Incorporating inventories in GIS and R environments for investigating plant species distribution patterns

Fois Mauro, Cuena-Lombraña Alba, Abdelaal Mohamed, Ben Haj Jilani Imtinen, Cambria Salvatore, Minissale Pietro, Nikolic Toni, Podda Lina, and Bacchetta Gianluigi

3rd Mediterranean Plant Conservation Week

CHANIA, CRETE, GREECE | 27 SEPTEMBER - 1 OCTOBER 2021

Plant Conservation Strategies: from Science to Practice

CIHEAM MAI CHANIA

Genmeda

NETWORK OF MEDITERRANEAN PLANT CONSERVATION CENTRES

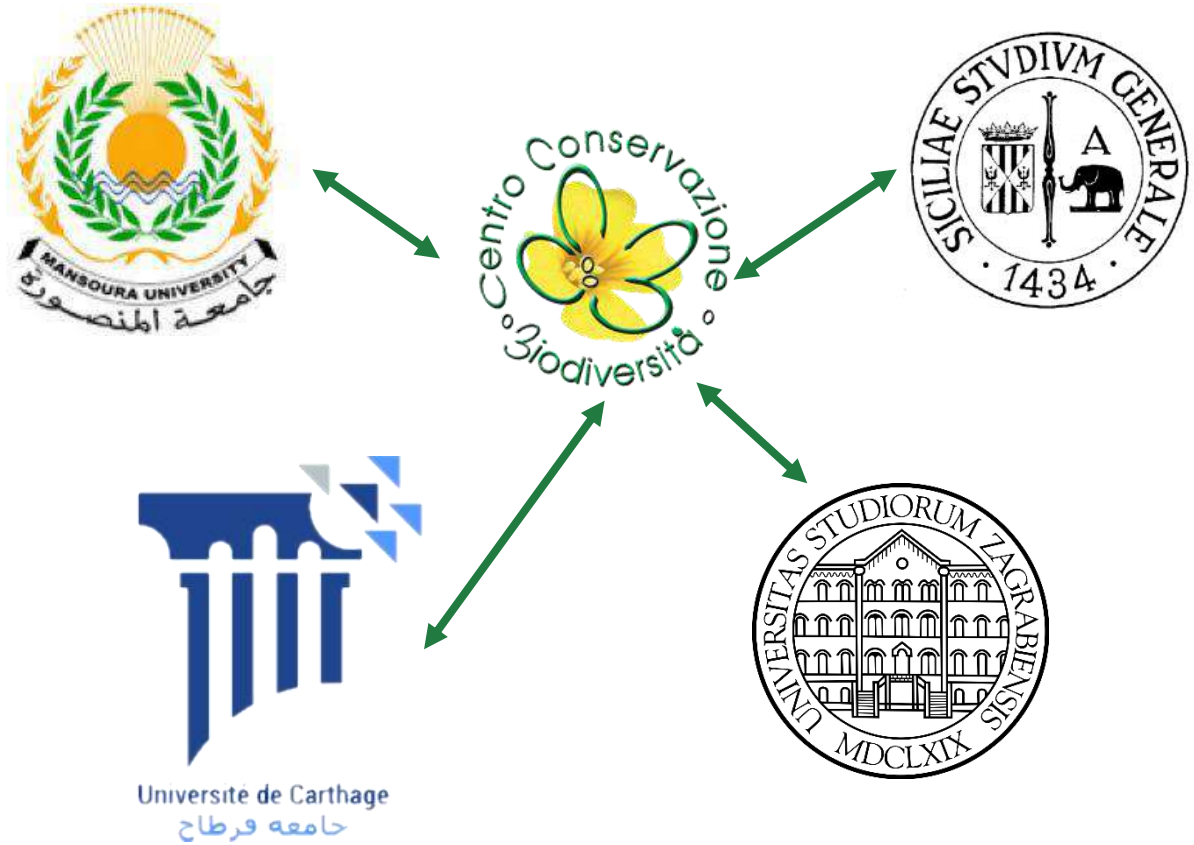
CRITICAL ECOSYSTEM PARTNERSHIP FUND

IUCN

ONCE UPON A TIME…

Incorporating inventories in GIS and R environments for investigating plant species distribution patterns

Fois Mauro, Cuena-Lombraña Alba, Abdelaal Mohamed, Ben Haj Jilani Imtinen, Cambria Salvatore, Minissale Pietro, Nikolic Toni, Podda Lina, and Bacchetta Gianluigi

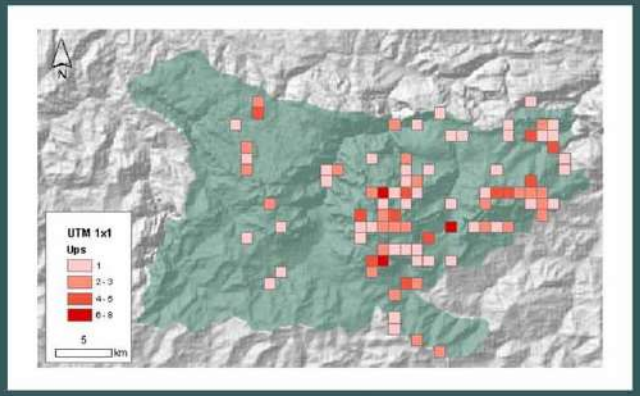



Gijon
Marseille
Zagreb
Cagliari
Carthage
Catania
Mansoura

Summer 2009, Picos de Europa

Asistencia Técnica y Consultoría para el Desarrollo y Cartografía de Flora Amenazada y Fase I del mapa de vegetación 1:10.000 del Parque Nacional Picos de Europa

Cartografía de flora amenazada



I. Síntesis Cartográfica

MEMORIA FINAL

MINISTERIO DE MEDIO AMBIENTE
SECRETARÍA GENERAL DE MEDIO AMBIENTE
PARQUES NACIONALES
PICOS DE EUROPA PARQUE NACIONAL
Jardín Botánico Atlántico GIJÓN

Dactylorhiza insularis (Sommier) Landwehr — dacins01

DATOS GENERALES SOBRE LA POBLACIÓN:	
Extensión de presencia	3.998 m^2
Área de ocupación	523 m^2
Subpoblaciones	3
Número de individuos	16
Tipo de censo	Directo
Distribución espacial	Aleatoria
Altitud media	1.116 metros
Exposición media	Noreste
Pendiente media	10 grados
Óptimo de floración	Mayo
Naturaleza del suelo	Básico
Unidad fitosociológica principal	*Merendero pyrenaicae-Cynosuretum cristati* Oberdorfer & Tüxen in Tüxen &Oberdorfer 1958
Especies acompañantes	*Carduncellus mitissimus, Carex humilis, Conopodium pyrenaeum subsp. pumilum, Cynosurus cristatus, Festuca rubra, Genista legionensis, Helianthemum canum subsp. cantabricum, Hippocrepis comosa, Lithodora diffusa, Luzula campestris, Poa bulbosa, Potentilla neumanniana, Ranunculus gramineus, Rhinanthus serotinus subsp. asturicus*
Hábitat principal	Pastizal de diente con poco suelo y en contacto con el Genistion
Hábitat secundario	Matorral aclarado de *Genista legionensis*
Amenazas	Recolección por parte de senderistas al tratarse de una planta atractiva. Pastoreo. Cambio de manejo del prado de siega y colonización por parte del matorral
Medidas de conservación propuestas	Cultivo y propagación. Estudio del impacto del abandono de las actividades tradicionales sobre estos hábitats

Dactylorhiza insularis en los prados de El Pedroso (Morrena de Pido).

REFERENCIAS:

Lainz, M (1962). *Dactylorhiza insularis* (Sommier) Landwehr, ESP (S), non longe a Fuente De (ditione santanderiensi), Lainz, M., Herbario JBAG-Lainz: 945

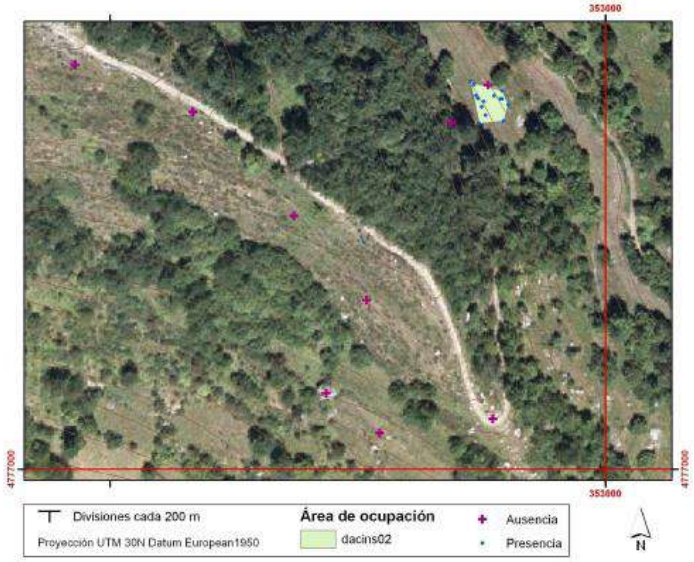
Dactylorhiza insularis (Sommier) Landwehr — dacins02

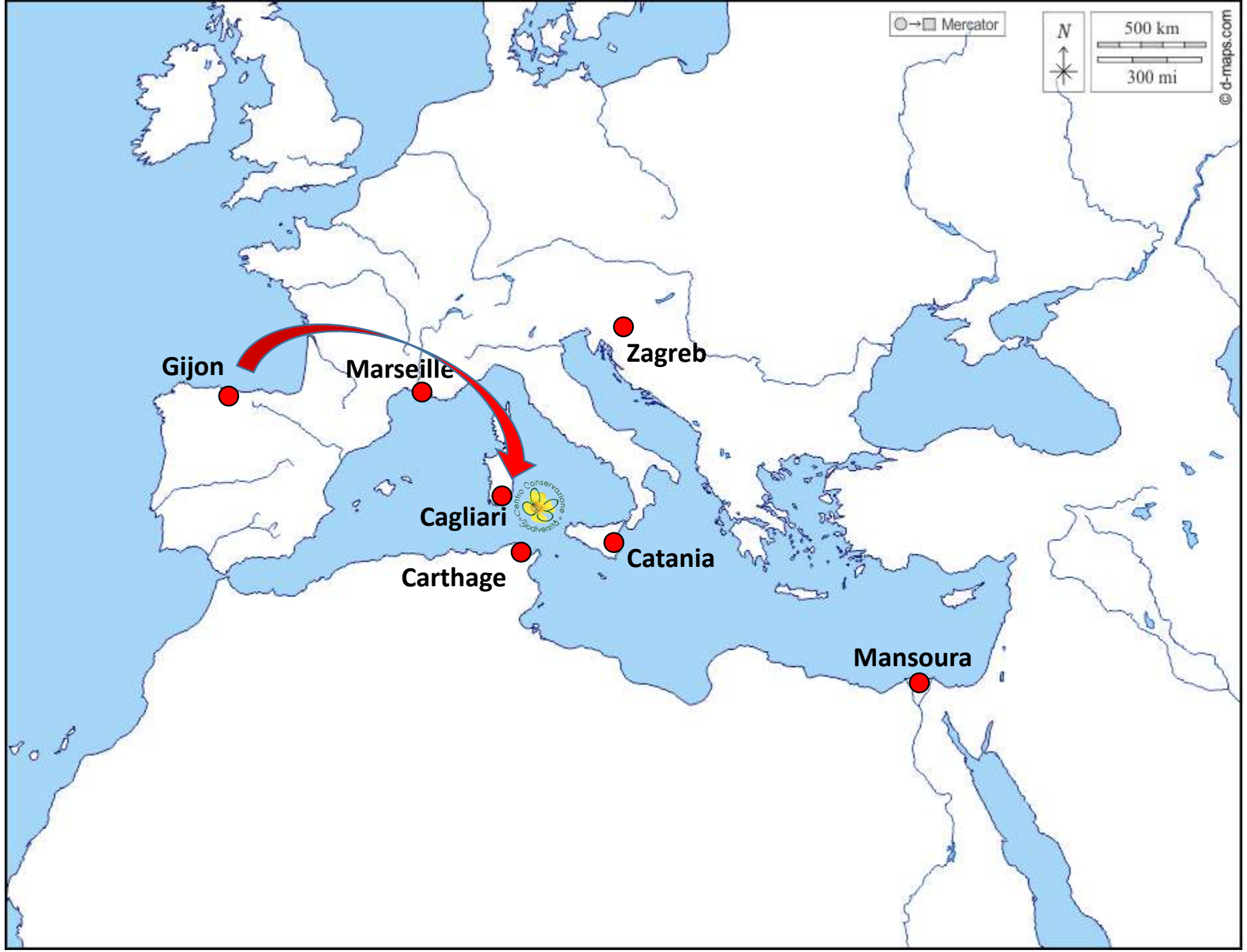
Autores:
Ana Fernández,
Sara L. González Robinson,
Borja Jiménez-Alfaro

Número total de citas en el Parque Nacional (arriba), y localización de la población (izqda).

POBLACIÓN	
Nombre:	Las Cortes
Código:	dacins02

UBICACIÓN GEOGRÁFICA	
Lugar:	Las Cortes, Morrena de Pido
Localidad próxima:	Pido
Acceso:	Pista de Pido a los Invernales de las Berrugas
Municipio:	Camaleño
Provincia:	Cantabria
UTM 1x1 km:	30TUN 5277
Población nueva:	SI
Referencias anteriores:	-

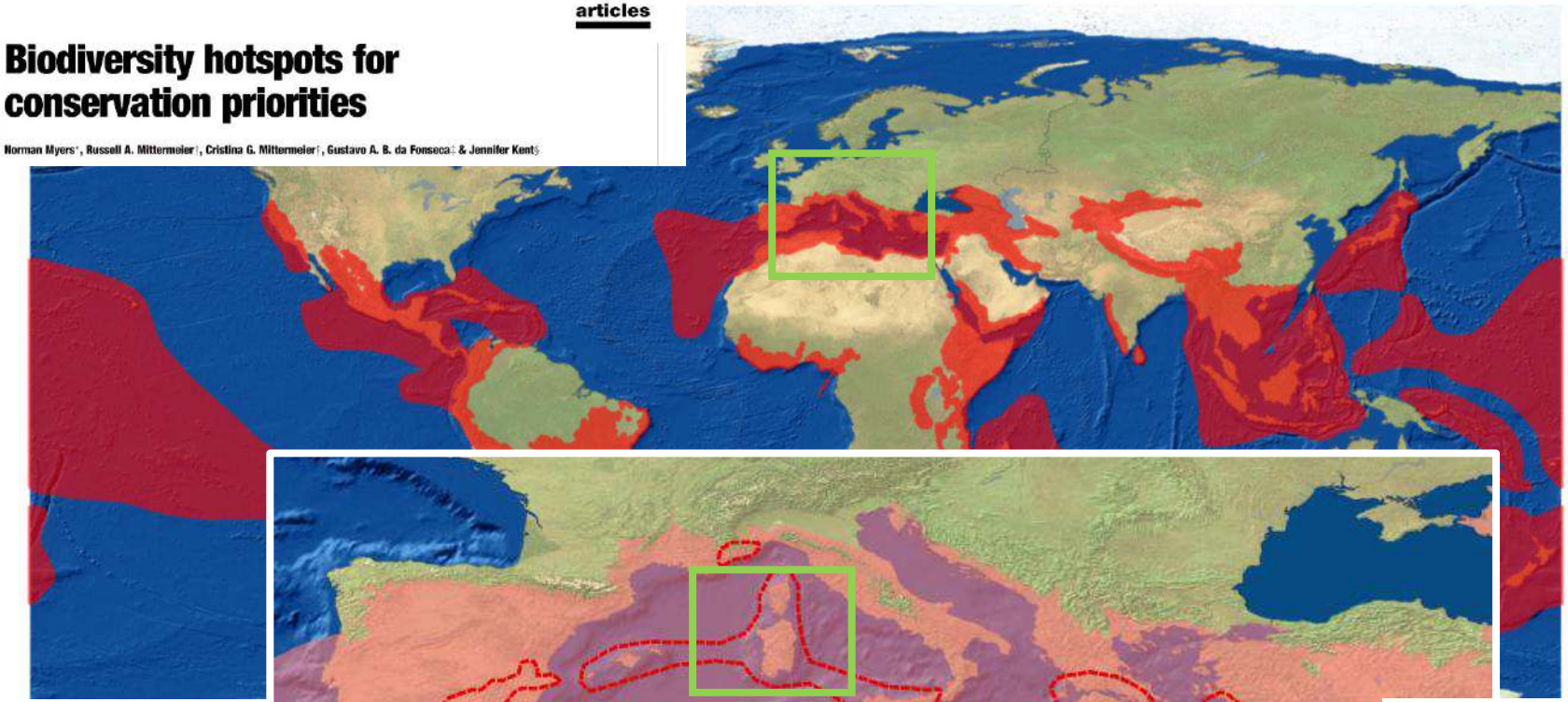



Mercator
N
500 km
300 mi
© d-maps.com
Gijon
Marseille
Zagreb
Cagliari
Carthage
Catania
Mansoura
Centro Conservazione Biodiversità

articles

Biodiversity hotspots for conservation priorities

Norman Myers*, Russell A. Mittermeier†, Cristina G. Mittermeier†, Gustavo A. B. da Fonseca‡ & Jennifer Kent§



