comparison of current images with the vegetation map of Negre (1964) established for the Tipasa region at the scale of 1: 50,000.

The diachronic results aim to highlight the effect of the pressures on the vegetation for more than five decades and thus reveal the modifications made on the landscape.

The proposed habitat map is based on ecological mapping methods. It is conceived as an ecological synthesis map where are grouped the main biotic and abiotic environmental variables, archived as rasters and vectors in the GIS and delimiting homogeneous zones.

### **KEY WORDS:**

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## S4 - Science for action: Mapping tools to incorporate plant data into decision tools for management

**TITLE:** Implementing GIS tools to analyse geospatial distribution factors to the reproductive success of sexual deceptive orchids: *Ophrys balearica* P. Delforge as an example

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### **ABSTRACT:**

Reproductive success in sexual deceptive orchids is extremely low, such as 10% of fruit set (Vandewoestijne et al., 2009). *Ophrys balearica* P. Delforge, an endemic species from the Balearic Islands, could be a good model for implementing GIS tools in sexual deceptive orchids; in particular, for a non-autogamous species with a single species, as is the case of *O. balearica* (Paulus & Gack, 1990). In this study, we tested the effects of population (patch geometry, population density and size) and individual (nearest neighbour distance and plant position) parameters on male (pollinia removal rate) and female fitness (fruit set). Seven populations distributed in Mallorca, that comprise between 18 and 329 individuals, were studied during two consecutive years (2017-2018). Individuals from each population were georeferenced integrally using differential GPS. Relative position within the population and density grid (from 1×1 m to 10×10 m cells) were obtained using QGIS.

Results showed no correlation between population size and mean population fruit set (p-value = 0.586). Results from 2017 in the largest population (data from 2018 are not available yet due to species phenology) showed that male fitness is driven by position of flower stalks within the population. Concretely, where peripheral and intermediate plants show a significantly higher pollinia removal rate (14.34% and 9.4%, respectively, against 3.32% in the central; residual deviance = 83.46, p-value < 0.001). Meanwhile, female fitness is driven by density grid within the population, specifically, in cells of 7×7 m that contains 1-22 plants per cell. Results showed that cells with 1-10 plants had significantly higher fruit set than cells high-density plants (22.40-15.04% and 5.50-0%, respectively; residual deviance = 108.83, p-value < 0.001). Consequently, the whole population works as a pollinator attraction for pollinia removal and chances of female success increase in low-medium density cells.

Analysing geospatial distribution factors to the reproductive success using GIS tools could enhance positive results in situ conservation actions. For this species, if pollinia removal rate is within normal values and fruit set is low, the conservation effort should focus on improving optimal density in cells. However, if pollinia removal rate is low, conservation actions in overall attraction of pollinator should be prioritized by increasing peripheral population density. Thus, management priority should be considered in the most critical stages of pollination service.

**KEY WORDS:** Orchidaceae, Mediterranean, Balearic Islands, Sexual Deception, Species-Specific Pollinator

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## S4 - Science for action: Mapping tools to incorporate plant data into decision tools for management

**TITLE:** Assessing the conservation status of Monocots in the Mediterranean region: reflections from a recent IUCN Red List evaluation

**AUTHORS:** Errol Véla\*1, David Allen2, Violeta Barrios3, Richard Lansdown4, and Catherine Numa3

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### **ABSTRACT:**

The current Red List assessment of Mediterranean plants aims to assess all endemic and near-endemic monocotyledon taxa of the Mediterranean Basin Hotspot, in order to identify those that are threatened with extinction. Currently, more than 350 species or subspecies have been assessed (including almost 150 orchids), while hundreds of synonyms were considered! Several difficulties were encountered and confronted, including problems of nomenclature, taxonomy, chorology, biology, ecology and field data. The choice of a taxonomic reference was strongly debated. We avoided this unsolvable question by adopting a fluctuant taxonomy adapted both to our field knowledge and the conservation issues. In particular, for the genus *Ophrys* we dealt with taxonomic uncertainty and their consequences, we proposed solutions and examined the consequences for conservation strategies. Data heterogeneity or deficiency (lack of quantitative data, lack of historical data, lack of global knowledge and lack of biological data) frequently made it difficult to apply the IUCN Red List Categories and Criteria. Some specific questions arose about functional biology and the resilience capacities of Orchids (e.g. severe fragmentation, overgrazing, forest fires and climatic change). We also collected feedback from other groups of Monocots and perspectives for assessment of dicots in the future.

### **KEY WORDS:**

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S5 - Disruptive ethnobotany in blasted landscapes: rethinking people-plant relationships in the Mediterranean

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## S5 - Disruptive ethnobotany in blasted landscapes: rethinking people-plant relationships in the Mediterranean

### **Description**

This session will facilitate transdisciplinary reflection and dialogue on the relationships between people and plants in the context of Mediterranean Cultural Landscapes. Lying at the intersection of vastly different cultures and biomes, the Mediterranean has long been a space characterised by movement and change. Here, people-plant relationships - and the landscapes in which they are embedded - are continuously being transformed by migrations, natural and cultural cross-pollinations, human and natural disasters and the innovations that blossom in this fertile ground. As these transformations accelerate in a context of rapid socioecological change, we are pressed to find new ways of coping with our precarious and indeterminate environmental futures.

The session brings the conservation sciences into dialogue with emerging social scientific concepts that 'disrupt' our binary perspective of nature as separate from culture. In doing so, it hopes to find new spaces for creative and joint reflection on how to conserve Mediterranean plants in rapidly changing landscapes. In particular, it will explore how we can harness the dynamic, active and reciprocal relationships that exist between people and plants in the Mediterranean to sustain existing community conservation initiatives and to build innovative plant conservation actions across the region.

The session will be composed of 8 Pecha Kucha talks followed by an interactive dialogue session.

### **Topics to address**

- Changing relationships between people and plants
- Transformation, loss and maintenance of traditional plant knowledge
- Agrobiodiversity and seed conservation
- Community-based conservation initiatives and their diversity
- Innovative approaches to plant conservation, particularly in the context of rapid environmental change

### **Chair of the session**

Emily Caruso (Global Diversity Foundation, Director).

### **Co-Chair of the session**

Ugo D'Ambrosio (Global Diversity Foundation, Mediterranean Programme Ethnobiology Director).

### **Keynote speakers**

Gary Martin (Global Diversity Foundation, Lead Consultant).