Island	Area (km^2)	Native plant richness	Endemic plant richness	Endemism rate	Endemic genera	Number of alien plants	% alien flora/total flora
Sicily	25,426	3250	322	10%	*Petagnaea, Siculosciadium*	ca. 440	13.5%
Sardinia	23,821	2149	290	13.5%	*Castroviejoa, Morisia, Nananthea, Soleirolia*	508	17.4%
Cyprus	9251	1633	142	8.7%	*Lindbergella*	152	8.5%
Corsica	8679	2237	284	12.7%	*Castroviejoa, Morisia, Nananthea, Soleirolia*	466	17.2%
Crete	8261	2240	395	17.6%	*Horstrissea, Petromarula*	162	6.7%
Balearic islands	4987	1551	140	9%	On eastern islands: *Femeniasia, Naufraga, Soleirolia*	124	7.3%

Biodiversity Hotspots in the Mediterranean Basin: Setting Global Conservation Priorities

FRÉDÉRIC MÉDAIL* AND PIERRE QUÉZEL

The Botanical Review
https://doi.org/10.1007/s12229-021-09245-3

REVIEW PAPER

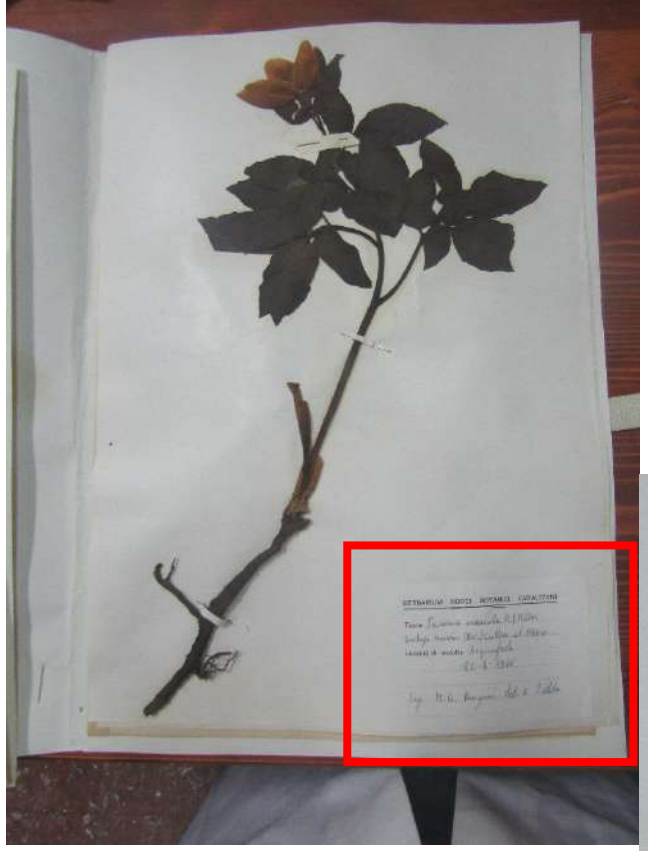
Plant Biogeography and Vegetation Patterns of the Mediterranean Islands

Frédéric Médail [1,2]

[1] Institut méditerranéen de biodiversité et d'écologie marine et continentale (IMBE), Aix Marseille University, Avignon University, CNRS, IRD. Campus Aix, Technopôle de l'Environnement Arbois-Méditerranée, F-13545 Aix-en-Provence cedex 4, France
[2] Author for Correspondence; e-mail: frederic.medail@imbe.fr

Herbaria data

CAG
SS – SASSA
CAT
FI
RO
TO



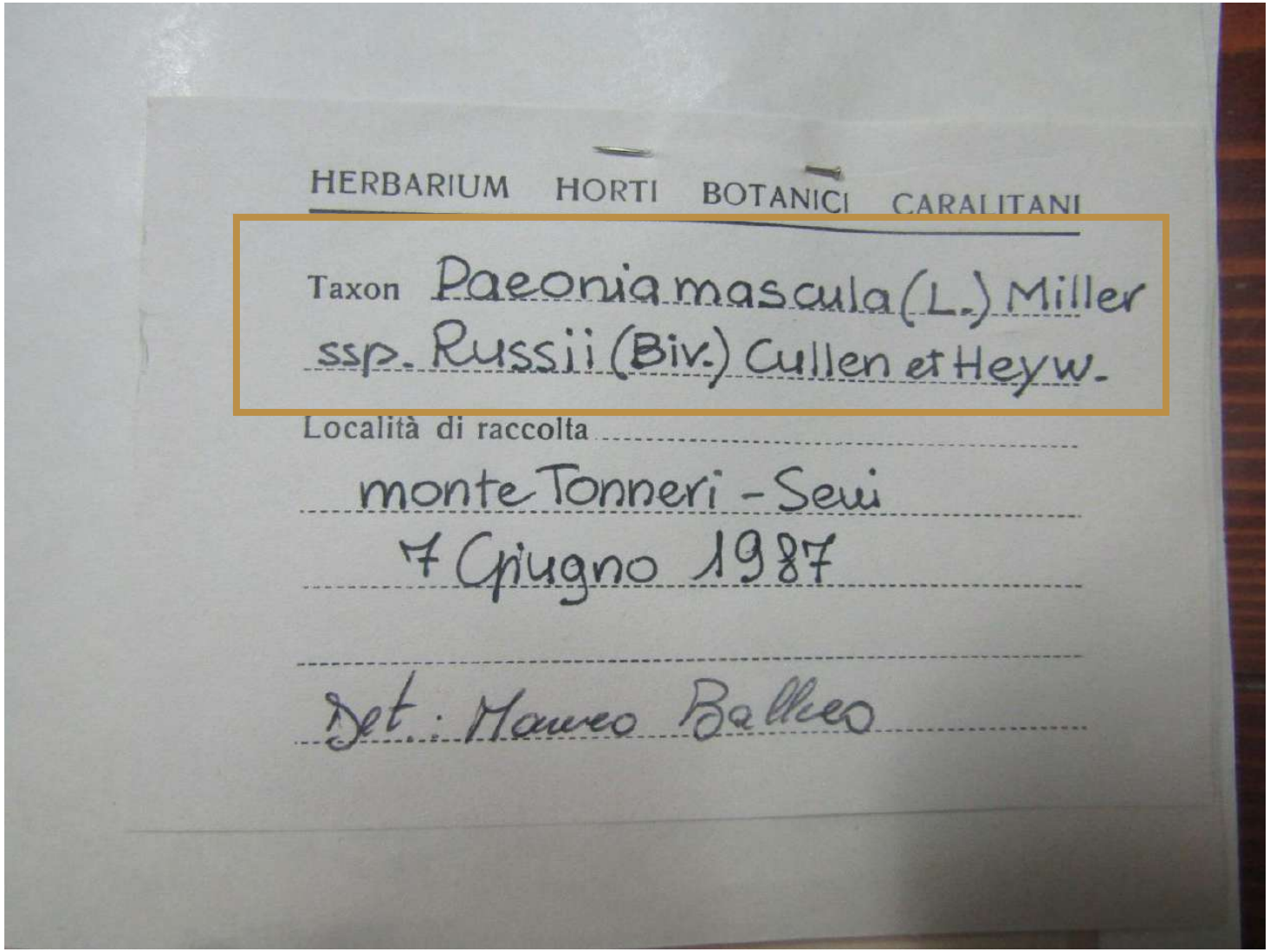
HERBARIUM HORTI BOTANICI CARALITANI

Taxon Paeonia mascula (L.) Miller
ssp. Russii (Biv.) Cullen et Heyw.

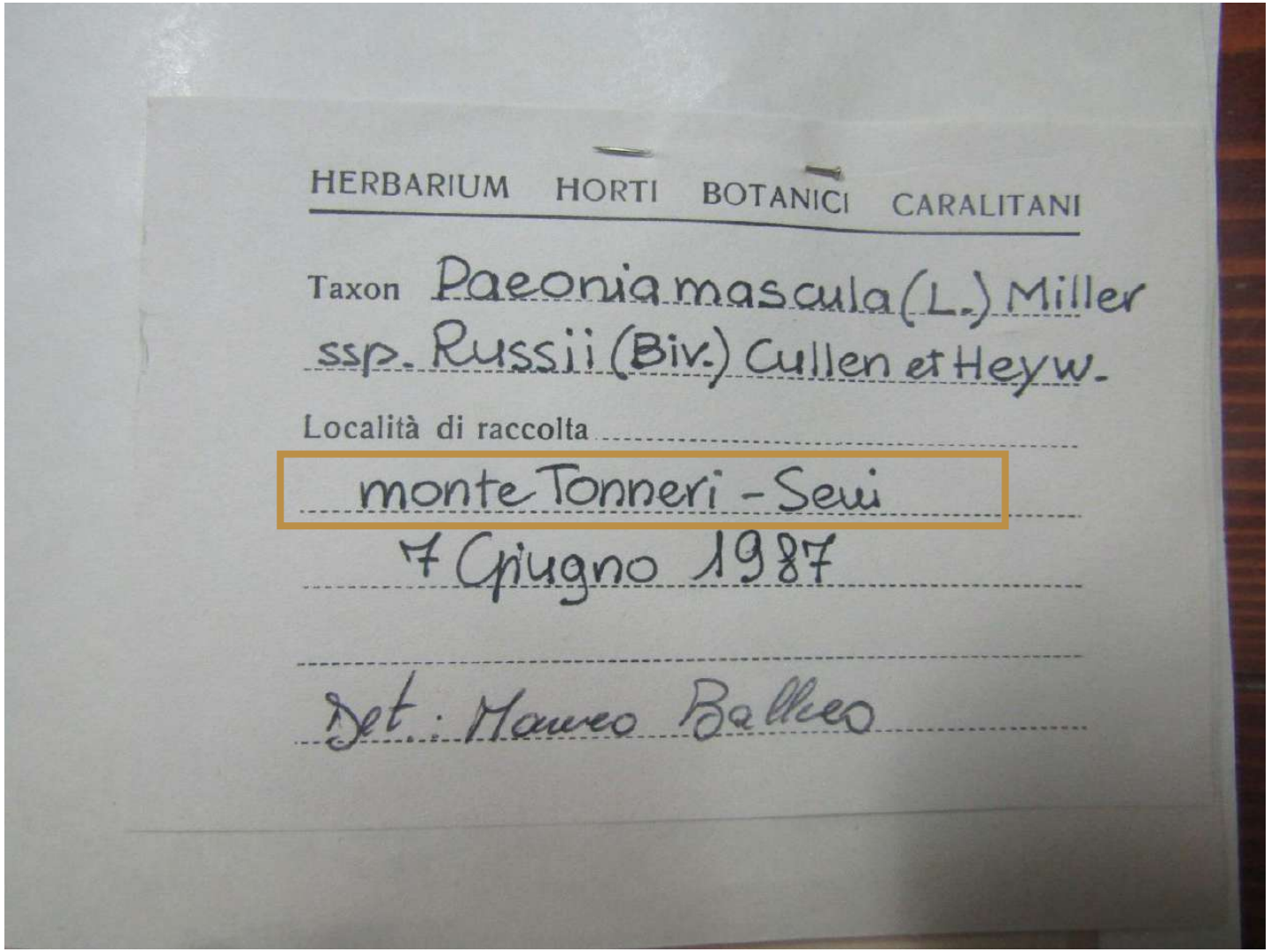
Località di raccolta
monte Tonneri - Seui
7 Giugno 1987

Det.: Mauro Ballero

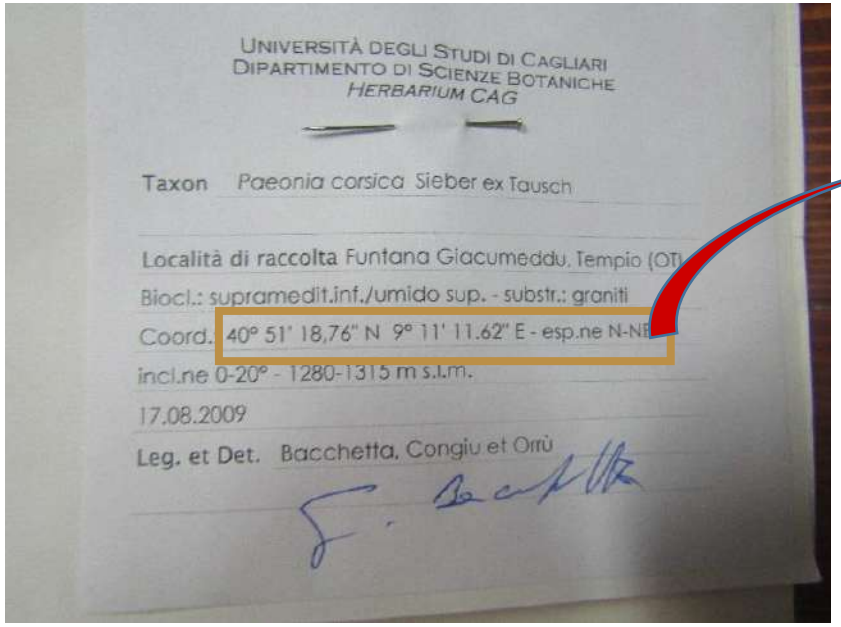
Taxonomic revision



Locality


HERBARIUM HORTI BOTANICI CARALITANI
Taxon Paeonia mascula (L.) Miller
ssp. Russii (Biv.) Cullen et Heyw.
Località di raccolta
monte Tonneri - Seui
7 Giugno 1987
Det.: Mauro Balleo

Locality


UNIVERSITÀ DEGLI STUDI DI CAGLIARI
DIPARTIMENTO DI SCIENZE BOTANICHE
HERBARIUM CAG

Taxon *Paeonia corsica* Sieber ex Tausch

Località di raccolta Funtana Giacumeddu, Tempio (OT

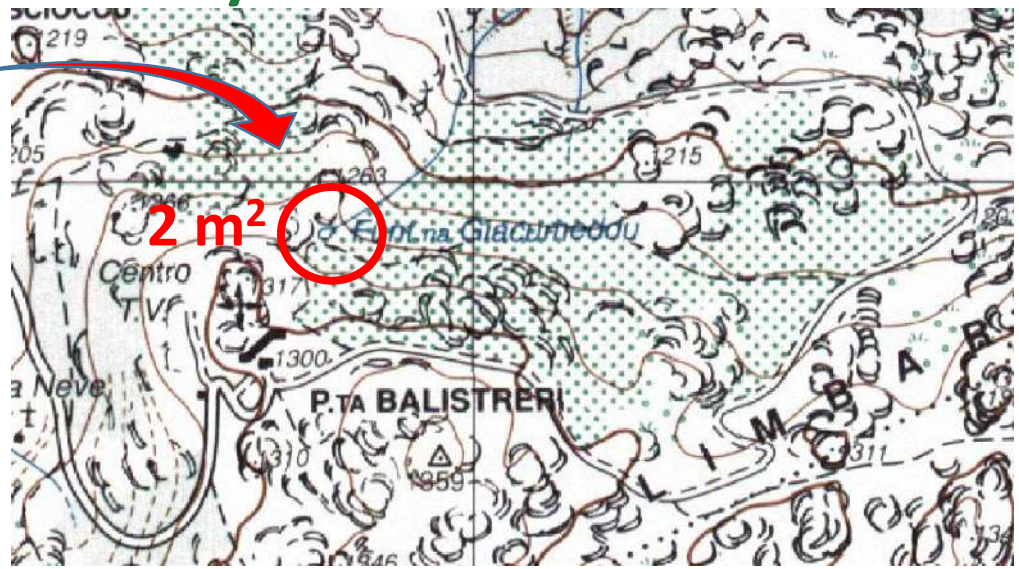
Biocl.: supramedit.inf./umido sup. - substr.: graniti

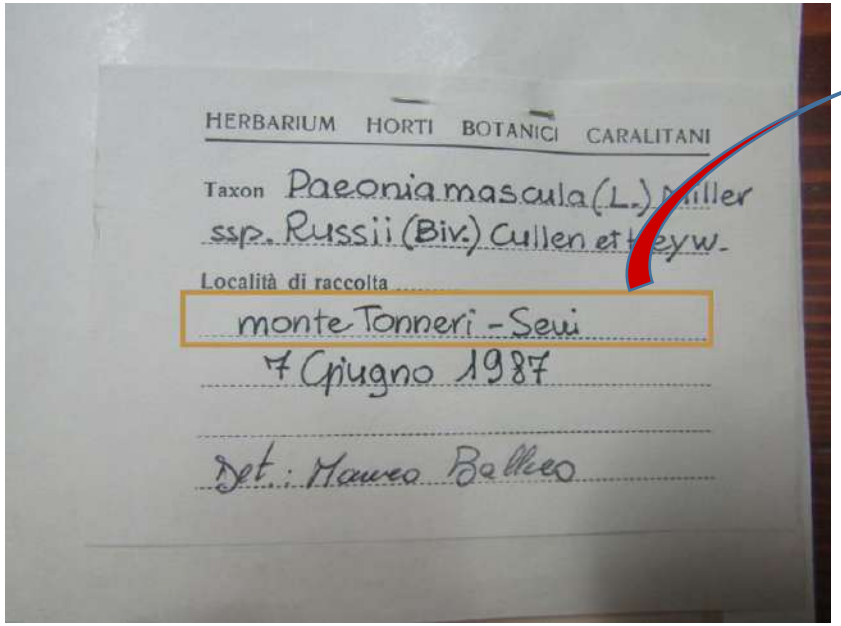
Coord. 40° 51' 18,76" N 9° 11' 11.62" E - esp.ne N-NE

incl.ne 0-20° - 1280-1315 m s.l.m.

17.08.2009

Leg. et Det. Bacchetta, Congiu et Orrù

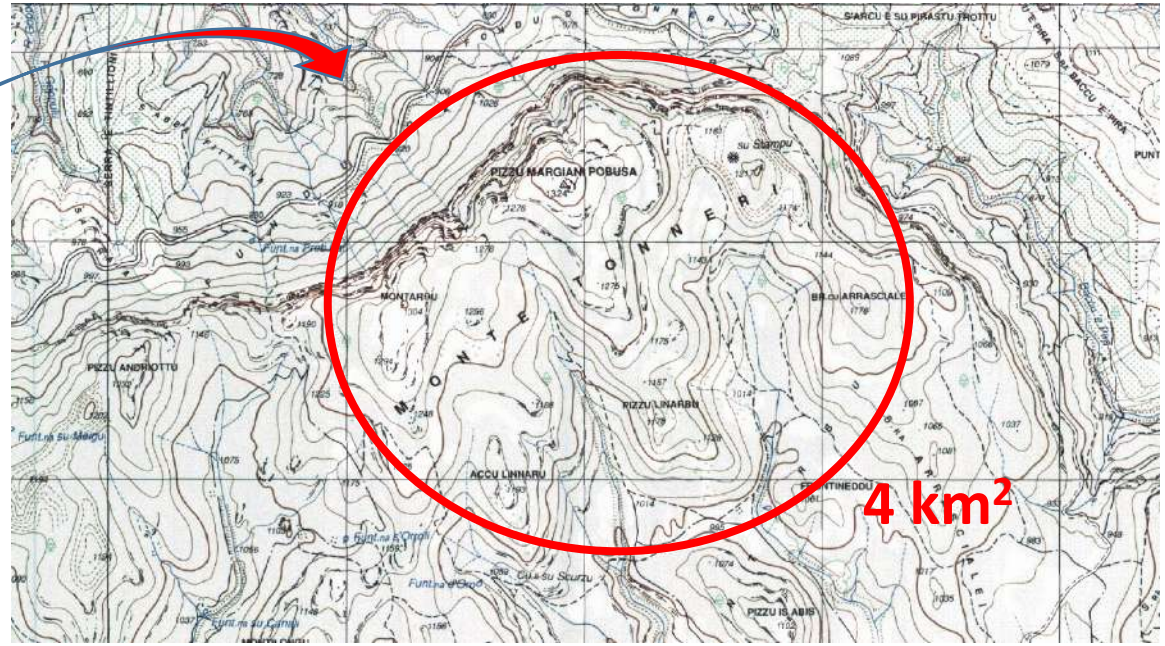



HERBARIUM HORTI BOTANICI CARALITANI

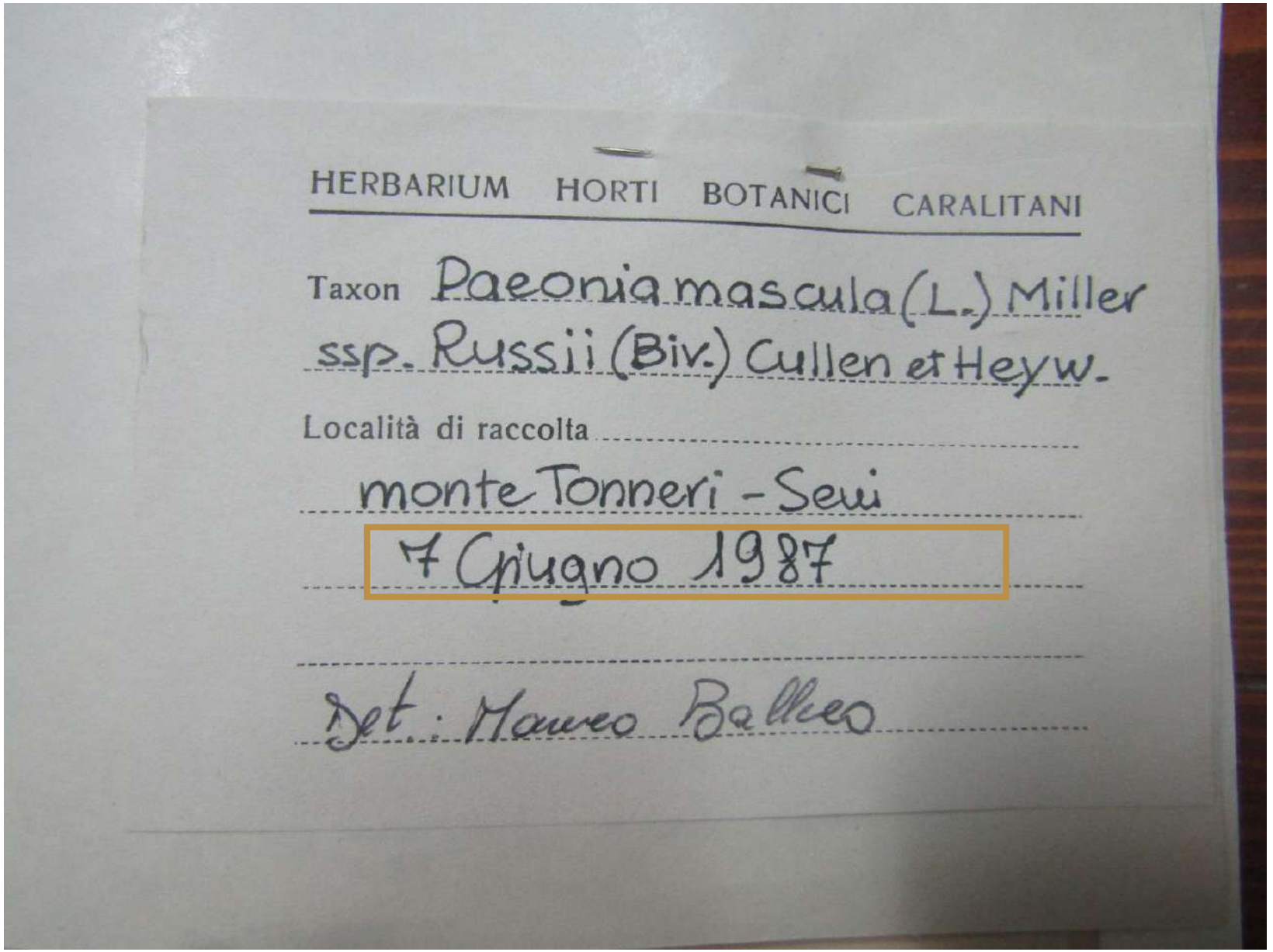
Taxon *Paeonia mascula* (L.) Miller
ssp. *Russii* (Biv.) Cullen et Heyw.

Località di raccolta
monte Tonneri - Seui
7 Giugno 1987

Det.: Mauro Bacchetta



Date


HERBARIUM HORTI BOTANICI CARALITANI

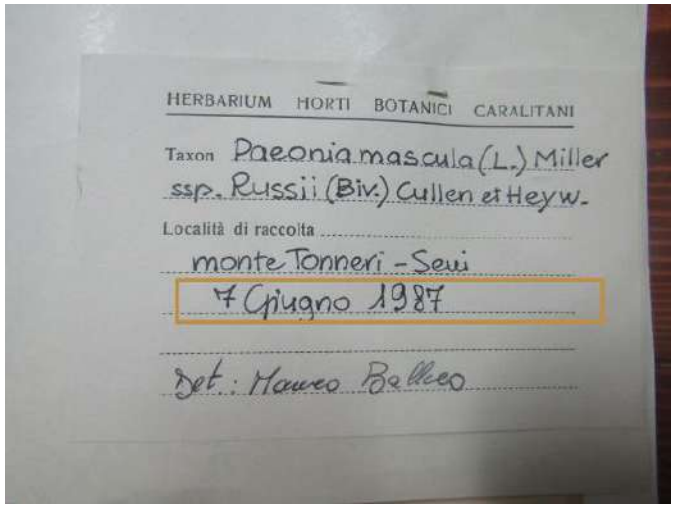
Taxon Paeonia mascula (L.) Miller
ssp. Russii (Biv.) Cullen et Heyw.

Località di raccolta

monte Tonneri - Seui

7 Giugno 1987

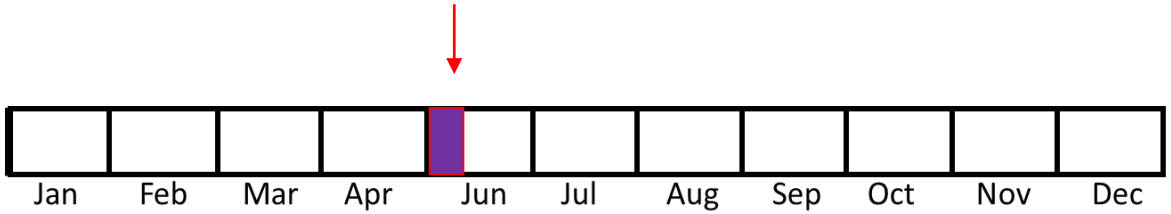
Det.: Mauro Balleo



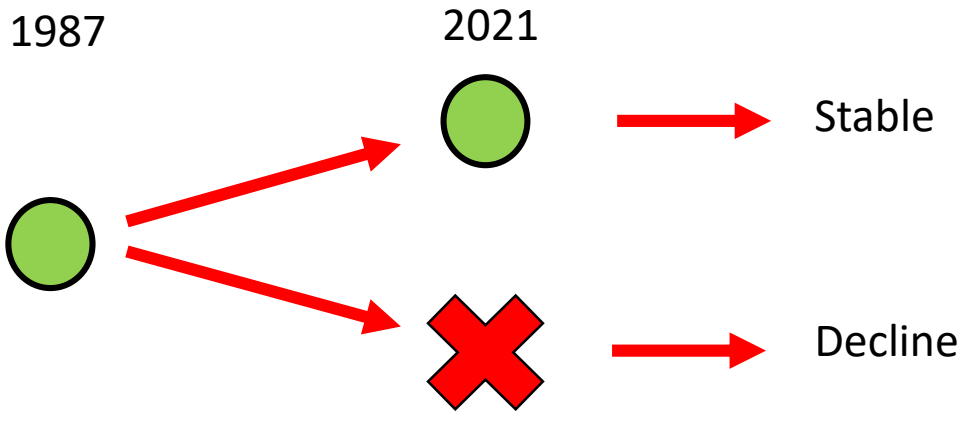
Date

1987, 1300 m asl, precipitation, temperature, etc.

Phenology



Geographic presence



Literature

Universidad del País Vasco / Euskal Herriko Unibertsitatea

GuineanA

12

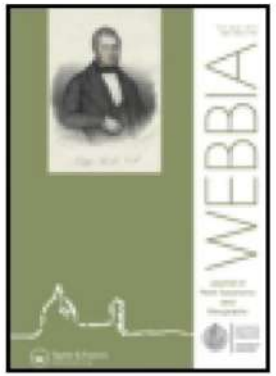
Flora vascolare del Sulcis
(Sardegna Sud-Occidentale, Italia)

UnissResearch

Università degli studi di Sassari

Bagella, Simonetta (1985) *Indagini floristiche e fenologiche sulle coste settentrionali della Sardegna: la spiaggia del Liscia*. Bollettino della Società sarda di scienze naturali, Vol. 24 (1985), p. 171-206. ISSN 0392-6710.

http://eprints.uniss.it/3293/



Webbia: Journal of Plant Taxonomy and Geography
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/tweb20

La flora della penisola di Capo Frasca (Sardegna centro occidentale)

Emanuele Bocchieri [a] & Bonaria Mulas [a]
[a] Istituto di Botanica e Orto Botanico dell'Università , Viale Frà Ignazio 13, I-09123 , Cagliari
Published online: 14 Apr 2013.

UNIVERSITÀ DEGLI STUDI DI CAGLIARI

FACOLTÀ DI SCIENZE MM.FF:NN.
DIPARTIMENTO DI SCIENZE BOTANICHE

Dottorato di ricerca in Botanica ambientale ed applicata
(XIX ciclo)

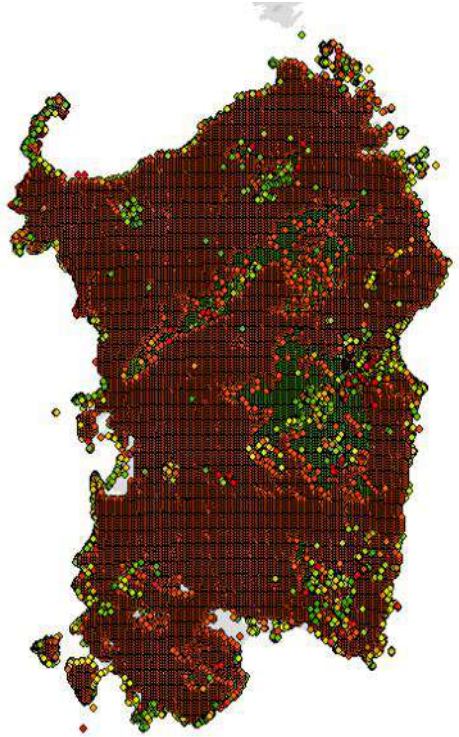
Settore Scientifico Disciplinare BIO/03
Coordinatore: Prof. *Luigi Mossa*

Tutor: Prof. *Gianluigi Bacchetta*

LA FLORA DELL'IGLESIENTE (SARDEGNA SW)

Field observations

Geodatabase of Endemic vascular plants of Sardinia: the database



60.232 records of **290** endemic plant taxa

FID	Shape	FID_1	Id	DECIMAL_X	DECIMAL_Y	mod	id	taxon
92	Point	0	223	535181,72666	4417797,95848	0	223	Allium parciflorum Viv.
107	Point	0	223	531334,619024	4408344,60895	0	223	Allium parciflorum Viv.
625	Point	0	223	531939,504115	4408572,56941	0	223	Allium parciflorum Viv.
626	Point	0	223	532555,859888	4414746,0585	0	223	Allium parciflorum Viv.
627	Point	0	223	532270,404591	4415757,72857	0	223	Allium parciflorum Viv.
1088	Point	0	2036	533744,597796	4416406,83021	0	2036	Amelanchier ovalis Medik.
1089	Point	0	2036	535139,035659	4417818,69855	0	2036	Amelanchier ovalis Medik.
1090	Point	0	2036	531310,141693	4415558,54718	0	2036	Amelanchier ovalis Medik.
1091	Point	0	2036	531966,68952	4415645,69954	0	2036	Amelanchier ovalis Medik.
1092	Point	0	2036	532257,197409	4415901,34649	0	2036	Amelanchier ovalis Medik.
1093	Point	0	2036	532716,199872	4416331,29816	0	2036	Amelanchier ovalis Medik.
1094	Point	0	2036	533058,99918	4416447,50132	0	2036	Amelanchier ovalis Medik.