## Presentations

	TYPE	Title	Authors	PRESENTER	E_mail
13.30-14.00	<b>Keynote</b>	Zaatar and zaitra: a parable of disruption and rewilding in Moroccan cultural landscapes	Gary Martin	Gary Martin	<a href="mailto:gmartingdf@gmail.com">gmartingdf@gmail.com</a>
14.00-14.15	<b>Short presentation</b>	What's the point of talking about flowers?	Hub Members: Attard Everaldo, Gerada Mario, Pisani Maria, Radmilli Rachel Hub Researchers: Cutajar Simone, Lippi Simiona Hub Collaborations: Caruana Censu, Caruana Joseph, Farrugia Pyt	Mario Gerada	<a href="mailto:mariogerada@gmail.com">mariogerada@gmail.com</a>
14.15-14.30	<b>Short presentation</b>	Local knowledge on uses and the ecological sustainability of wild medicinal plant harvesting: a case study on Lemnos island, Greece	Papageorgiou Dimitrios, Schunko Christoph	Papageorgiou Dimitrios	<a href="mailto:jimpap.geo@hotmail.com">jimpap.geo@hotmail.com</a>
14.30-14.45	<b>Short presentation</b>	Ethnobotanical knowledge in the High Atlas: potential for plant biodiversity conservation	Ugo D'Ambrosio, Irene Teixidor-Toneu, Hajar Salamat, Soufiane M'Sou, Hamid Ait Baskad, Fadma Ait Illigh, Touda Atyah, Giada Bellia, Abdeddaim El Hajjam, Hafida Mouhdach, Hassan Rankou, Emily Caruso & Gary J.Martin	Hajar Salamat	<a href="mailto:ugo@global-diversity.org">ugo@global-diversity.org</a>
14.45-15.00	<b>Short presentation</b>	Conserving and managing local seed crops biodiversity in Sicily: towards functional community seed banks	Cristina Salmeri	Cristina Salmeri	<a href="mailto:cristinamaria.salmeri@unipa.it">cristinamaria.salmeri@unipa.it</a>
15.00-15.30	<b>COFFEE BREAK</b>				
15.30-15.45	<b>Short presentation</b>	Functional seed traits of wild edible East Mediterranean plants	Pablo Gómez-Barreiro, Efsio Mattana, Khaled Abulaila, Joelle Breidy, Nizar Hani, Michiel van Slageren, Elinor Breman, Udayangani Liu, Tiziana Cossu, Santiago Vilanova Navarro, Tiziana Ulian	Pablo Gómez-Barreiro	<a href="mailto:p.gomez@kew.org">p.gomez@kew.org</a>
15.45-16.00	<b>Short presentation</b>	Conservation of traditional knowledge on wild plants, despite the vanishing of their natural habitats: the case of central spanish wetlands	Segundo Ríos, Alonso Verde, José Fajardo, Vicente Consuegra, Diego Rivera, Concepción Obón, Francisco Alcaraz, Vanessa Martínez-Francés, Arturo Valdés, José Reyes, Estela Barroso, Luis San Joaquín, José García, P. Pablo Ferrer- Gallego & Emilio Laguna.	Segundo Ríos (Presenta Emilio Laguna)	<a href="mailto:s.rios@ua.es">s.rios@ua.es</a>
16.00-16.15	<b>Short presentation</b>	Plant species translocation in Mediterranean: lessons from the Antiquity on the meaning and value of the alien species	Pietro Minissale	Pietro Minissale	<a href="mailto:p.minissale@unict.it">p.minissale@unict.it</a>
16.15-16.30	<b>Short presentation</b>	A quantitative tool to assess local preference for the conservation of Important Plant Areas (IPA): a case study of Sannine-Kneyses IPA in Lebanon	Salman, M.M., S.N. Talhouk, S. Kharroubi, and M. Itani	M. Salman	<a href="mailto:ntsalma@aub.edu.lb">ntsalma@aub.edu.lb</a>
16.30-17.00	<b>SESSION CLOSURE</b>				

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## S5 - Disruptive ethnobotany in blasted landscapes: rethinking people-plant relationships in the Mediterranean

**TITLE:** What's the point of talking about flowers?

**AUTHORS:** Hub Members: Attard Everaldo, Gerada Mario, Pisani Maria, Radmilli Rachel  
Hub Researchers: Cutajar Simone, Lippi Simiona  
Hub Collaborations: Caruana Censu, Caruana Joseph, Farrugia Pyt

**INSTITUTION:** Institution: The National Hub for Ethnobotanical Research (an entity within The Presidents Foundation for the Wellbeing of Society)

**CORRESPONDING AUTHOR:** mariogerada@gmail.com

### **ABSTRACT:**

What's the point of talking about flowers with asylum seekers and refugees, when many are languishing in open centres and can't figure out how to make ends meet? What's the point of looking at Monastic cloisters, when gardens in Urban settings are being destroyed, to be replaced by more towering apartments that keep the economy going? What is the point of trying to safeguard heirloom seeds, when growing cultural vegetables is neither profitable nor responding to a market demand, and when it is so much easier and cheaper to import food? What is the point of investing in ethnobotany at all?

The Hub is an initiative of the President's Foundation for the Wellbeing of Society, that believes that people and their relationships matter. What matters more for us are people who are living on the margins of society, or issues which lie at the sidelines of political agendas. We focus on minority narratives and try to bring them to the forefront of the discussion.

While relationships are essential for people to thrive, our way of life keeps disconnecting us from those we love, from our natural environment, from the food we eat, from our spirituality, from who we are.

The Hub chose ethnobotany as a means to investigate relationships and wellbeing because we believe that people have a deep connection with the natural environment, and plants play a key role in our lives and relationships. Human life is dependent on plant life, while plants may also contribute to our sense of joy, happiness and towards our need for beauty and connection to the natural world.

At the Hub we often ask, who is being excluded? Whose voice is not being heard? Whose voice do we need to add to the table? Why are those excluded, being excluded?

While at the Hub we valorize the importance of plant conservation we tend to focus on the human dimension around conservation issues. We don't only look at plants through the conservation lens but focus more on the place they occupy within human relationships and cultures, and ask why some plants, seeds or traditions were lost and are no longer part of the fabric of human relationships. We try to figure out the changes that took place, changes that bring with them loss of biodiversity and cultural identit(ies). At the Hub, we are trying to revive interest in renewing some of those relationships and traditions that had meaning and that might remind us of who we are, and of where we are coming from: people living on a small semi-arid island in the middle of the Mediterranean sea, a crossroad of cultures, traditions and human experiences.

**KEY WORDS:** Narrative, Ethnobotany, Marginalisation, Island, Relationships

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## S5 - Disruptive ethnobotany in blasted landscapes: rethinking people-plant relationships in the Mediterranean

**TITLE:** Local knowledge on uses and the ecological sustainability of wild medicinal plant harvesting: a case study on Lemnos island, Greece

**AUTHORS:** Papageorgiou Dimitrios\*, Schunko Christoph

**INSTITUTION:** 1 University of Natural Resources and Life Sciences, Vienna

**CORRESPONDING AUTHOR:** jimpap.geo@hotmail.com

### **ABSTRACT:**

The countries surrounding the Mediterranean basin show a rich biocultural diversity and remarkable endurance of traditional plant knowledge. Medicinal plants are an integral part of a variety of cultures in the region and have been used to prevent or treat health problems since ancient times. Wild gathered medicinal plant species are still a fundamental element of ethnopharmacology and ethnomedicine all around the basin. However, overexploitation, unsustainable harvesting practices, intensive agricultural systems, industrialization, urbanization, tourism, and other types of commercial development have resulted in the extraction of large volumes of medicinal flora and degradation of its natural habitats. Meanwhile, local knowledge related to the uses and harvesting practices of these plants is diminishing, taking away valuable information on the long-living sustainable management systems for such resources. Lemnos, a Greek island of the northeastern Aegean Sea with high ecological value landscapes has been chosen as one of the four pilot sites for investigation under the Outcome M6 Mediterranean Strategy. The initiative, created by the MAVA Foundation, deals with the loss of biodiversity by abandonment of cultural practices. This master thesis is conducted under the umbrella of this project and focuses on the wild medicinal plants of the island. The aim of the study is to document the local knowledge on wild harvesting and utilization of these plants. Also, to identify elements of ecological and environmental awareness, as part of this knowledge, that relate to an ecologically sustainable harvesting approach.

Semi-structured interviews are conducted with local gatherers. The interviewees are chosen through snowball sampling with an intention to approach the knowledgeable harvesters of the island. Each interviewed person states the medicinal plants he/she collects and provides detailed information on uses and harvesting practices of the most commonly used medicinal plant species. The retrieved data is catalogued with scientific and vernacular names of the harvested species, plant parts utilized, therapeutic uses and preparation methods. The harvesting practices are evaluated based on their compliance under the attributes of an ecologically sustainable harvest.

**KEY WORDS:** Local knowledge, medicinal plants, wild harvesting, ecological sustainability, Mediterranean

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## S5 - Disruptive ethnobotany in blasted landscapes: rethinking people-plant relationships in the Mediterranean

**TITLE:** Ethnobotanical knowledge in the High Atlas: potential for plant biodiversity conservation

**AUTHORS:** Ugo D'Ambrosio\*<sup>1,2,+</sup>, Irene Teixidor-Toneu<sup>1,5,+</sup>, Hajar Salamat<sup>1,3</sup>, Soufiane M'Sou<sup>1,3</sup>, Hamid Ait Baskad<sup>3</sup>, Fadma Ait Illigh<sup>3</sup>, Touda Atyah<sup>3</sup>, Giada Bellia<sup>4</sup>, Abdeddaim El Hajjam<sup>1,3</sup>, Hafida Mouhdach<sup>3</sup>, Hassan Rankou<sup>1,3</sup>, Emily Caruso<sup>1</sup> & Gary J.Martin<sup>1</sup>

**INSTITUTION:** 1 Global Diversity Foundation (GDF), Canterbury, UK  
2 Etnobiofic Research Group- Universitat de Barcelona and Institut Botànic de Barcelona (CSIC-ICUB), Barcelona, Spain  
3 Moroccan Biodiversity and Livelihoods Association (MBLA), Marrakech, Morocco  
4 Independent researcher, Italy  
5 Natural History Museum, University of Oslo, Norway

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### **ABSTRACT:**

Conservation programs in the Mediterranean are progressively incorporating the participation of local communities and their traditional ecological knowledge (Brooks et al. 2012). New multi-stakeholder approaches that combine 'classic' conservation with innovative bottom-up strategies are emerging (Drew & Henne 2006). Global Diversity Foundation and Moroccan Biodiversity and Livelihoods Association have built a participatory action-research High Atlas Cultural Landscapes program with members of rural Amazigh communities and partner institutions that exemplifies this integrated approach. With this presentation, we share results from our ethnobotanical action-research, their relevance for plant and landscape conservation in the region and some proposals for sustaining plant-people relationships in the High Atlas in a changing world.

A mixed-methods participatory approach was used to collect and analyze ethnobotanical data, producing a database with over 300 interviews in two rural communes: Ait M'hamed and Imegdale. In total, 192 species were reported in both sites belonging to 65 botanical families, and up to over 4000 use reports, with a slightly higher diversity and quantity in Imegdale. The most common uses for these plants are as medicine, food and fodder. The high number and diversity of use reports documented shows the current vitality and relevance of environmental knowledge, practices and beliefs for local livelihoods and wellbeing. Most useful species are common, with the exception of *Quercus ilex*, which was more common in the past. Many of them are plants structurally important in shaping local landscapes.

Recently, traditional crafts have been significantly transformed, and other types of plant uses show abandonment to varying degrees. To maintain the transmission of this knowledge and associated practices, tailored actions are planned in collaboration with partner communities. This participatory action research focuses on innovating approaches that nurture people-plant relationships. Our programme supports local valorization of these cultural practices of conservation through dialogue, skill-sharing and capacity-building; focus groups to understand change; the development of locally-owned processes to commercialise plant products; creation and local management of community seed banks; community exchanges where seeds, knowhow and resource management innovations are shared; biocultural diversity fairs to celebrate local knowledge, recipes and agrobiodiversity and needs-based integrated capacity-building and pedagogical processes. The continued participation and growing enthusiasm of community members, who bring their knowledge and specific needs to the programme, enhances biocultural conservation in the short, medium and long-terms. As our programme seeks to promote local resilience, ensuring innovative and inclusive adaptation to social, cultural and environmental change, fieldwork challenges are being dealt through an adaptive co-management process.

**KEY WORDS:** Ethnobotany, knowledge-practice-belief systems, High Atlas, biocultural conservation, participatory methodologies

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## S5 - Disruptive ethnobotany in blasted landscapes: rethinking people-plant relationships in the Mediterranean

**TITLE:** Conserving and managing local seed crops biodiversity in Sicily: towards functional community seed banks

**AUTHORS:** Cristina Salmeri

**INSTITUTION:** Department of Biological, Chemical and Pharmaceutical Sciences and Technologies, University of Palermo, Italy

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### **ABSTRACT:**

The potential value of traditional local varieties and the genetic diversity of the wild relatives of domesticated crops is a key concept in prospecting adequate strategies for in-situ and ex-situ conservation plans applied to the safeguard, improvement and sustainable use of plant genetic resources.

Local crop varieties are integral part of the plant genetic diversity, which resulted from human selection and management, as well as natural processes of evolution; they constitute an important heritage made up of "biological value", "economic benefits" and "historical knowledge" strictly linked to the territorial identity[1].

In fact, adaptation to specific soil types and climatic conditions, peculiar agro-techniques, qualitative and aesthetical preferences, geographical isolation and cultural distinctiveness of growing areas have acted in the selection of old exclusive local landraces and cultivars, often associated to circumscribed sub-regional sites (even a valley or some close villages).

The Italian agro-biodiversity patrimony has been quoted among the richest ones in the world. In this context, Sicily plays a chief role due to the occurrence of numerous local ecotypes, expression of specific climatic and environmental conditions, as well as of very peculiar traditions and culture, which risk to be lost and displaced by modern commercialized varieties[2]. Despite an increased attention and several conservation projects, the knowledge about the levels of such diversity still needs a coordinate scientific work with the aim of cataloguing, characterizing and managing the existing germplasm at regional scale.

Here comes from the need of programs and specific actions for a better and wider seed organization and management, also aimed to supply companies directed towards qualitative productions focused on the enhancement of regional autochthonous germplasm, and provide an inventory of local smallholder farmers. Actually, for a long time the conservation of local cultivars was carried out exclusively by local farmers, who have assured to pass this heritage on to next generations. To this regards, for instance, noteworthy are the activities promoted by the Mts. Nebrodes Regional Park (NE Sicily) for the conservation, valorization and propagation of local agro-biodiversity and CWRs, with special attention to old varieties of fruit-trees and vegetable crops, including a core collection with 65 common bean landraces. A fully equipped seed bank and spread collection fields preserve both seed accessions and living plants, with the main goal of creating a "functional community seed bank"[3] that brings together farmers, plant breeders, researchers, gene-bank curators and other stakeholders to ensure for future valuable local genetic resources.

**KEY WORDS:** Agro-biodiversity, community seed bank, conservation, local landraces, Sicily

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## S5 - Disruptive ethnobotany in blasted landscapes: rethinking people-plant relationships in the Mediterranean

**TITLE:** Functional seed traits of wild edible East Mediterranean plants

**AUTHORS:** Pablo Gómez-Barreiro\*1, Efsio Mattana1, Khaled Abulaila2, Joelle Breidy3, Nizar Hani4, Michiel van Slageren1, Elinor Breman1, Udayangani Liu1, Tiziana Cossu1, Santiago Vilanova Navarro5, Tiziana Ulian1

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### **ABSTRACT:**

Enclosed in the eastern side of the Mediterranean Sea, the Levant region is known as one of the cradles of civilization, partly due to the high plant diversity of this area, which is still providing its habitants with food, medicines and material. The geographical variability of the area ranges from coastal landscapes up to high mountainous systems, shaping the region into different geoclimatic areas with a high presence of endemic species. However, unsustainable population growth, geopolitically driven mass migration, fires and climate change are a threat to these species, and their loss could endanger the livelihoods of rural communities in the region. In order to conserve and promote the sustainable use of plants from this region, the Royal Botanic Gardens, Kew (RBG Kew), through the Millennium Seed Bank Partnership (MSBP), has collaborated since 2001 with the National Center for Agricultural Research and Extension in Jordan and the Lebanese Agricultural Research Institute. To date, this partnership has yielded ex-situ collections of 2,553 accessions comprising 662 taxa (including species, subspecies and varieties) from Jordan and 964 taxa from Lebanon (with 262 taxa collected in both countries), representing a total of 90 families. At least one traditional material or non-material use has been identified for 45% of the banked species, including several medicinal and edible plants. Species adapted to similar geoclimatic regions usually develop similar strategies, and seed germination traits are not an exception. Our investigation intends to characterise the seed biology and germination traits of useful plants from Jordan and Lebanon stored at the Millennium Seed Bank (RBG Kew), with a special focus on wild edible species from the traditional Mediterranean diet, in order to support their ex-situ and in-country conservation along with its sustainable use by the rural communities of the East Mediterranean region.