Coordinates

Accuracy

Species name

Source

Date

Geodatabase of Endemic vascular plants of Sardinia: first results

Università degli Studi di Cagliari

Facoltà di Scienze Matematiche, Fisiche e Naturali
Dipartimento di Scienze della Vita e dell'Ambiente

Corso di laurea magistrale in Scienze della Natura
Anno Accademico 2010/2011

La flora endemica come strumento per la definizione biogeografica dei territori della Sardegna

Candidato
Mauro Fois

Relatori
Prof. Gianluigi Bacchetta
Prof.ssa Elisabetta Marini

Correlatore
PhD. Giuseppe Fenu

Tutor esterno
PhD. Eva Cañadas

2012

Systematics and Biodiversity (2014), **12(2)**: 181–193

Taylor & Francis

Research Article

Using endemic-plant distribution, geology and geomorphology in biogeography: the case of Sardinia (Mediterranean Basin)

GIUSEPPE FENU, MAURO FOIS, EVA M. CAÑADAS & GIANLUIGI BACCHETTA

Centro Conservazione Biodiversità (CCB), Dipartimento di Scienze della Vita e dell'Ambiente, Università degli Studi di Cagliari, Viale Sant'Ignazio da Laconi, 11-13, I-09123, Cagliari, Italia

(Received 18 July 2013; revised 9 January 2014; accepted 10 February 2014)

The importance of robust systems for classifying biogeographical patterns has been emphasized for its usefulness in designing conservation strategies. For such purposes, the distribution patterns of the endemic flora have often been used. Several studies have identified phytogeographical units within Sardinia (western Mediterranean); however, the main part of the island remains unstudied. Thus, the aim of this study is to lay out a comprehensive biogeographical scheme for Sardinia based on endemic vascular plant distributions, together with geological and geomorphological units. We georeferenced, in a 1-km^2 grid cell, the presence of 290 vascular endemic taxa from the literature, herbarium specimens and field investigators' research. Sardinia was subdivided into 31 homogeneous units through the integration of geological and geomorphological maps and, subsequently, a presence–absence matrix of endemic taxa in each unit was built. Hierarchical cluster analysis was performed to define two levels of biogeographical units (i.e. sectors and subsectors). For each unit the exclusive and differential endemic taxa were identified. For sectors, indicator species were explored by the Indicator Value (Ind Val) analysis and relationships were analysed by quantitative interaction web. A total of six sectors and 22 subsectors were identified. The highest endemic plant richness was found in the Campidanese-Turritano, Sulcitano-Iglesiente and Supramontano sectors, and in the Gennargentu, Barbaricino, Iglesiente and Sulcitano subsectors. All sectors were characterized by the presence of exclusive, differential and indicator taxa. The interaction analysis showed the highest uniqueness in endemic flora in the Supramontano and Sulcitano-Iglesiente sectors, which hosted a high number of exclusive endemic species. Mostly mountainous sectors/subsectors had higher endemic-species richness compared with lowland ones. The study showed the relevance of geology and geomorphology, together with accurate data on endemic distribution, to define consistent phytogeographical units. Furthermore, the biogeographical scheme presented here helps to define area-based conservation strategies in Sardinia.

Keywords: conservation, continental island, endemic plant richness, geology, geomorphology, Mediterranean vascular flora

Introduction

Biogeography is a comparative science that attempts to describe and explain spatial patterns of biological diversity on Earth, with respect to its geological history and how these patterns change over time (Lomolino *et al.*, 2006; Parenti & Ebach, 2009). In recent years, the importance of robust systems seeking to classify biogeographical patterns has been emphasized (Whittaker *et al.*, 2005; Mackey *et al.*, 2008; Kreft & Jetz, 2010) for their usefulness in conservation planning (e.g. Mackey *et al.*, 2008 and references therein; Luna-Vega *et al.*, 2013). In this sense, distribution patterns of the vascular flora (e.g. Rivas-Martínez *et al.*, 2002; Moreno Saiz & Lobo, 2008; Moreno Saiz *et al.*, 2013), and in particular of endemic flora (e.g. Rivas Martínez *et al.*, 1997; García Barros *et al.*, 2002; Santa Anna Del Conde *et al.*, 2009; Medina-Cazorla *et al.*, 2010; González-Orozco *et al.*, 2013) has often been used to describe biogeographical schemes.

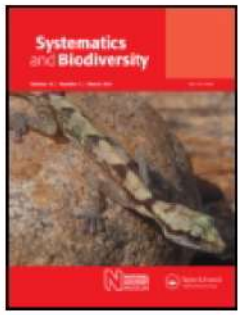
The spatial distribution of endemic species is not random (e.g. Laffan & Crisp 2003; Tribsch, 2004; Casazza *et al.*, 2008; Essl *et al.*, 2009); but is uneven across the world's land areas, with endemic species often being concentrated in specific regions or habitats (Trigas *et al.*, 2012). Several factors shape endemic distribution patterns, such as area, biotic interactions, stochastic events, habitat diversity, isolation and human impact (e.g. Lobo *et al.*, 2001; Willerslev *et al.*, 2002; MacMaster, 2005; Panitsa *et al.*, 2006; Casazza *et al.*, 2008; Duarte *et al.*, 2008). In addition, the current distribution of endemic species on continental Mediterranean

Corresponding author: Eva M. Cañadas. E-mail: ecanadas@ugr.es

ISSN 1477-2000 print / 1478-0933 online
© The Trustees of the Natural History Museum, London 2014. All Rights Reserved.
http://dx.doi.org/10.1080/14772000.2014.894592

2014

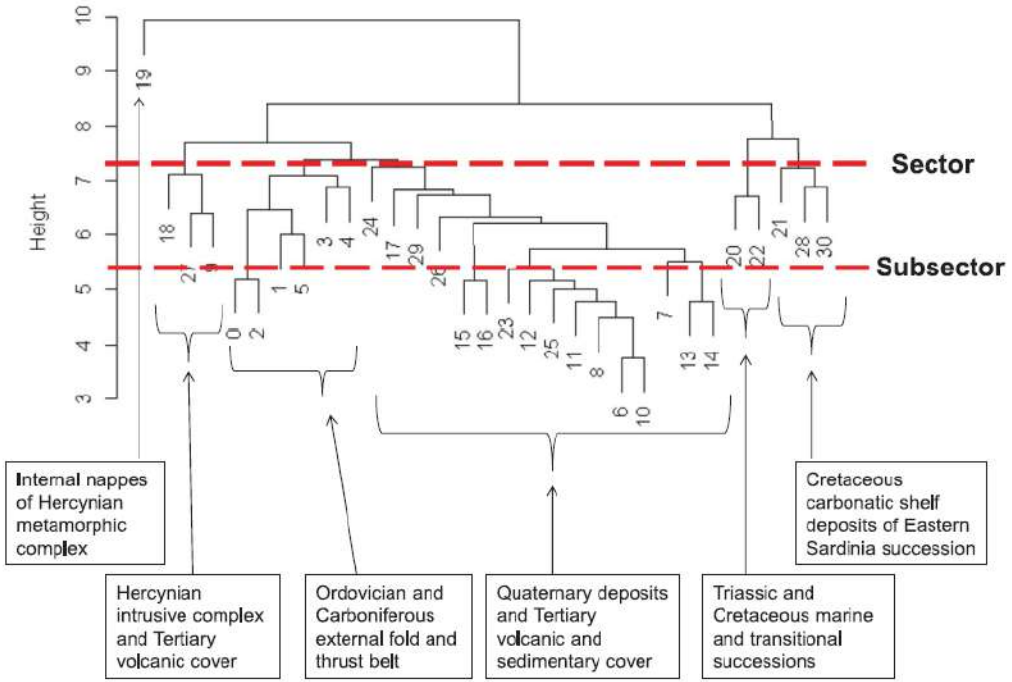
Geodatabase of Endemic vascular plants of Sardinia: first results



Systematics and Biodiversity
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/tsab20

Using endemic-plant distribution, geology and geomorphology in biogeography: the case of Sardinia (Mediterranean Basin)

Giuseppe Fenu[a], Mauro Fois[a], Eva M. Cañadas[a] & Gianluigi Bacchetta[a]
[a] Centro Conservazione Biodiversità (CCB), Dipartimento di Scienze della Vita e dell'Ambiente, Università degli Studi di Cagliari, Viale Sant'Ignazio da Laconi, 11-13, I-09123, Cagliari, Italia
Published online: 24 Mar 2014.



IF: 2.2
43 Citations

Clarivate Analytics
WEB OF SCIENCE™

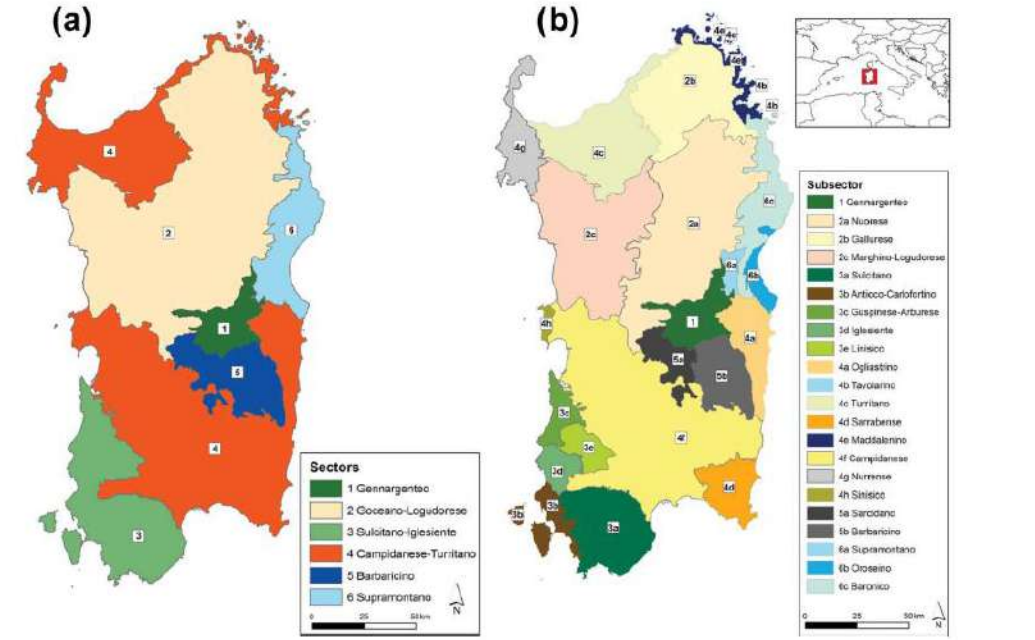


Fig. 2. Biogeographical regionalization in sectors (a) and subsectors (b) of Sardinia based on the distribution of endemic vascular plants.

Applications in Conservation planning (e.g. seed collection for restoration activities)

12 Conservation status assessments

ISSN-0020-0697

Informatore Botanico Italiano

BOLLETTINO DELLA SOCIETÀ BOTANICA ITALIANA ONLUS

VOLUME 40 • SUPPLEMENTO 1 LUGLIO 2008

Flora da conservare

Iniziativa per l'implementazione in Italia delle categorie e dei criteri IUCN (2001) per la redazione di nuove Liste Rosse

INFORMATORE BOTANICO ITALIANO, 45 (2) 319-390, 2013
Schede per una Lista Rossa della Flora vascolare e crittogamica Italiana

Genista ovina Bacch., Brullo *et* Feoli Chiapella

M. FOIS, A. CUENA, G. FENU, G. BACCHETTA

Helicodiceros muscivorus (L.f.) Engl.

E.M. CAÑADAS, G. FENU, M. FOIS, V. MURRU, G. BACCHETTA

Costs: Equipment

100€

1000€

Usually free for students

Free

ArcGIS

100€/y (student license)

Costs: Time/Personnel

2 Years → willingness

1 Student (master degree) → grants

3 Supervisors → expertise

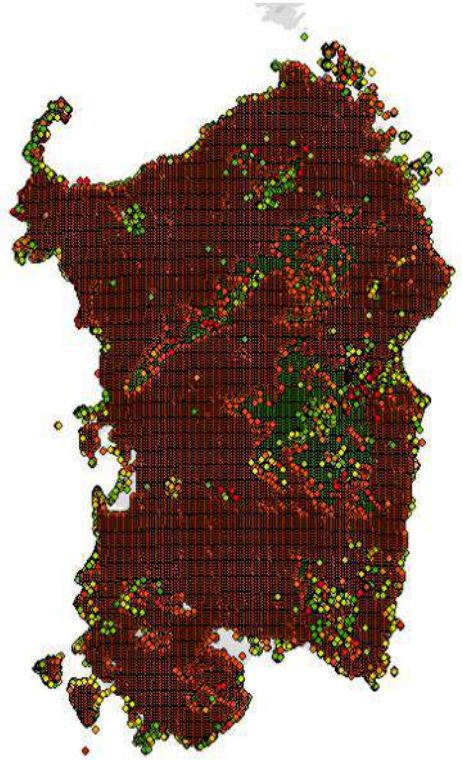
Costs: Personnel

2 Years → willingness

1 Student (master degree) → PATIENCE

3 Supervisors → PATIENCE

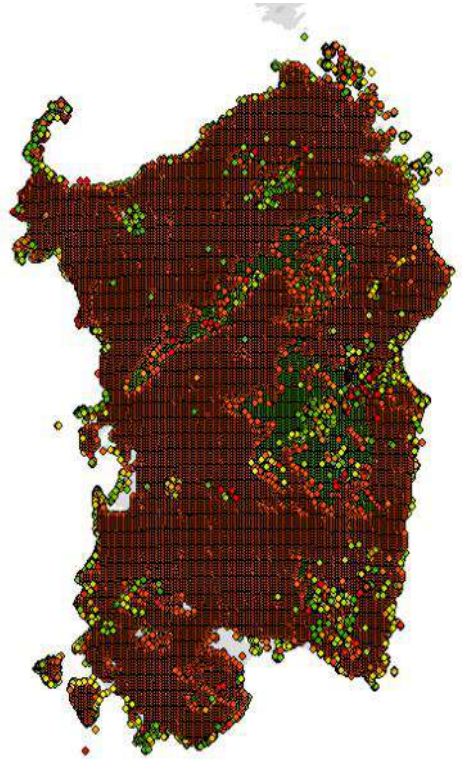
Geodatabase of Endemic vascular plants of Sardinia: other applications



60.232 records of **290** endemic plant taxa

- ✓ Atlas of endangered plants
- ✓ Conservation status assessments
- ✓ Biogeographic regionalization

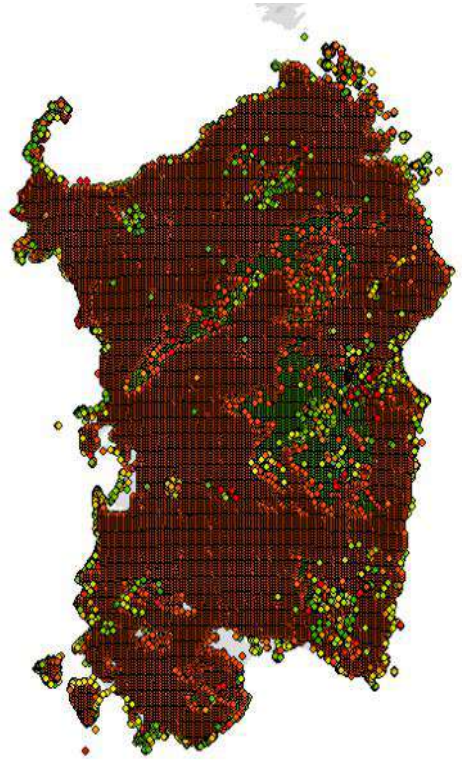
Geodatabase of Endemic vascular plants of Sardinia: other applications



60.232 records of **290** endemic plant taxa

- ✓ Atlas of endangered plants — 2010
- ✓ Conservation status assessments — 2012-14
- ✓ Biogeographic regionalization — 2014
- Next? — ???