**KEY WORDS:** Ex situ conservation, Jordan, Lebanon, Mediterranean diet, useful plants

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## S5 - Disruptive ethnobotany in blasted landscapes: rethinking people-plant relationships in the Mediterranean

**TITLE:** Conservation of traditional knowledge on wild plants, despite the vanishing of their natural habitats: the case of central Spanish wetlands

**AUTHORS:** Segundo Ríos<sup>1</sup>, Alonso Verde<sup>2</sup>, José Fajardo<sup>2</sup>, Vicente Consuegra<sup>2</sup>, Diego Rivera<sup>3</sup>, Concepción Obón<sup>4</sup>, Francisco Alcaraz<sup>3</sup>, Vanessa Martínez-Francés<sup>1</sup>, Arturo Valdés<sup>2</sup>, José Reyes<sup>2</sup>, Estela Barroso<sup>2</sup>, Luis San Joaquín<sup>2</sup>, José García<sup>2</sup>, P. Pablo Ferrer- Gallego<sup>5,6</sup> & Emilio Laguna<sup>4</sup>.

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2 Instituto Botánico - Jardín Botánico de Castilla-La Mancha, Universidad de Castilla-La Mancha, Albacete, Spain

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### ABSTRACT:

The active policy on land reclamation and agricultural production developed in Spain during the second half of the past century, threatened severely some of the most relevant wetlands of international importance. The most outstanding case is the National Park Tablas de Daimiel (3,030 ha) placed in the wide plains of Castilla-La Mancha, and covering part of the upper course of river Guadiana. Although this National Park was protected by law in 1973, their ecosystems have suffered a long and severe agony, caused by large extractions of groundwater from the surrounding aquifers, maintained for decades. Both legal and illegal extractions caused a close to complete desiccation of this outstanding site, the most relevant wetland in Central Spain. During most years of the 1980s, 1990s and 2000s, the water table did not appear on the surface, and lots of aquatic vascular plants became extinct or seriously threatened. Fortunately, this dark panorama is reversing in recent years, and this national park once again has sufficient water reserves for much of the year.

As happened in other Spanish wetlands (i.e. Doñana National Park, Albufera Natural Park, etc.), the human life around the permanent or seasonal waters yielded after centuries a rich heritage of traditional knowledge, especially focused on the uses of wild plants. Despite the temporary destruction of the wetland ecosystem, the ancient uses have been preserved in the collective memory of the older people. In order to recover this heritage, an ethnobotanical survey has been performed since 2016 around the National Park Tablas de Daimiel. 76 interviews done with 72 informants yielded 1,719 references of ancient and current uses for 255 plant species. Additionally an exhaustive bibliographical review yielded 6,432 references from 217 plant species. Both from interviews and bibliography, parallel references on animal and fungi species were also obtained. Remarkable information has been obtained reporting, among others, lost ancient jobs like river fishermen -i.e. traditional fishtraps-, basketry made with riverine species, or cultivated landraces of neglected wet crops, currently in extinction. In addition, a complete digital library containing images of plants and their uses, a collection of handcraft objects and a seed collection of threatened landraces is being prepared.

**KEY WORDS:** Spanish National Parks, Ethnobiology, Central Spain.



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## S5 - Disruptive ethnobotany in blasted landscapes: rethinking people-plant relationships in the Mediterranean

**TITLE:** Plant species translocation in Mediterranean: lessons from the Antiquity on the meaning and value of the alien species

**AUTHORS:** Pietro Minissale

**INSTITUTION:** Department of Biological, Geological and Environmental Sciences, University of Catania, Italy

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### **ABSTRACT:**

The distribution of native plants of a territory is usually attributed to current and past climatic conditions, to the existence of appropriate habitats and paleo-geographic events and to speciation for geographic isolation. However, in the Mediterranean area, pluri-millenary human activities have certainly contributed to the re-mixing and diffusion of a lot of Mediterranean species which in some cases entered the new territories disguising the foreign origin and contributing to increase the biodiversity of the region, not only as species, but affecting the plant communities assemblage. In particular the study of movements, such as trade routes and colonial settlements of Mediterranean peoples such as Greeks, Phoenicians and Romans, compared to the distribution, sometimes singular as disjoint and often point-like of some species, normally considered native, makes possible to justify some singular geographical distributions, which, on the other hand, are difficult to explain through the natural diffusion mechanisms even if we take into account the complex Mediterranean paleo-geographic history. Three emblematic cases are those concerning some East Mediterranean species: *Sarcopoterium spinosum* (L.) Spach (Rosen et al., 2009); *Platanus orientalis* L. (Rosati et al., 2015) and *Origanum onites* L. (Minissale et al., 2015) occurring in Italy with strongly disjoint distributions, more easily explained by human transport as evidenced by fragments together with archaeological remains or pollen finds. But also for other species we can give similar explanations. In practice, even in antiquity Mediterranean people moved alien species but on a regional scale and with less impact than at present. In fact these strictly Mediterranean species were already well adapted to the environmental conditions often similar to the territory of origin and therefore they did not have that invasive character that is frequent in today's alien species coming from other biogeographical regions which in new territories often have unbalanced competitive capacities compared to native species, which in disturbance conditions give way to invaders or are strongly conditioned. The theme of Mediterranean biodiversity strongly influenced by man who, since ancient times, has modeled landscapes with actions such as agro-silvo-pastoral activities has been tackled from various angles including the possibility of increasing speciation as already long postulated by Pignatti. But the theme of species translocation, intentional or involuntary, is less debated and probably underestimated and it deserves more attention also because these ancient human shifts of species are an important cultural heritage of the Mediterranean civilizations and today they can represent another theme of plant conservation.

**KEY WORDS:** Geographic distribution, plant conservation, Mediterranean civilizations, Mediterranean biodiversity

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## S5 - Disruptive ethnobotany in blasted landscapes: rethinking people-plant relationships in the Mediterranean

**TITLE:** A quantitative tool to assess local preference for the conservation of Important Plant Areas (IPA): a case study of Sannine-Kneysseh IPA in Lebanon

**AUTHORS:** Salman, M.M1., S.N. Talhouk1,2\*, S. Kharroubi3, and M. Itani1

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### **ABSTRACT:**

Areas designated for their biodiversity value, such as Important Plant Areas (IPAs), are not always protected and often fall within mixed private-public landownership schemes. The objective of this study was to develop a quantitative tool in Arabic to assess local preference for conservation of these areas. The quantitative survey tool is based on IUCN Protected Area (PA) management categories and includes six conservation attributes. This tool was applied to one case study IPA (Sannine-Kneysseh) and administered to 776 high school students (the total student population) living in seven villages that overlap the targeted IPA. The relation between local youth and the target IPA was further assessed by measuring participants' environmental behavior and attitude and their frequency of contact with nature. The findings suggest that the youth prefer flexible conservation measures that entail sustainable resource use, education and tourism and free access. The majority preferred conservation measures that adhere to IUCN PA categories III and VI. Participants also reported having a strong sense of care for nature and frequent contact with nature. Moreover, care for nature seemed to play an important role in explaining their high engagement in ecological behavior (33.3%,  $F(1, 776) = 367.87, p < .001$ ). Considering the vulnerability of unprotected IPAs and the need to harmonize conservation planning with local community's preference, the developed tool can serve as an efficient and reliable instrument to guide local conservation initiatives and build locally responsive plant conservation actions across the region.