Geodatabase of Endemic vascular plants of Sardinia: other applications



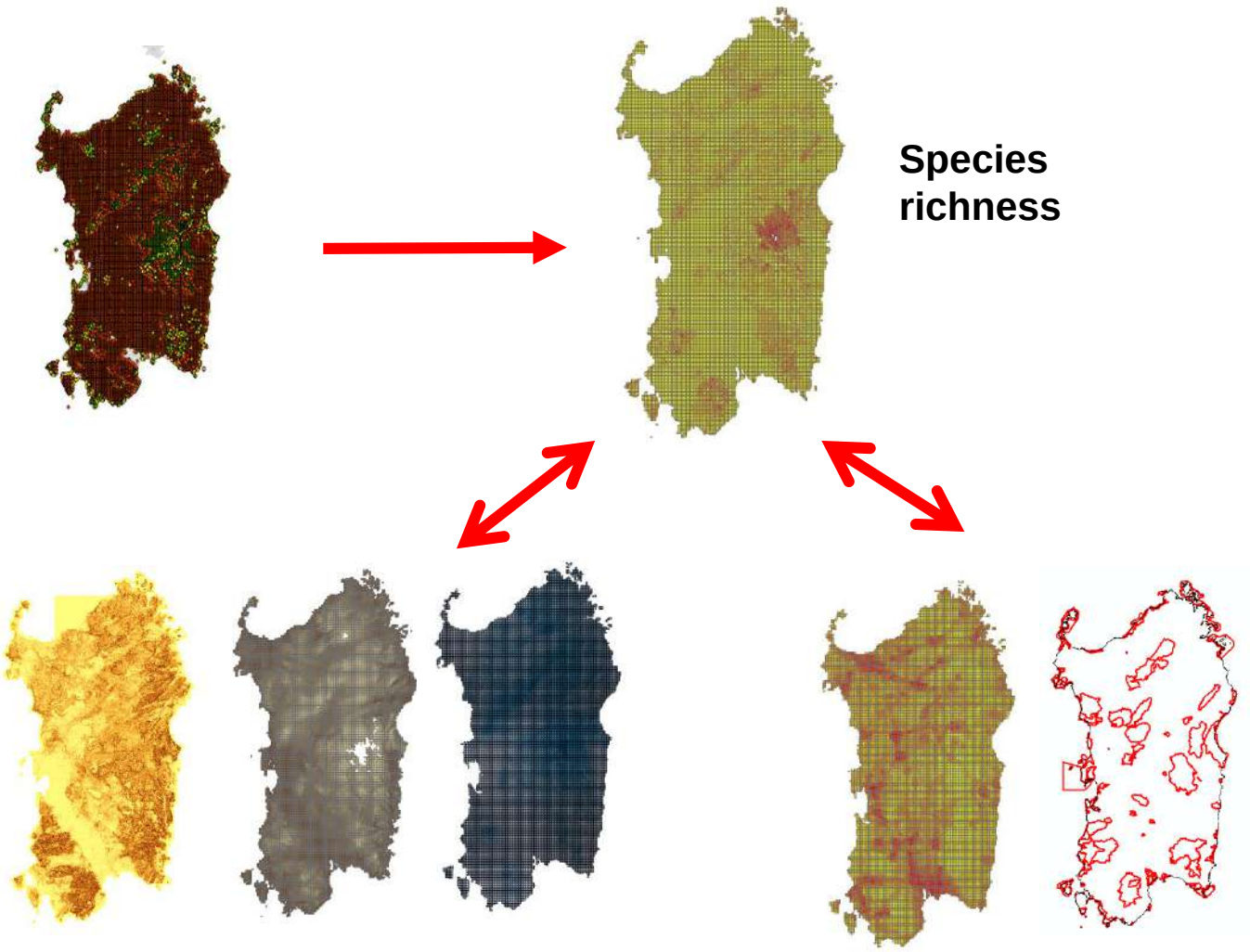
60.232 records of **290** endemic plant taxa

- ✓ Atlas of endangered plants — 2010
- ✓ Conservation status assessments — 2012-14
- ✓ Biogeographic regionalization — 2014
- ✓ PhD (3 years) — 2015-18

Financed by
REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

Geodatabase of Endemic vascular plants of Sardinia: PhD (2015-2018)

60.232 records of **290** endemic plant taxa

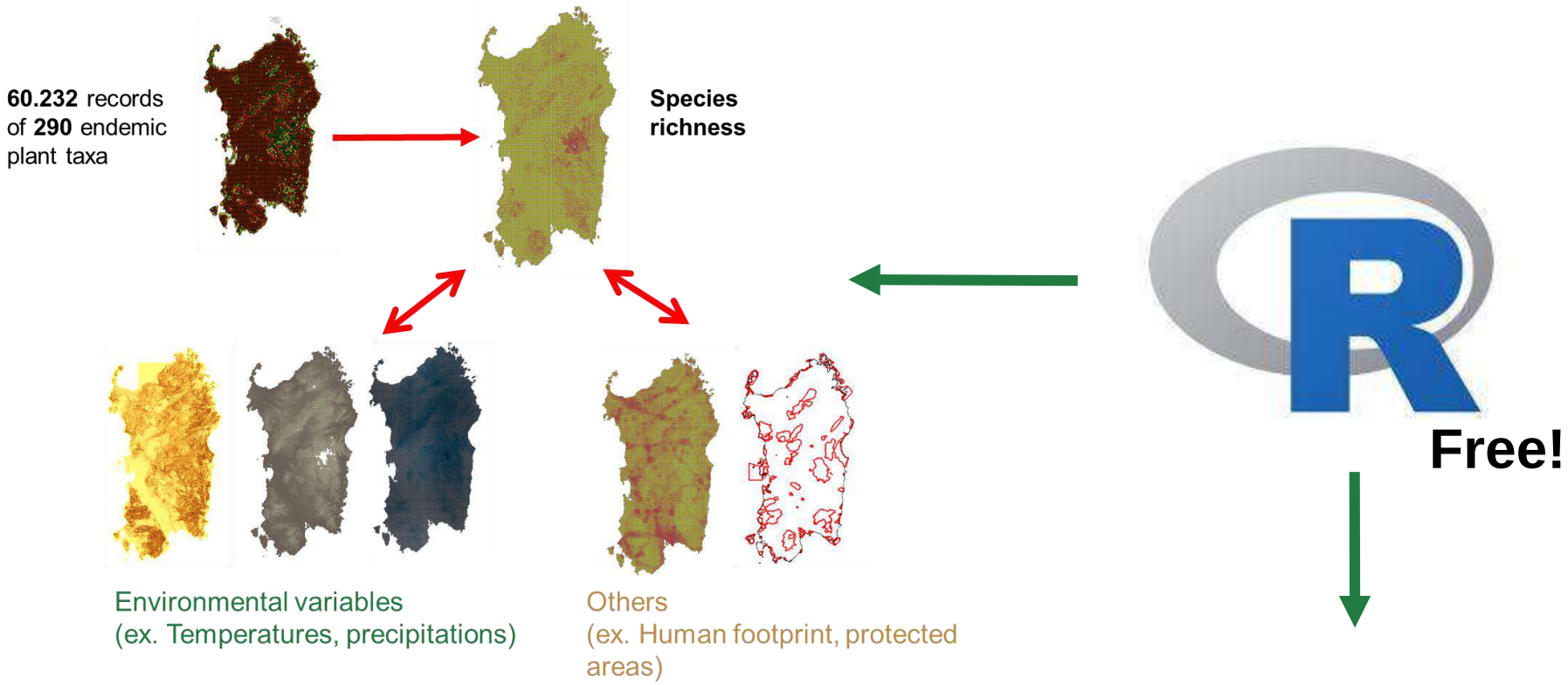


Species richness

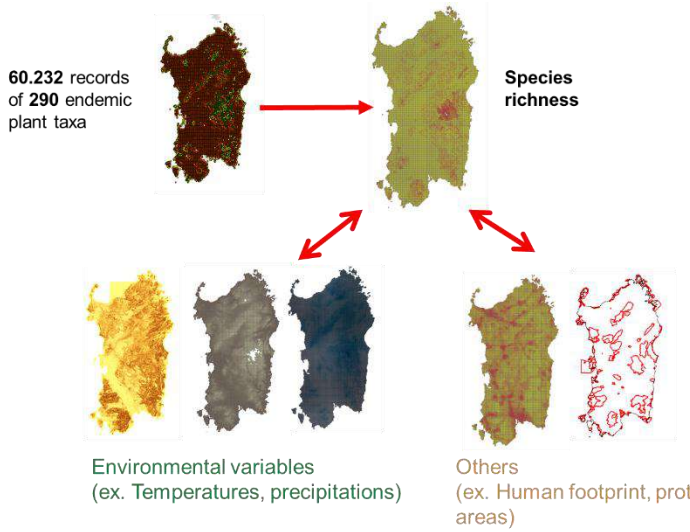
Environmental variables
(ex. Temperatures, precipitations)

Others
(ex. Human footprint, protected areas)

Geodatabase of Endemic vascular plants of Sardinia: PhD (2015-2018)



Geodatabase of Endemic vascular plants of Sardinia: PhD (2015-2018)



Courses

Imperial College London

Extract

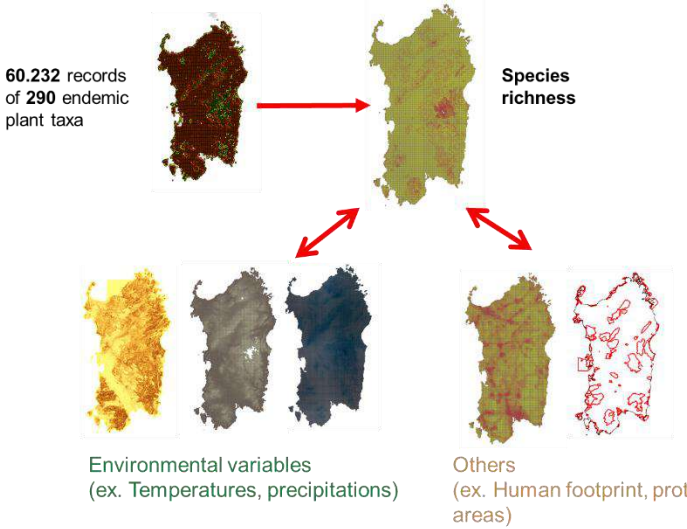
Predict

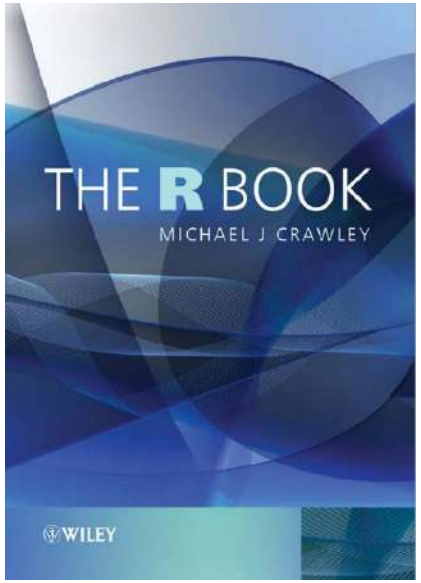
Glm, lm …

Financed by

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

Geodatabase of Endemic vascular plants of Sardinia: PhD (2015-2018)






Multivariate Analysis of Ecological Communities in R: vegan tutorial

Jari Oksanen

September 9, 2010

Abstract

Contents

Books & Tutorials

Extract

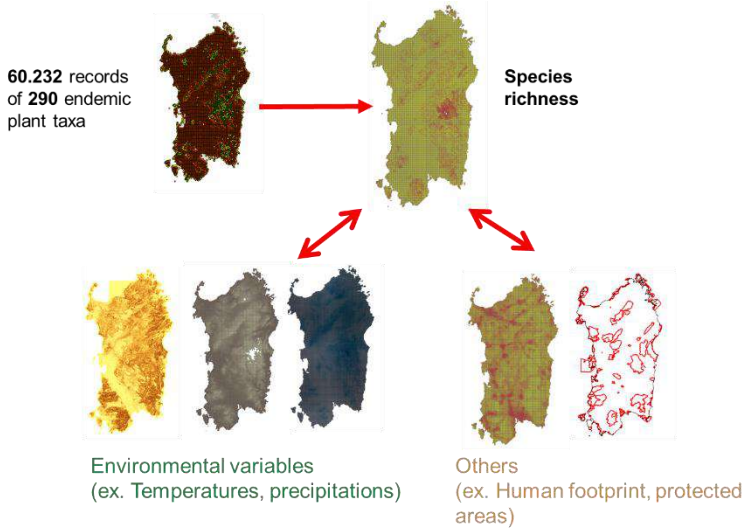
Predict

Glm, lm …

Financed by

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

Geodatabase of Endemic vascular plants of Sardinia: PhD (2015-2018)



Extract

Predict

Glm, lm …

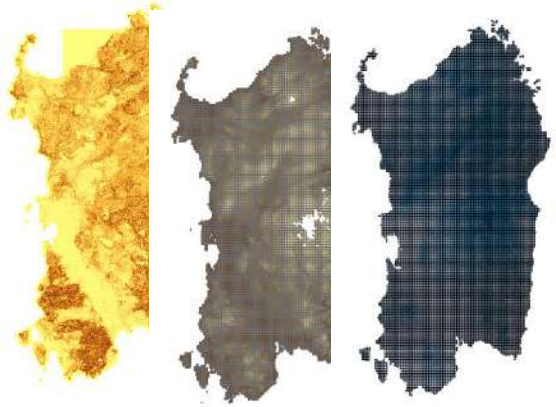
Web resouces

Financed by
REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

Geodatabase of Endemic vascular plants of Sardinia: Species richness

Endemic Species richness

+



Environmental variables
(ex. Temperatures, precipitations)

Generalized Linear Models (R)

PLOS ONE

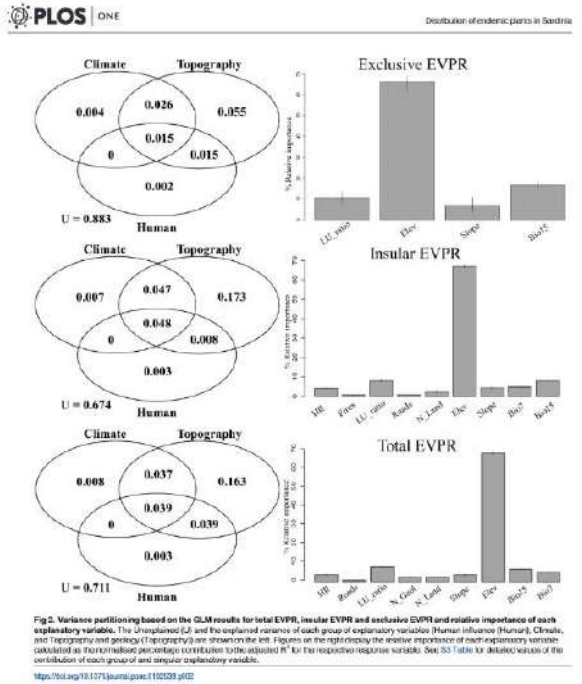
RESEARCH ARTICLE

Disentangling the influence of environmental and anthropogenic factors on the distribution of endemic vascular plants in Sardinia