**KEY WORDS:** Important Plant Areas, IUCN Protected Area management category, local preference, quantitative tool and environmental profile

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Session 6 - Site based approaches for plant conservation: Micro-reserves  
and habitat restoration

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## Session 6 - Site based approaches for plant conservation: Micro-reserves and habitat restoration.

### **Description**

This session will explore tools for conservation at site level. In the context of this session, a “site” is defined according to its management scale: it includes not only Key Biodiversity Areas (KBAs) for plants, but also Protected Areas, community managed areas, or other management units.

The emphasis of the session will be given to management figures specifically designed for plant conservation like plant micro-reserves, or certain community managed areas, as well as the identification of sites important to plant diversity like the KBAs identified for plants.

This session will finally explore the type of actions that site management allows, including habitat restoration. Species actions conducted at site level are explored separately in Session 2. This session 6 will focus on showcasing examples from around the Mediterranean and show concrete site- level examples that have permitted site conservation of species.

### **Topics to address:**

- Micro-reserves and other fine-scale approaches for plant conservation.
- Interrelationships between Important Plant Areas and micro-reserves or other protected sites
- Conservation units and protected areas
- Habitat restoration and ecological restoration
- Election of plant species for habitat restoration
- Relationships science-management-conservation in species/habitat conservation

### **Chair of the session**

Emilio Laguna (Generalitat valenciana).

### **Facilitator of the session**

Marcos Valderrabano (IUCN Centre of Mediterranean Cooperation).

### **Keynote speakers**

Prof. Magda Bou Dagher Kharrat (Head of Department of Life and Earth Science , Faculty of Science in Saint-Joseph University (USJ) Beirut)

Dr Emilio Laguna (Senior officer for plant conservation, CIEF, Generalitat Valenciana)

## Timetable Session 6

TIME	ACTIVITY	TIME	PRESENTATION	MODERATORS OR SPEAKERS
8:30-9:10	Introduction			M. Valderrábano & E. Laguna
8:40-9:10	Keynote 1 + discussion		Overview of Micro-reserves and site based approaches	E. Laguna
9:10-9:40	Short presentations 1	9:10-9:17	Identification of micro-reserves in a context of urban sprawl for the preservation of the endangered endemic <i>Acis nicaeensis</i> (Amaryllidaceae) in the Maritime Alps: the use of conservation units and population vulnerability	K. Diadema
		9:20-9:27	Endemic, rare and threatened coastal species of Ionian Islands: threats and protection	S. Samaropoulou
		9:30-9:37	Coastal cliffs: Protecting through plant micro-reserves an outstanding habitat, threatened by urbanistic development in the Mediterranean Basin	S. Fos (E. Laguna)
9:40-10:00	Discussion			M. Valderrábano & E. Laguna
10:00-10:30	Coffee break			
10:30-11:00	Keynote 2 + discussion		Overview of habitat restoration and habitat approaches.	M. Bou Dagher-Kharrat
11:00-11:30	Short presentations 2	11:00-11:07	Employing species and life-form data to guide planting design and vegetation management in a Mediterranean city for plant species conservation.	M. Itani
		11:10-11:17	<i>Lythrum thesioides</i> : how to conserve a species with unknow ecology: research and conservation partnership.	A. Gazaix
		11:20-11:27	Structural basis of a habitat: A model to choose species to be used in habitat restorations.	E. Laguna
11:30-12:00	Discussion and final remarks			M. Valderrábano & E. Laguna

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## S6-Site based approaches for plant conservation: Micro-reserves and habitat restoration

**TITLE:** Overview of Micro reserves and site based approaches

**AUTHORS:** Emilio Laguna

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### **ABSTRACT:**

As already discussed during the 1st Mediterranean Plant Conservation Week (Ulcinj, Montenegro, October 2016), the protection and/or effective conservation of Key Biodiversity Areas (KBAs) cannot be only solved through the traditional approaches of Natural Protected Areas (NPAs: National Parks, Natural Parks, Protected Landscapes, Nature Reserves, Natural Monuments). On a hand lots of relevant sites holding rare, endangered or endemics species and deserving to be protected, are microsites, where the protection through is too complex and excessively bureaucratized. On the other hands, small sites with big relevance for plant conservation, already protected into the boundaries of big NPAs, are not adequately conserved, due that the priorities for those areas are more focused on the big fauna -vertebrates, and particularly on mammals and birds-, spectacular landscapes, etc.

As an alternative to that outlook, the Generalitat Valenciana's Wildlife Service (Valencian Community, Spain) led close to 30 years ago the idea to establish networks of Plant Micro-reserves (PMRs), small nature reserves with much more reduced bureaucratic procedures to be officially protected, and able to give protection to microhabitats rich in relevant plant species or vegetation types. Contrary to the traditional model of Nature Reserves, where a single reserve is a whole NPA -so deserving a specific director, a complex management plan, etc.- all the Valencian PMR network works as a unified and permanently on-growing protected area, progressively targeting species still lacking in the network, new described taxa, recently discovered outstanding sites, etc. The first Valencian PMR was officially declared in December 1998, so just close to 20 years. Currently the Valencian PMR network (PMRN) is formed by 304 officially protected microsites over 2.362 ha. Not less than 25.180 populations of 1.817 species (56,8% of the regional diversity) are housed by the PMR network, despite of its small size (less than 0.1% of the regional surface). Up to 319 endemic, 224 protected and 838 rare or very rare species have one or more populations into the PMRN. A significant proportion of its success is due to the support given during

As the most relevant milestone of the Valencian PMRN, its model to protect microsites has been exported to other Spanish regions, and towards other far regions and countries along Europe and the Mediterranean basin, reaching Latvia, Western Crete (Greece), Cyprus, Lebanon or the Karst Region (Slovenia). The Law on NPA in Latvia, and in two Spanish regions (Castilla-La Mancha and Balearic Islands) include the figure of 'microreserve', inspired in the Valencian model but enlarged to fauna, rocks, etc. In other cases, i.e. Bulgaria, the PMR concept has been adopted as a subclass of legal figures already extant in their laws.

However, as far as the legal rules in each country or region can be very different or unable to incorporate the PMR concept, alternative or parallel initiatives to conserve small sites can be highlighted. Some kinds of private reserves, even not officially protected -but respected in a similar way by the environmental authorities- can be also effective, thanks to long-term agreements of custodianship between owners and conservation NGOs or research centres. In other cases the conservation of selected species or vegetation units has been possible thanks to the maintenance of traditional management practices developed by local communities, or as a result of the public respect to sacred sites (i.e. some protected forest patches in some areas of North Africa). Rural cemeteries in the culture of Islamic countries

often enclose monumental trees and rare species, and projects such as ancillary botanic gardens (ABG) in archaeological sites in Lebanon open the doors for active conservation linked to education projects.

**KEY WORDS:** Structure, Functionality, Singularity, Habitat restoration, GENMEDA

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## S6-Site based approaches for plant conservation: Micro-reserves and habitat restoration

**TITLE:** Overview of habitat restoration and habitat approaches

**AUTHORS:** Magda Bou Dagher-Kharrat

**INSTITUTION:** Faculté des Sciences, Département Sciences de la Vie et de la Terre, Laboratoire Caractérisation Génomique des Plantes, Campus Sciences et Technologies, Université Saint-Joseph, Mar Roukos Mkalles, Lebanon

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**ABSTRACT:**

Ecological Restoration (ER) is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed (Society for Ecological Restoration SER, 2004). It has become a central component of modern conservation paradigms (Young 2000). The Aichi Target 15 of the Convention on Biodiversity states that "by 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks have been enhanced through conservation and restoration, including restoration of at least 15% of the degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification". ER is therefore an important practice that may increase levels of biodiversity in human-altered ecosystems and may mitigate the impact of climate change.

Biotic and abiotic resources should be considered to allow the ecosystem to continue its development without further assistance or subsidy. A successful ER project should allow the ecosystem to sustain itself structurally and functionally and demonstrates resilience to normal ranges of environmental stress and disturbance.

Restoring biological communities to an earlier condition (reference ecosystem) is usually labor-intensive and costly. Therefore, it is imperative to define goals, to apply suitable criteria for measuring success, and to insure that all procedures are robust, both practically and scientifically.

Concepts underpinning restoration are: ecosystem disturbance, genetic diversity, ecological succession, community assembly including below-ground linkages and landscape ecology (Vaughn et al., 2010). In my presentation, an example of applied forest restoration project in Mount Lebanon as a multi-step process will be presented with important broader considerations. In the light of global climatic change scenarios, which predict more frequent extreme disturbances and climatic events, we are focusing on functional diversity of tree species assemblages rather than focusing on species per se. Plant genetic diversity and above - below-ground linkages are also considered during the restoration process.

The concept of rewilding (Torres et al. 2018) will be discussed as emerging promising restoration strategy to enhance the conservation status of biodiversity and promote self-regulating ecosystems while re-engaging people with nature.

**KEY WORDS:** Rewilding, Community Assembly, landscape Ecology, genetic diversity, Forest restoration



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## S6-Site based approaches for plant conservation: Micro-reserves and habitat restoration

**TITLE:** Identification of micro-reserves in a context of urban sprawl for the preservation of the endangered endemic *Acis nicaeensis* (Amaryllidaceae) in the Maritime Alps: the use of conservation units and population vulnerability

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### **ABSTRACT:**

The erosion of the natural spaces due to urban sprawl constitutes a major threat to biodiversity. Urban ecological footprint extends beyond city boundaries and drives environmental change from local to global scales, by both direct habitat conversion and through various indirect effects. The narrow endemic snowflake *Acis nicaeensis* is growing in the Maritime Alps, also known as the French Riviera (France, Principality of Monaco, Italy), and this plant is threatened by tremendous anthropogenic pressures and by land-use changes. Within this conflict between biodiversity and human activities, our goal was to define sites priorities for setting up micro-reserves to preserve the populations' viability of this endangered species (EN). A large collection of current records and historic data (herbarium record) has been used to delineate *A. nicaeensis* populations and to outline populations' extinctions. Then, to implement this priority conservation action, conservation units of the snowflake were defined by combining data on ecological and evolutionary divergences. The urbanization level and urban sprawl around populations have been estimated using both historic and contemporary maps indicating major land-uses. Results present evidences of direct impact of urbanization on the extinction of populations, but also the impact of other pressures (eg. alteration of surrounding habitats) on *A. nicaeensis*' populations. These two combined spatial and evolutionary approaches highlight the vulnerability of some populations of the species. Two of the five conservation units call for rapid setting up of micro-reserves because of their originality and restricted distribution, in order to avoid the loss of an important part of the evolutionary legacy of this endangered snowflake.

**KEY WORDS:** Urbanization, conservation priorities, habitat fragmentation, conservation units, vulnerability

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## S6-Site based approaches for plant conservation: Micro-reserves and habitat restoration

**TITLE:** Endemic, rare and threatened coastal species of Ionian Islands: threats and protection

**AUTHORS:** Georgia Kamari<sup>1</sup>, Sofia Samaropoulou<sup>\*2</sup> and Pepy Bareka<sup>2</sup>

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### **ABSTRACT:**

Ionian Islands' coastline is characterized by its extended length, which along with its sandy or precipitous ecosystems host a noteworthy biodiversity. Particularly, the west coasts and their gulfs, forming vertical and rocky ecosystems, constitute shelters for rare and endemic plant species of Adriatic-Ionian floristic region. Despite the large number of taxa occurring in the area, the rate of endemism is not that high, comparing to Aegean Islands. Approximately 26 taxa (19 species and 7 subspecies), belonging to 7 families of Dicotyledons and 3 families of Monocotyledons, consist the endemic Ionian flora. Most of them are included in The Red Data Book of Rare and Threatened Plants of Greece. This presentation provides information for this rare biodiversity and examples of endemic species. Our goal is to display the various threats, caused either by man or nature itself. The anthropogenic threats include extensive plant collections, but the most important hazard is coming from the uncontrollable touristic usage of the areas, the constant habitat destruction and human constructions. Concerning the natural dangers, the habitats are vulnerable to random landslides, due to earthquakes or wind and wavy erosion, changing ecological conditions, overgrazing etc. Nowadays, tourism development must respect nature and environmental protection (alternative tourism). At the same time, measures for protection are proposed. When it comes to in situ conservation, knowledge, promotion and sustainable management of rare and threatened species are required, while ex situ conservation of seeds in Seed Banks, like the one already existing at Mt. Aenos National Park, is anyway obligatory to secure the preservation of Ionian Islands' biodiversity.

**KEY WORDS:** Coastal flora, biodiversity, Adriatic-Ionian region, threatened taxa

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## S6-Site based approaches for plant conservation: Micro-reserves and habitat restoration

**TITLE:** Coastal cliffs: protecting through plant micro-reserves an outstanding habitat threatened by urbanistic development in the mediterranean basin

**AUTHORS:** Simón Fos<sup>1,2</sup>, Emilio Laguna<sup>1</sup>, Josep E. Oltra<sup>1,2</sup>, Joan Pérez-Botella<sup>1,2</sup>, Patricia Pérez-Rovira<sup>1,2</sup>, P. Pablo Ferrer-Gallego<sup>1,2</sup>, Inmaculada Ferrando<sup>1,2</sup>, Miguel A. Gómez-Serrano<sup>1,2</sup> & Vicente Deltoro<sup>1,2</sup>.

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### ABSTRACT:

Coastal cliffs are widely distributed along the coasts of the whole Mediterranean basin, often holding a hyper-especialized outstanding flora, particularly for the case of micro-endemic species of the genus *Limonium*. However, most of their representative rare species are significantly threatened by land reclamation for touristic and urbanistic development. This territorial model, initially affecting only the Northwestern Mediterranean coasts, is being progressively enlarged toward Eastern and Southern countries. In the case of Spain, *Limonium* is the genus holding more red-listed species (74 taxa, most of them only living in coastal sites). As a common and repeated issue, the available habitats for coastal cliffs and small islands are reduced and fragmented, dealing with one of the most accurated examples of natural habitats able to be protected through plant micro-reserves.

The Valencian Community (Spain) was the pioneer region to propose and create a large network of Plant Micro-Reserves (PMR). The first PMR were declared in 1998, and currently the Valencian network enclose 304 legally protected microsities -up to 20 ha- as PMR. 29 of them are partially or fully formed by coastal cliffs or small islands covered by cliff vegetation. These 29 PMR hold 419 species of vascular plants, 64 of them being endemics; 110 of them are rare or very rare species at regional level, and 30 are threatened and strictly protected. These 29 microsities include, among other relevant taxa, representatives of 14 species of *Limonium*, 11 of them being Spanish endemics -8 species are exclusive Valencian endemics. Thanks to the PMR network, some of the most relevant threatened coastal species to Spain have been protected, i.e. the unique living population of *Limonium perplexum*, the unique remainder site of the endemic plant association *Crithmo-Limonietum dufourii*, the only Spanish population of *Reseda hookerii*, etc. In addition PMR on coastal cliffs are home to some of the most relevant Valencian projects for in situ conservation, as the reinforcement and/or reintroduction of *Medicago citrina*, *Silene hifacensis*, *L. perplexum*, etc. Main threats found after 20 years of experience managing PMRs, are mainly caused by human actions, but also by natural causes -but linked to human activities- such as the coastal erosion of low cliffs, partially attributed to effects of climate change. As an alternative strategy new safe populations of the most threatened species are being set up on close sites, preferably on PMRs placed nearby.