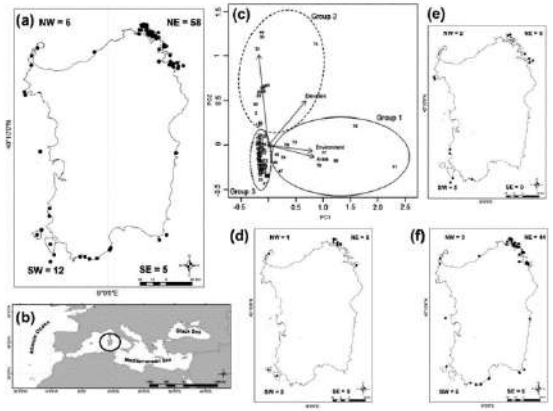
Mauro Fois[1], Giuseppe Fenu[1,2]*, Eva Maria Cañadas[3], Gianluigi Bacchetta[1]

1 Centro Conservazione Biodiversità (CCB), Dipartimento di Scienze della Vita e dell'Ambiente, Università degli Studi di Cagliari, Cagliari, Italia, **2** Dipartimento di Biologia Ambientale, 'Sapienza' Università di Roma, Roma, Italia, **3** Departamento de Botánica, Facultad de Ciencias, Universidad de Granada, Granada, Spain

* giuseppe.fenu@uniroma1.it

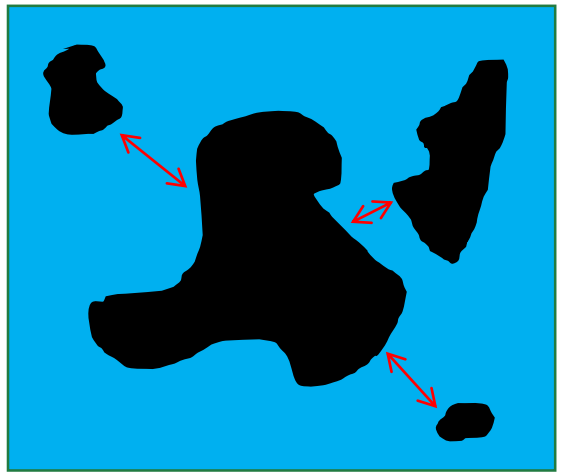


Geodatabase of Endemic vascular plants of Sardinia: Species richness



Species richness in small islands

+



Islets attributes (area, perimeter, max. elevation, isolation)

Generalized Linear Models (R)

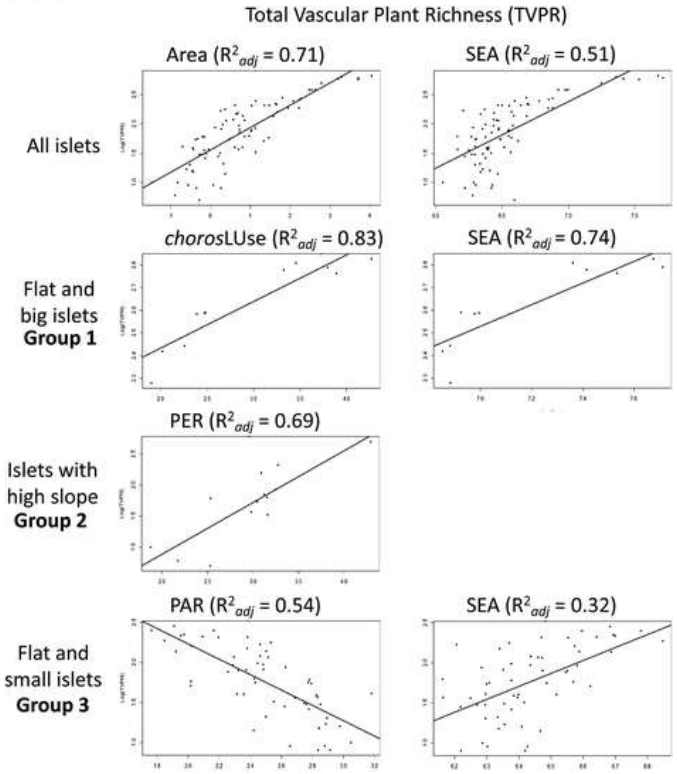
Biodivers Conserv (2016) 25:1091–1106
DOI 10.1007/s10531-016-1110-1

CrossMark

ORIGINAL PAPER

Global analyses underrate part of the story: finding applicable results for the conservation planning of small Sardinian islets' flora

Mauro Fois[1] · Giuseppe Fenu[2] · Gianluigi Bacchetta[1]



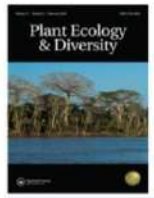
Geodatabase of Endemic vascular plants of Sardinia: Species richness

Species richness

+

Protected areas
(Gap analyses)

GAP analyses (QGIS)



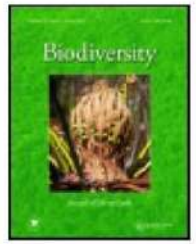
Plant Ecology & Diversity

Taylor & Francis

ISSN: 1755-0874 (Print) 1755-1668 (Online) Journal homepage: http://www.tandfonline.com/loi/tped20

Identifying and assessing the efficiency of different networks of a fine-scale hierarchy of biodiversity hotspots

Mauro Fois, Giuseppe Fenu & Gianluigi Bacchetta



Biodiversity

Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/tbid20

The Aichi Biodiversity Target 12 at regional level: an achievable goal?

Giuseppe Fenu[ab], Mauro Fois[b], Donatella Cogoni[b], Marco Porceddu[b], Maria Silvia Pinna[bc], Alba Cuena Lombraña[b], Anna Nebot[b], Elena Sulis[b], Rosangela Picciau[b], Andrea Santo[b], Valentina Murru[b], Martino Orrù[b] & Gianluigi Bacchetta[b]

[a] Dipartimento di Biologia Ambientale, Sapienza Università di Roma, Roma, Italia

[b] Centro Conservazione Biodiversità (CCB), Dipartimento di Scienze della Vita e dell'Ambiente, Università degli Studi di Cagliari, Cagliari, Italia

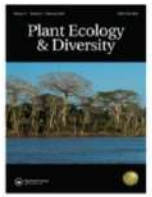
[c] DIAEE Dipartimento di Ingegneria Astronautica Elettrica ed Energetica, Sapienza Università di Roma, Roma, Italia

Published online: 16 Jul 2015.

CrossMark

Click for updates

Geodatabase of Endemic vascular plants of Sardinia: Species richness

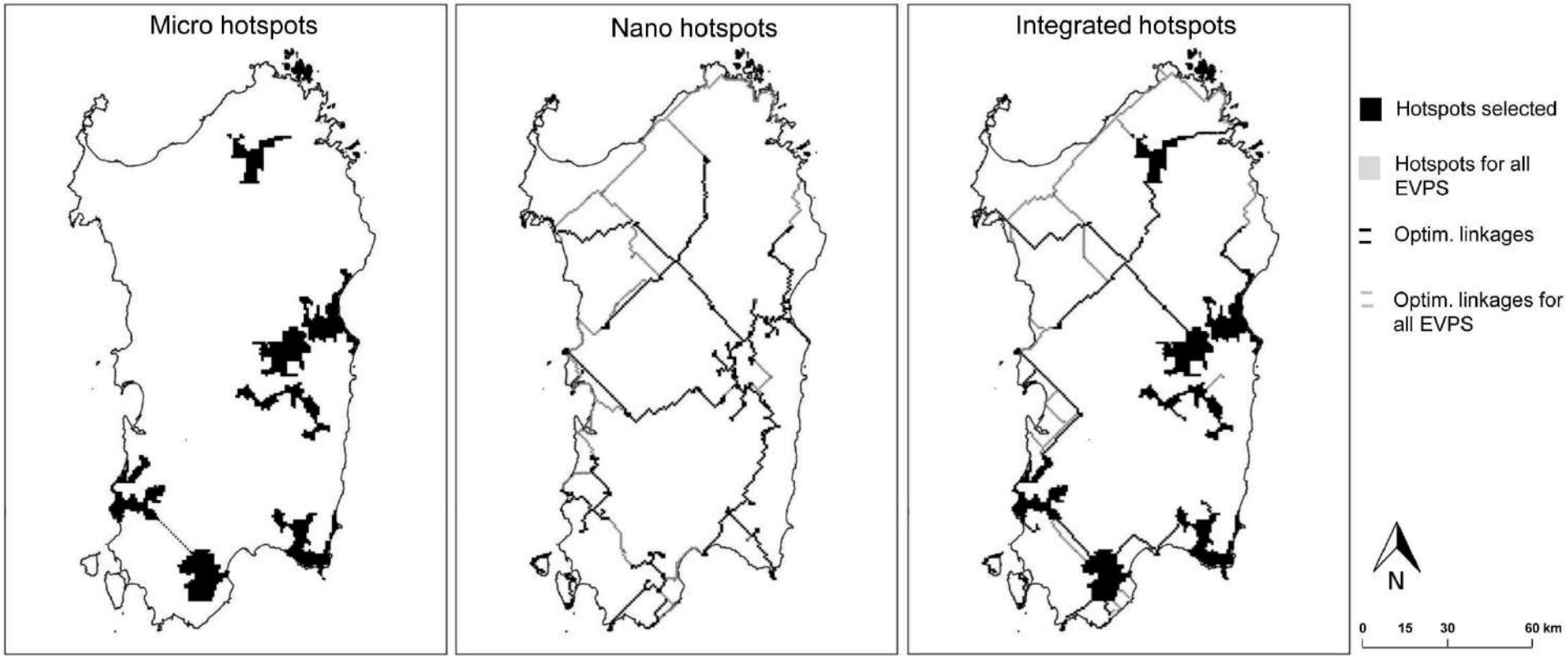


Plant Ecology & Diversity

ISSN: 1755-0874 (Print) 1755-1668 (Online) Journal homepage: http://www.tandfonline.com/loi/tped20

Identifying and assessing the efficiency of different networks of a fine-scale hierarchy of biodiversity hotspots

Mauro Fois, Giuseppe Fenu & Gianluigi Bacchetta



Geodatabase of Endemic vascular plants of Sardinia: Species Distribution Models

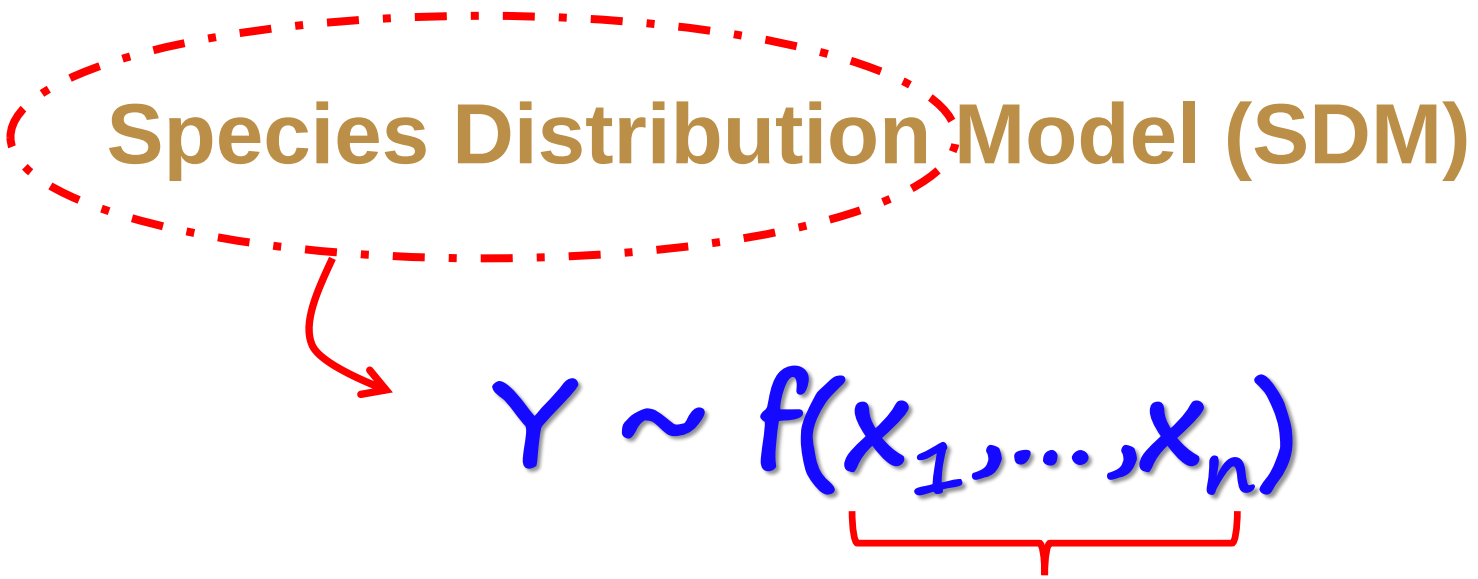
Presence/absence

+

Environmental variables
+ Human footprint

Species Distribution Model (SDM)

Geodatabase of Endemic vascular plants of Sardinia: Species Distribution Models

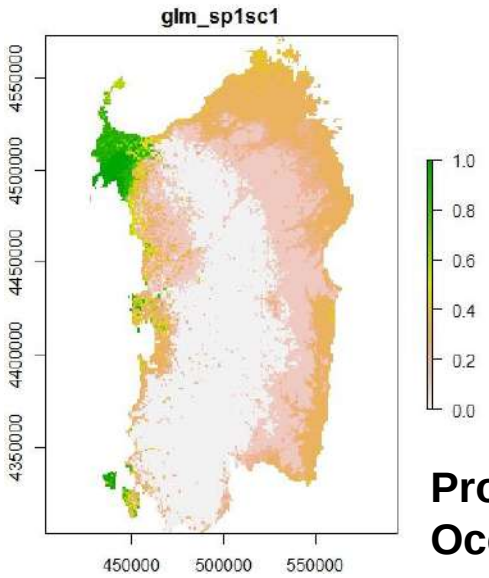


Species Distribution Models

Environmental variables (present)

Statistical relationship

Predictive Model



Probability of Species Occurrence (PRESENT)

Species observations

Generalized Linear Models (GLM)

Maximum Entropy (MaxEnt)

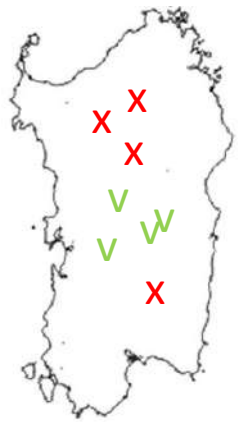
Random Forest (RF)

….

Species Distribution Models

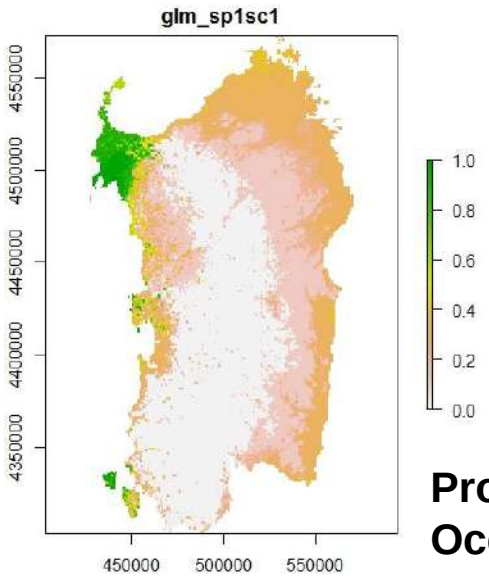
Environmental variables (future - ipcc)

Statistical relationship



Species observations

Predictive Model



Probability of Species Occurrence (FUTURE)

Generalized Linear Models (GLM)

Maximum Entropy (MaxEnt)

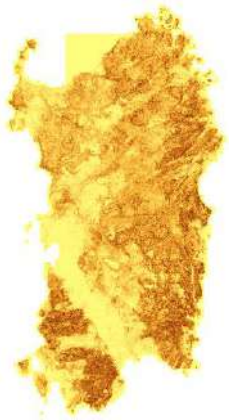
Random Forest (RF)

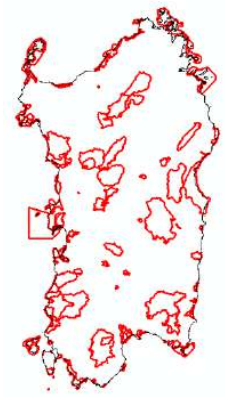
….