**KEY WORDS:** Plant micro-reserves, Coastal cliffs, Urban impact, *Limonium*, Critically endangered

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## S6-Site based approaches for plant conservation: Micro-reserves and habitat restoration

**TITLE:** Employing species and life-form data to guide planting design and vegetation management in a Mediterranean city for plant species conservation

**AUTHORS:** Itani, M.3, S.N. Talhouk\*1,3, and M. Al-Zein2

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### **ABSTRACT:**

Type III cities are cities that include 'quality remnant vegetation' of conservation value. In these cities, small cityscape elements, such as public gardens and street medians, can serve as management units that possess conservation potential for native plants. Lack of integrated and systematic vegetation management in small cityscape elements may compromise prospects for plant conservation in urban landscapes. Furthermore, overrepresentation of ruderal species in cities makes vegetation description using community assessments a challenge. The purpose of this study is to develop a vegetation description methodology for cities that can guide planting design and vegetation management for conservation. Using the city of Beirut as a Mediterranean case study, and a target endemic species *Matthiola crassifolia* Boiss. & Gaill., we developed a modified approach to community classification by integrating life-form data. Sampling quadrats (one by one square meter) in semi natural areas and small cityscape elements (street medians and public gardens) were used to collect both floristic and life-form data during peak flowering period. Classification using Twinspan was performed twice, once for a floristic data set and another time for a life-form data set, resulting in two different classifications of the same quadrats. A vegetation matrix was produced; it distributed quadrats into groups sharing unique life-form and species compositions. This approach helped identify elements of the vegetation that either supported or compromised the representation of the target species. For example, regardless of native status, species belonging to certain life-forms, such as canopy trees and many mat-forming perennials, with the exception of succulent ones, consistently occurred at high abundance in quadrat groups that lacked the target species, while palm-like species and shrubs with scale-like leaves, among others, frequently co-occurred with it. The developed method allowed us to develop guidelines for planting design and vegetation management that may enhance the conservation potential of small cityscapes elements. This allows for design and planning of novel ecosystems that are more conducive for the persistence of the target species.

**KEY WORDS:** Biodiversity conservation, vegetation description, endangered species, novel ecosystems, urban land use

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## S6-Site based approaches for plant conservation: Micro-reserves and habitat restoration

**TITLE:** *Lythrum thesioides*: how to conserve a species with unknown ecology: research and conservation partnership

**AUTHORS:** Gazaix A.\*1,2, Grillas G.1, Gauthier P.2, Pirsoul L.3, Kluszczewski M. 3 & Thompson J.D.2

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### ABSTRACT:

Mediterranean Temporary Ponds (MTPs), characterized by alternate winter flooding and summer drought, resulted in a highly specialized flora (Grillas et al., 2004), which is of high conservation interest (Quezel, 1982) but threatened (Rhazi et al., 2012). Among this flora, *Lythrum thesioides* is a very rare annual species, known from only 3 different populations around the world (one in Russia and 2 in France)

The main population was discovered in 2010 during an environmental impact assessment before the construction of a railway track in southern France, in the wetland of Campuget. This resulted in the modification of the project thus avoiding to destroy the population. Moreover, the wetland was given (compensatory measure) for management to the "Natural area conservatory of Languedoc-Roussillon". However, the biology of *L. thesioides* is hardly known, and a research project has been made to explore the ecology of this species in order to propose a sound management plan for its conservation.

Here we present the history of this project, and the strategy developed to explore this problematic.

The program has been built by both scientists and managers. Firstly, laboratory tests were made to determine the germination conditions for the seeds of *L. thesioides*. Secondly, a map of the active seed bank has been built using the germination methods.

During the third on-going step we will explore the ecological niche of the species, both with laboratory experiments (shade and hydrology effects), and field work (plant communities and soil conditions). Disturbance experiments and re-enforcement of the populations are also currently being monitored.

The first results reveal a higher optimal germination temperature of *L. thesioides* seeds than what is known for other species of MTPs. Moreover, the germination rate is increased after a period of cold and moist stratification. These ecological traits and the late phenology observed in the populations of southern France seem closer to continental species than MTP's one.

The study of the Campuget population showed a small active seedbank for *L. thesioides*, with higher densities found at places where the species was not observed suggesting that environmental conditions are not suitable for germination, probably because of high cover of perennial vegetation.

This motivated the first management action with the re-opening of the land where the core of the seedbank has been localized. More management actions are expected following the results of the different on-going experiments.

**KEY WORDS:** *Lythrum thesioides*, Mediterranean Temporary Ponds, wetland, ponds management

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## S6-Site based approaches for plant conservation: Micro-reserves and habitat restoration

**TITLE:** Structural basis of a habitat: a model to choose species to be used in habitat restorations.

**AUTHORS:** Emilio Laguna<sup>1</sup>, Pedro Pablo Ferrer-Gallego<sup>1,2</sup>, Inmaculada Ferrando<sup>1,2</sup> & Antoni Marzo<sup>3</sup>

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### **ABSTRACT:**

CIEF (Centre for Forestry Research and Experimentation, Generalitat Valenciana), one of the founder members of GENMEDA, piloted the Interreg IIIb MedOcc project SEMCLIMED, performing a large group of experiences and innovative techniques. One of the proposals, called "STRUCTURAL BASIS OF A HABITAT", consisted of a scoring model to choose main species to be employed in ecological restorations, coming from a three information sources: 1) one or more representative phytosociological relevés, containing the species list and their abundance-dominance and sociability data for the optimal stage of the plant community to be restored, in order to estimate the structural role of each plant species (E); 2) Indication of the functional role (F) of each species, using the classification of Jones et al. (1994); and 3) fine data on the singularity (S) expressed through the degrees of threat, rareness, and endemism of each species listed at the relevés. 'Structural species' are the species that characterize the physiognomic aspect of the plant community. The global score can vary from 36 points (for a structural, direct-autogenic-engineer species, critically endangered, very rare and endemic) to 0 points.

The model allows to calculate the contribution of each species to the sum of scores separating E, F and S, so the manager can choose the species combination depending on the purpose of the restoration work to be done. If the main purpose is to restore the structure and functionality of the plant community (i.e. river restorations, roadside slopes, etc.), the main species to be reproduced and planted will be those reaching major values for E and F. On the case of habitat restorations pursuing the reinforcement of a rare or endangered species, the species reaching major values for S should be taken in account. Anyway, the options to use each species must be qualified with realistic conditioning data such as the plant availability, seed provisions, etc.

The current version of the Structural Basis of a Habitat (Ferrer-Gallego, 2007) is a provisory version that must still be reviewed and contributed by the remainder GENMEDA partners, testing its use and proposing new improvements in a close future.

**KEY WORDS:** Structure, Functionality, Singularity, Habitat restoration, GENMEDA

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Side events

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## Side Event - The MedIsWet project: Conservation of Mediterranean Islands Wetlands

### **Description**

This session deals with the conservation of Mediterranean Basin islands wetlands and highlight the MedIsWet project. MedIsWet contributes to the implementation of a network of nine countries involved in the completion of the inventories of all the Mediterranean islands wetlands, dissemination of knowledge and promotion of certain conservation measures at local, national and Mediterranean scale.

One of the aim of the project is to find further financing resources to develop urgent and effective restoration activities. Accordingly, this session will present several restoration activities of small wetlands taking place in small islands. In addition, governance system, funding and type of restoration will be discussed between participants. These outputs will be the occasion to identify and prioritize the issues related to islands wetlands specificities and will provide the basis to set up a roadmap for islands wetlands of the Mediterranean.

### **Topics to address**

- Presentation of the MedIsWet project "Conservation of Mediterranean Islands wetlands"
- First results of the project, with a special focus on the inventories of Sardinia (1) , Malta (2) and Turkey (3)
- Examples of restauration activities in small wetlands (Sicily, Greece, France)
- Presentation of the legal framework for wetland protection

### **Chair of the session**

Mathieu Thévenet (PIM Initiative)

### **Co-Chair of the session**

Krista Falzon (Nature Trust Malta)

Eylül Dizdaroglu (WWF Turkey)

Mauro Fois (CCB/University of Cagliari)

Pietro Minissale (University of Catania)

Thanos Giannakakis (WWF Greece)

Boris Lauš (Hyla)

Pantelina Emmanouilidou (Limoges University)



## **Agenda**

The MedIsWet Project: Conservation of Mediterranean Island Wetlands

Total Duration side-event: 1h30

General Introduction.

Chairman: Mathieu Thévenet. (10min)

### **Part 1 - Presentation of the first results of national inventories and possible restoration activities. (60 min)**

1. Intro (Mathieu Thévenet/Thanos Giannakakis) + presentation of the first results of the inventories and possible restoration activities (20 min)
  - Mauro Fois (CCB/University of Cagliari): first results in Sardinia
  - Eylül Dizdaroglu (WWF Turkey) : first results in Turkey + presentation of 3 sites on Gökçeada and Ayvalik islands among the visited wetlands might be suitable for small/ wide scale restoration
  - Krista Farrugia (NTM-FEE Malta): first results in Malta + case of the restoration of a prime artificial wetland currently protected known as Il-Ballut ta' Marsaxlokk identified for restoration opportunities
2. Examples of restoration of Mediterranean island wetlands (20 min)
  - Thanos Giannakakis (WWF Greece): example of the case of the estuary of Moronis River in Crete, main achievements, setbacks and failures, lessons learnt (5 min)
  - Pietro Minissale (University of Catania): Example of the restoration of the Saline di Priolo (Natural Reserve), Invasive species eradication + restoration with native species (5 min)
  - Boris Lauš (Hyla) : Example of the small pond restoration pilot-project on Istria peninsula + possibilities of replication on several Adriatic islands (5 min)
  - Eva Tankovic (PIM Initiative) : Tunisian opportunities (Kuriat & Kerkennah) (5 min)
3. Advocacy strategy for the protection of islands wetlands in France & Italy (10 mn)
  - Lina Emmanouilidou (Limoges University) : Presentation of the legal framework study + legal tools for restoration

### **Part 2 - Discussions with the participants to highlight priorities for restoration activities on Mediterranean islands wetlands (small wetlands) - 30 min**

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## Side Event - The Critical Ecosystem Partnership Fund (CEPF) Side Event

### Description

The Critical Ecosystem Partnership Fund, active in the Mediterranean Basin since 2012, has started a [new phase of investment for the Mediterranean Basin](#) last year. The new strategy (outlined in the [Ecosystem Profile](#)), to which more than 500 experts and organizations of the region contributed, includes for the first time a specific strategic direction on plants.

During this session, representatives from CEPF will introduce to the audience the strategic direction on plants and investment priorities, followed by a series of short presentations from CEPF's newest grantees to understand the work they will be undertaking throughout the Mediterranean. The session will finish with a plenary discussion about the role of civil society in plant conservation; the benefits of having civil society organisations working in this field, the obstacles to their engagement, and how to get more involved.

The session will be followed by a cocktail event.

### Structure of the Session

	TYPE	Title	PRESENTER	E_mail
17.30-17.50	Introduction	General Presentation of CEPF Funding structure and functioning, and strategic direction for Plant Conservation	Pierre Carret and Liz Smith	
17.50-18.00	Questions and Answers	Clarification on CEPF presentation		
18.05-18.10	Presentation - Montenegro	Conservation of endemic, rare and threatened plant species on Mt. Orjen	Mihailo Jovicevic	mihajov@gmail.com
18.10-18.15	Presentation- Albania	Conservation and propagation of the Albanian tulip	Endri Haxhiraj	iep@iep-al.org
18.15-18.20	Presentation- Cape Verde	Melhorar o Conhecimento e Distribuição das Espécies da Flora Ameaçadas de Extinção na Ilha do Fogo e Brava	Herculano Andrade Dinis	projectovotofogo@gmail.com
18.20-18.25	Presentation- Jordan	Mainstreaming Important Plant Areas into the national Conservation Planning Framework	Khaled Abulaila	kabulaila@gmail.com
18.25-18.30	Presentation- Tunisia	Conserver les plantes patrimoniales de Garâa Sejenane et Dar Fatma-Tunisie	Imtinen ben haj jilani	imtinenbhj@yahoo.fr
18.30-18.35	Presentation- Macedonia	Working together for conservation of national endemic plants in Macedonia	Natalija Melovska	contact@mes.org.mk
18.35-19.00	Questions and Answers	Clarification on project presentation Discussion on the role of civil society organizations in plant conservation		

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## Side Event - Presentation of publication "Conserving wild plants in the south and east Mediterranean region"

### **Description**

During the side event the publication "Conserving wild plants in the south and east Mediterranean region" was released. The aim of this publication is to provide a snapshot of existing knowledge of plant diversity in the South and East Mediterranean, and to propose which strategies and actions can be taken to enhance plant conservation in the region.

Thanks to a joint effort of more than 40 authors and dozens of contributors, it brings together in a single document an overview of existing knowledge on plant diversity, and provides concrete strategies, with local examples, for plant conservation that are applicable in the south and east Mediterranean region. It is aimed at helping conservation policy makers and a wide range of practitioners (land managers, Non-Governmental Organizations, local communities, conservation agencies) to implement plant conservation programmes and initiatives in the south and east Mediterranean region. The publication may also help botanist, academia, and amateurs in getting a rapid overview of plant knowledge in the area, existing key resources and where to find them.

The Mediterranean region is one of the world's great centres of plant diversity and its benign climates have attracted successive waves of civilisations, which have largely shaped our attitudes and ethics to the present day. Despite the effects of grazing, agriculture, deforestation, pollution, urbanisation and tourism, it has developed a wide array of plant landscapes. It is also one of the cradles of agriculture and a centre of origin and diversification of many of our crop species. Nowhere else on this planet has humankind been so closely and intimately linked to the environment. Despite the undisputed importance of plantlife, conservation policies often neglect plant diversity in priority setting, and concrete strategies to ensure plant conservation are still insufficient to face the growing pressures. The reasons for this situation are complex, including not only sociological and political factors but also scientific and technical ones. The aim of this publication is to provide a snapshot of existing knowledge of plant diversity in the south and east Mediterranean, and to propose strategies and actions that can be taken to enhance plant conservation in the region.

You can download the publication on the following link:

<https://portals.iucn.org/library/node/47910>

### **Presentation of web platform "Trees and shrubs of North Africa"**

During the side event, the platform "Trees and shrubs of North Africa" was also launched and presented. Collaboration between IUCN Centre for Mediterranean Cooperation, and extensive network of botanist and foresters has allowed to update information contained in publication "Guía de los Árboles y Arbustos del Norte de África" (Charco, 2001), and let basis for the creation of this web page.

This site compiles all the native species of trees, shrubs and climbing woody plants of northern Africa. Altogether 872 species (sometimes includes very small but woody plants), from 290 genera and 76 families.

The side event explained functioning of the site, and how to collaborate to improve data and provide updates.

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List of participants

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