Geodatabase of Endemic vascular plants of Sardinia: Species Distribution Models

Presence/absence

+





SDMs

Environmental variables (present vs. future) + Protected areas (Gap analyses)

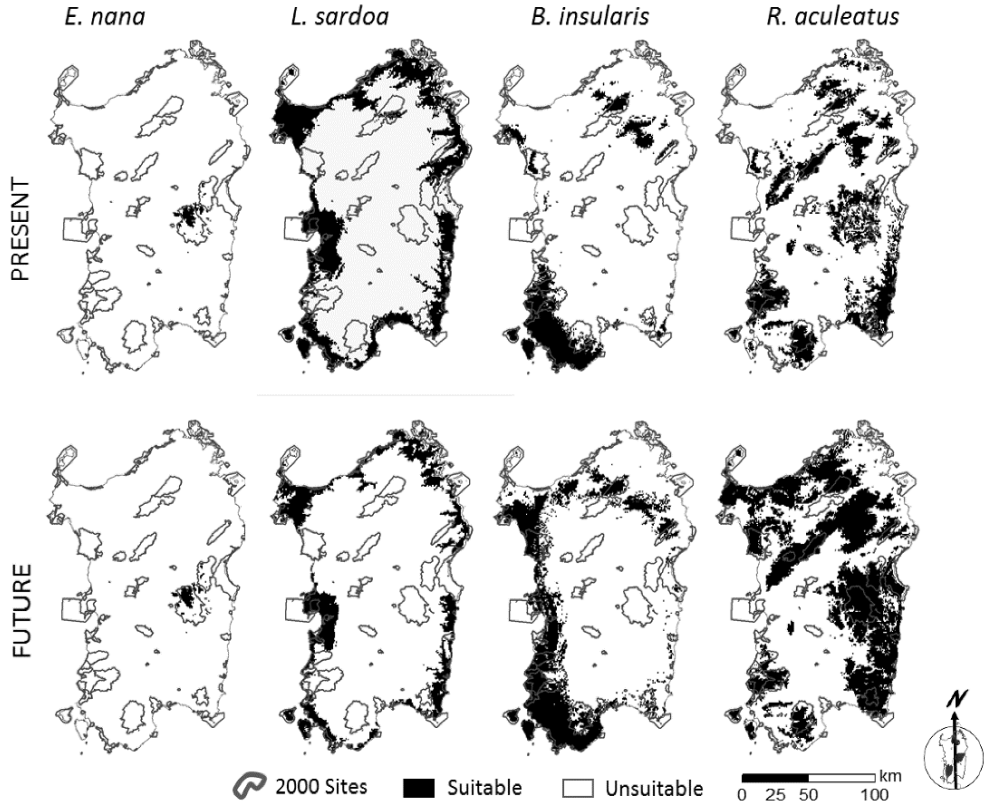
Journal of Environmental Planning and Management

ISSN: 0964-0568 (Print) 1360-0559 (Online) Journal homepage: http://www.tandfonline.com/loi/cjep20

Current and future effectiveness of the Natura 2000 network for protecting plant species in Sardinia: a nice and complex strategy in its raw state?

Mauro Fois, Gianluigi Bacchetta, Donatella Cogoni & Giuseppe Fenu

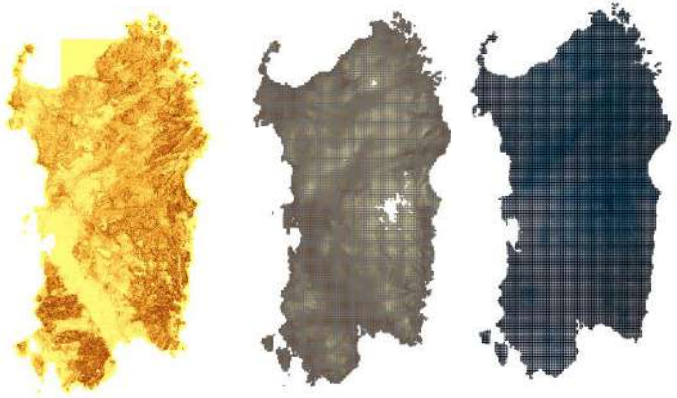
To cite this article: Mauro Fois, Gianluigi Bacchetta, Donatella Cogoni & Giuseppe Fenu (2018) Current and future effectiveness of the Natura 2000 network for protecting plant species in Sardinia: a nice and complex strategy in its raw state?, Journal of Environmental Planning and Management, 61:2, 332-347, DOI: 10.1080/09640568.2017.1306496



Geodatabase of Endemic vascular plants of Sardinia: Species Distribution Models

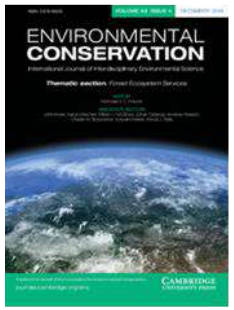
Local extintions

+



Environmental variables + Human footprint

SDMs



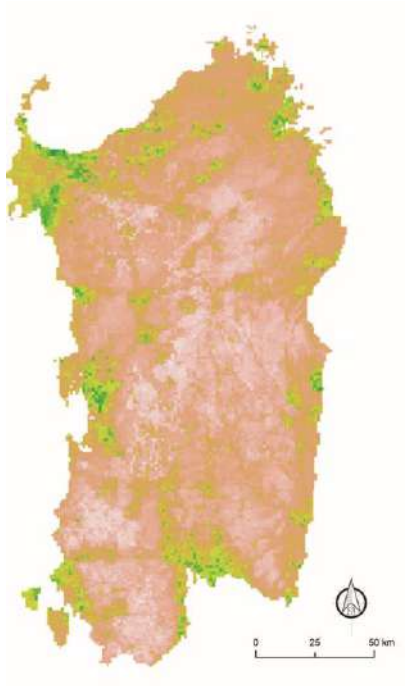
Environmental Conservation (2017) 0 (0): 1–9 © Foundation for Environmental Conservation 2017 doi:10.1017/S0376892917000108

Using extinctions in species distribution models to evaluate and predict threats: a contribution to plant conservation planning on the island of Sardinia

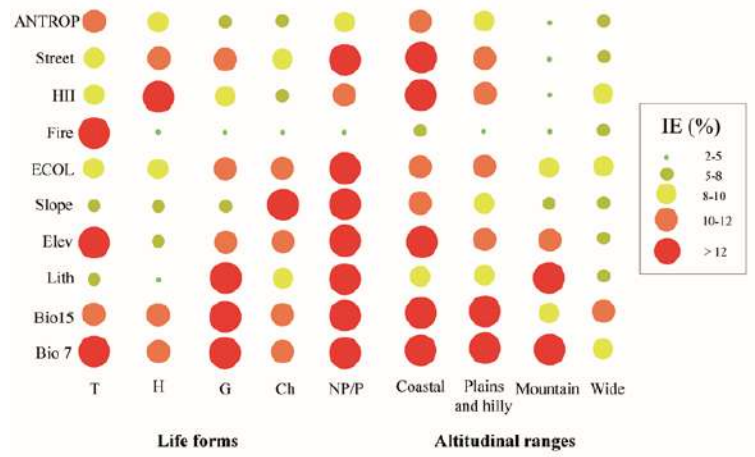
MAURO FOIS[1], GIANLUIGI BACCHETTA[1], ALBA CUENA-LOMBRAÑA[1], DONATELLA COGONI*[1], MARIA SILVIA PINNA[1], ELENA SULIS[1] AND GIUSEPPE FENU[1,2]
[1]*Centro Conservazione Biodiversità (CCB), Dipartimento di Scienze della Vita e dell'Ambiente, Università degli Studi di Cagliari, Viale S. Ignazio da Laconi 11–13, 09123, Cagliari, Italy and* [2]*Dipartimento di Biologia Ambientale, 'Sapienza' Università di Roma, P.le A. Moro 5, 00185, Rome, Italy*

Date submitted: 25 May 2016; Date accepted: 26 January 2017

THEMED ISSUE
Humans and Island Environments

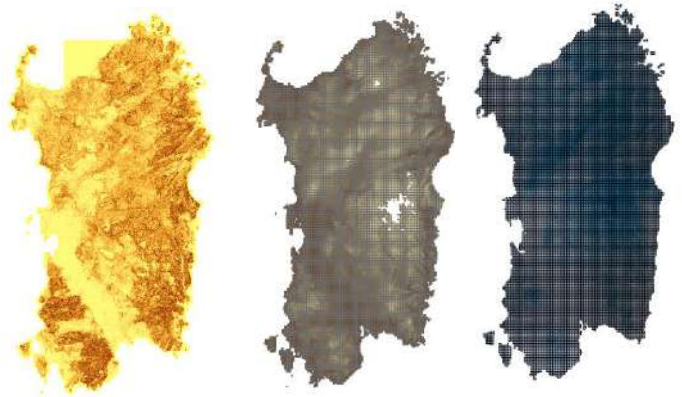


Potential map of extinctions



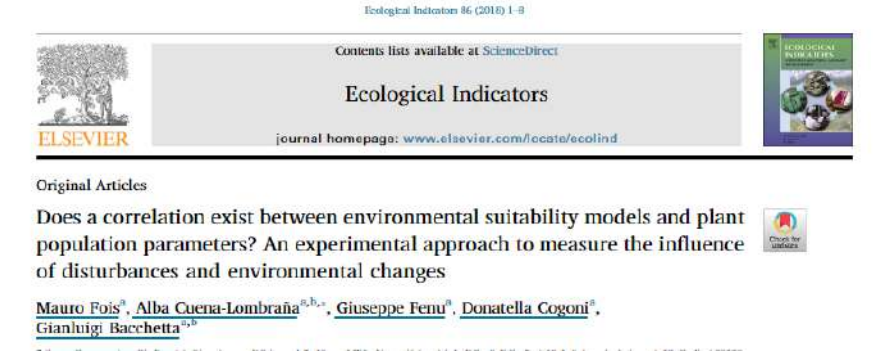
Geodatabase of Endemic vascular plants of Sardinia: Species Distribution Models

Presence/absence
(with post-hoc field validation)



SDMs

Environmental variables + Human footprint



Ecological Indicators 86 (2018) 1–8

Contents lists available at ScienceDirect

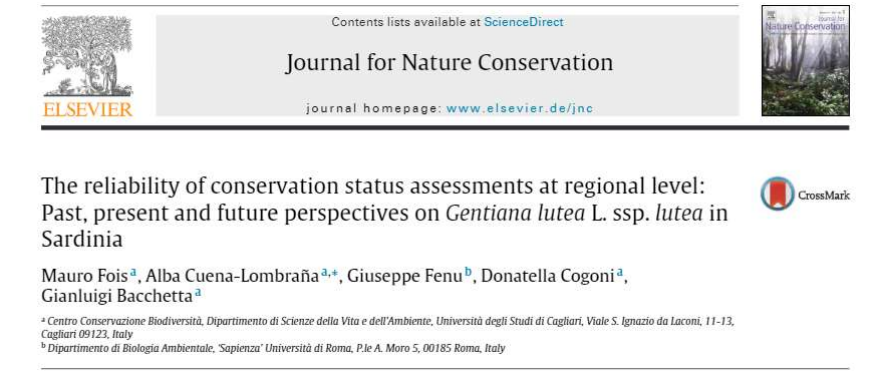
Ecological Indicators

journal homepage: www.elsevier.com/locate/ecolind

Original Articles

Does a correlation exist between environmental suitability models and plant population parameters? An experimental approach to measure the influence of disturbances and environmental changes

Mauro Fois[a], Alba Cuena-Lombraña[a,b,*], Giuseppe Fenu[a], Donatella Cogoni[a], Gianluigi Bacchetta[a,b]



Contents lists available at ScienceDirect

Journal for Nature Conservation

journal homepage: www.elsevier.de/jnc

The reliability of conservation status assessments at regional level: Past, present and future perspectives on *Gentiana lutea* L. ssp. *lutea* in Sardinia

Mauro Fois[a], Alba Cuena-Lombraña[a,*], Giuseppe Fenu[b], Donatella Cogoni[a], Gianluigi Bacchetta[a]

[a] Centro Conservazione Biodiversità, Dipartimento di Scienze della Vita e dell'Ambiente, Università degli Studi di Cagliari, Viale S. Ignazio da Laconi, 11-13, Cagliari 09123, Italy
[b] Dipartimento di Biologia Ambientale, 'Sapienza' Università di Roma, P.le A. Moro 5, 00185 Roma, Italy

Journal for Nature Conservation 24 (2015) 42–48

Contents lists available at ScienceDirect

Journal for Nature Conservation

journal homepage: www.elsevier.de/jnc

A practical method to speed up the discovery of unknown populations using Species Distribution Models

Mauro Fois[a], Giuseppe Fenu[b], Alba Cuena Lombraña[a,*], Donatella Cogoni[a], Gianluigi Bacchetta[a]

[a] Centro Conservazione Biodiversità, Dipartimento di Scienze della Vita e dell'Ambiente, Università degli Studi di Cagliari, Viale S. Ignazio da Laconi, 11-13, Cagliari 09123, Italy
[b] Dipartimento di Biologia Ambientale, 'Sapienza' Università di Roma, P.le A. Moro 5, 00185 Roma, Italy

Geodatabase of Endemic vascular plants of Sardinia: Species Distribution Models

Journal for Nature Conservation 24 (2015) 42–48

Contents lists available at ScienceDirect

Journal for Nature Conservation

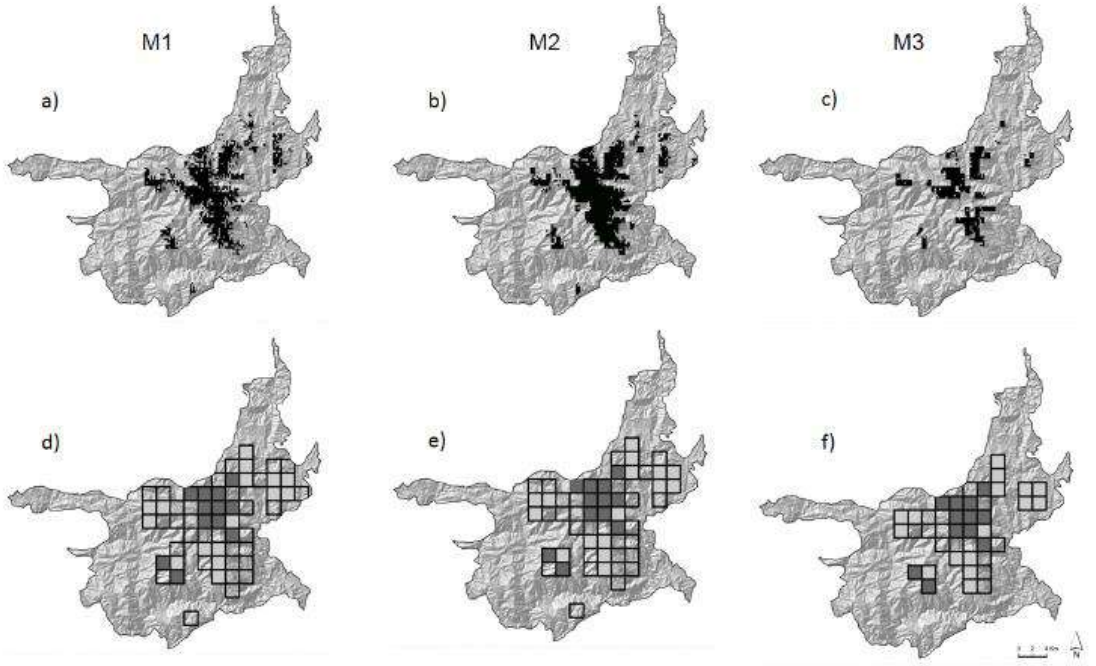
journal homepage: www.elsevier.de/jnc

A practical method to speed up the discovery of unknown populations using Species Distribution Models

Mauro Fois[a], Giuseppe Fenu[b], Alba Cuena Lombraña[a,*], Donatella Cogoni[a], Gianluigi Bacchetta[a]

[a] Centro Conservazione Biodiversità, Dipartimento di Scienze della Vita e dell'Ambiente, Università degli Studi di Cagliari, Viale S. Ignazio da Iacoli, 11-13, Cagliari 09123, Italy
[b] Dipartimento di Biologia Ambientale, 'Sapienza' Università di Roma, P.le A. Moro 5, 00185 Roma, Italy

M1 with occurrences from literature → Improved M2,3 with field data



Geodatabase of Endemic vascular plants of Sardinia: Species Distribution Models

Contents lists available at ScienceDirect

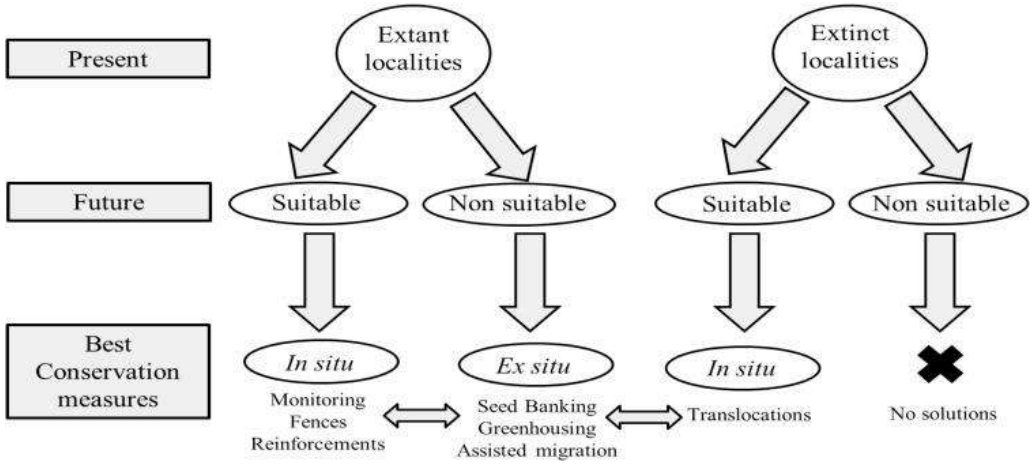
Journal for Nature Conservation

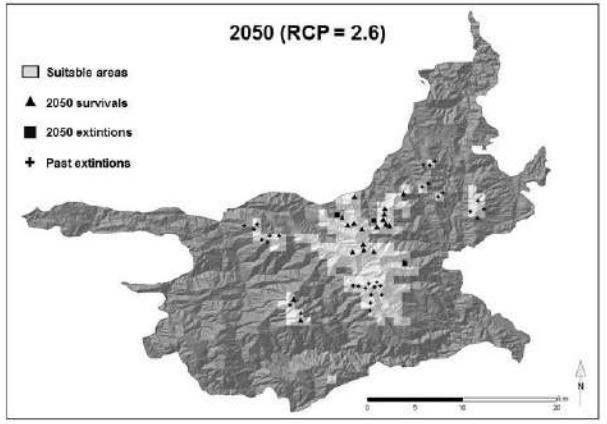
journal homepage: www.elsevier.de/jnc

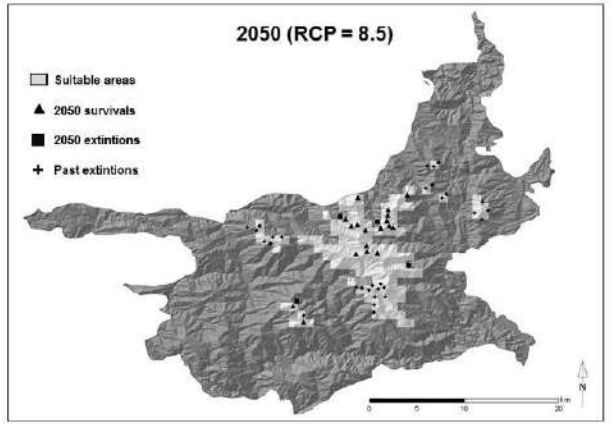
The reliability of conservation status assessments at regional level: Past, present and future perspectives on *Gentiana lutea* L. ssp. *lutea* in Sardinia

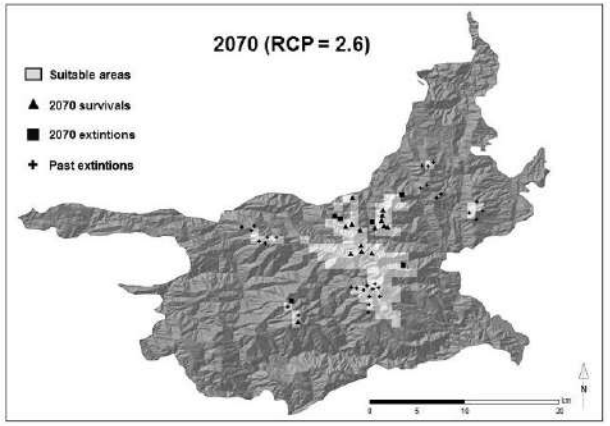
Mauro Fois[a], Alba Cuena-Lombraña[a,*], Giuseppe Fenu[b], Donatella Cogoni[a], Gianluigi Bacchetta[a]

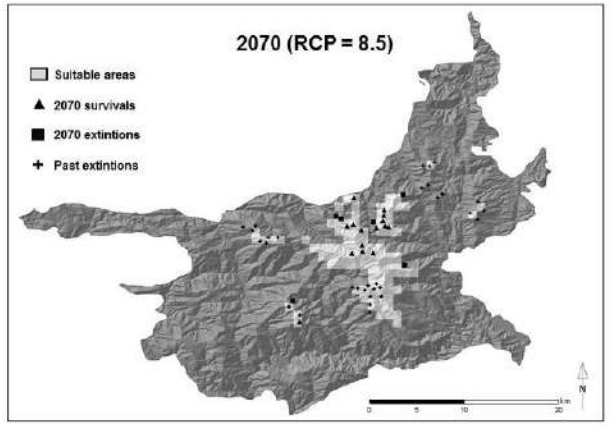
[a] Centro Conservazione Biodiversità, Dipartimento di Scienze della Vita e dell'Ambiente, Università degli Studi di Cagliari, Viale S. Ignazio da Laconi, 11-13, Cagliari 09123, Italy
[b] Dipartimento di Biologia Ambientale, 'Sapienza' Università di Roma, P.le A. Moro 5, 00185 Roma, Italy











Geodatabase of Endemic vascular plants of Sardinia: Species Distribution Models

Ecological Indicators 86 (2018) 1–8

Contents lists available at ScienceDirect

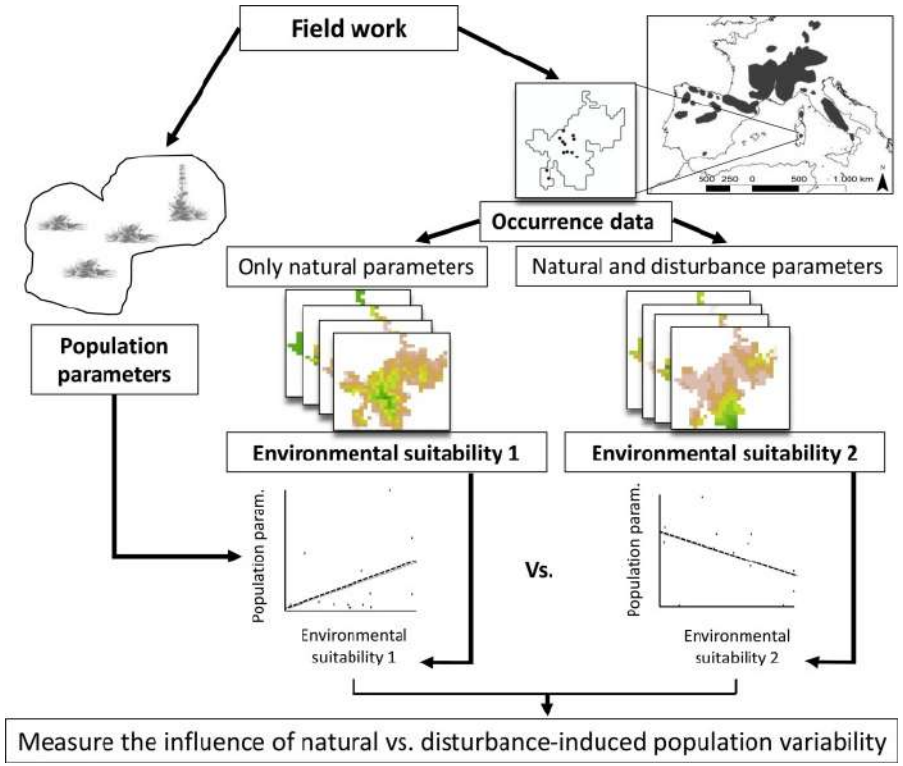
Ecological Indicators

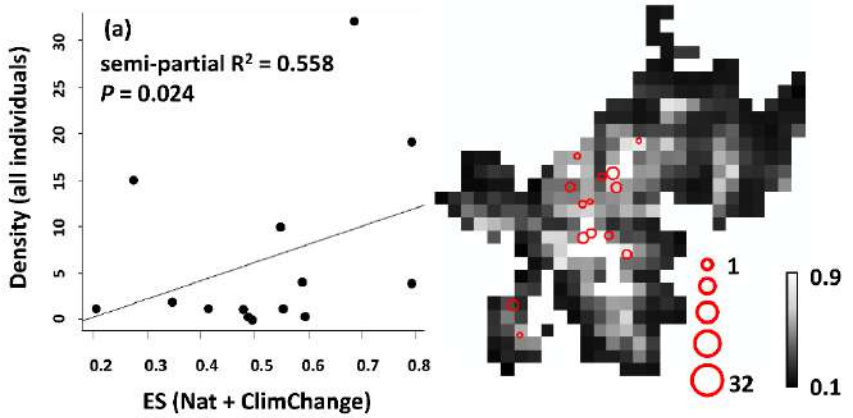
journal homepage: www.elsevier.com/locate/ecolind

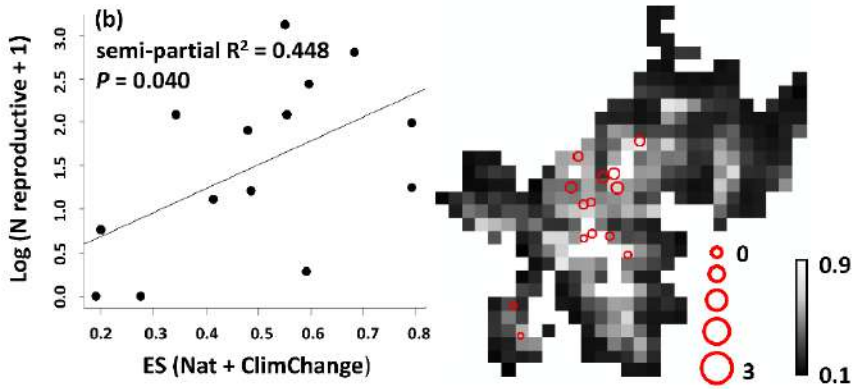
Original Articles

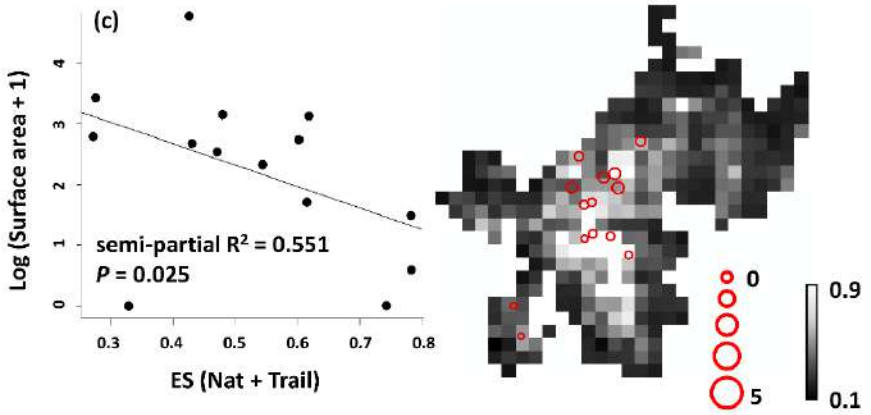
Does a correlation exist between environmental suitability models and plant population parameters? An experimental approach to measure the influence of disturbances and environmental changes

Mauro Fois[a], Alba Cuena-Lombraña[a,b,*], Giuseppe Fenu[a], Donatella Cogoni[a], Gianluigi Bacchetta[a,b]









Geodatabase of Endemic vascular plants of Sardinia: next steps

Master degree with Erasmus (2010-14)

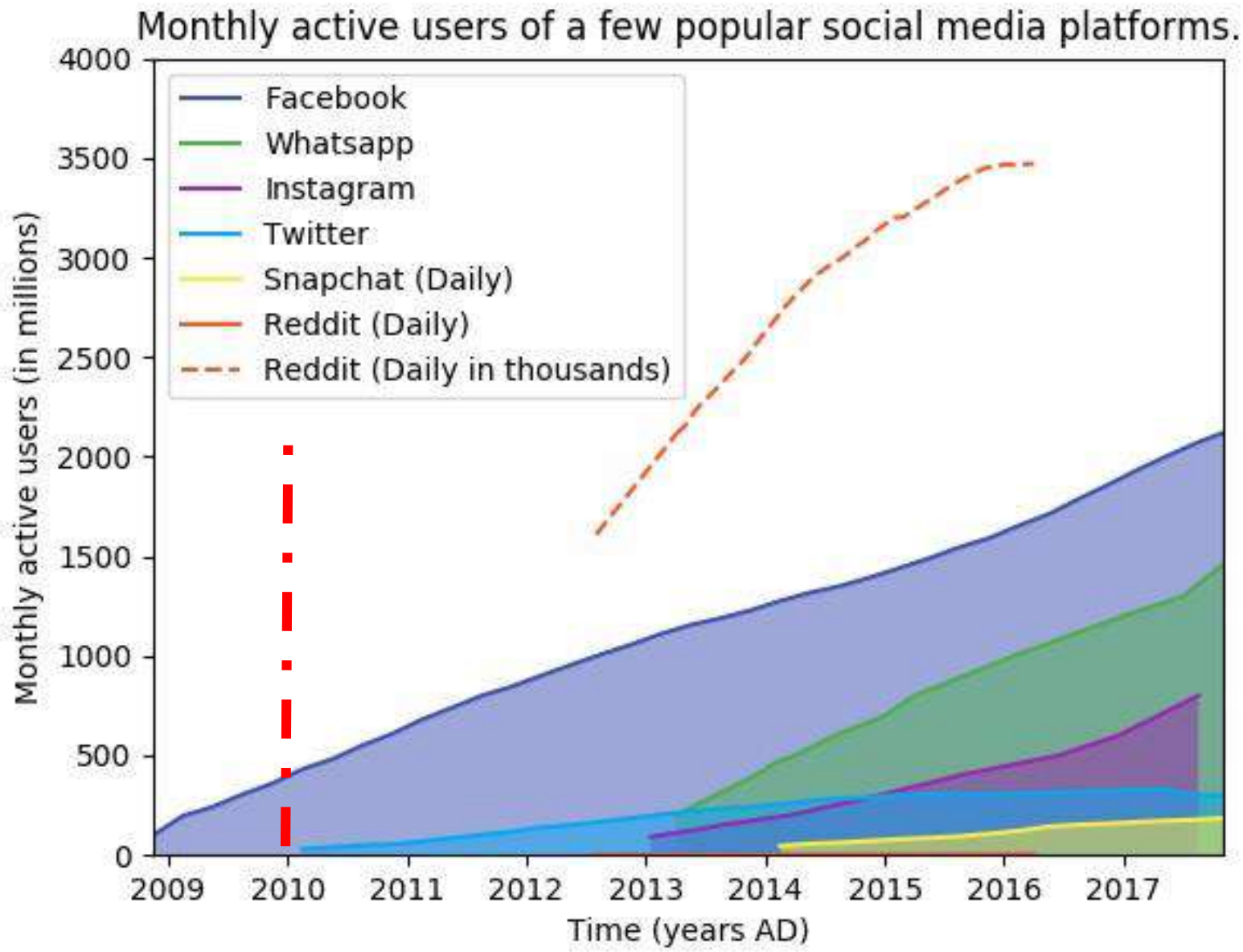
↓

PhD (2015-18)

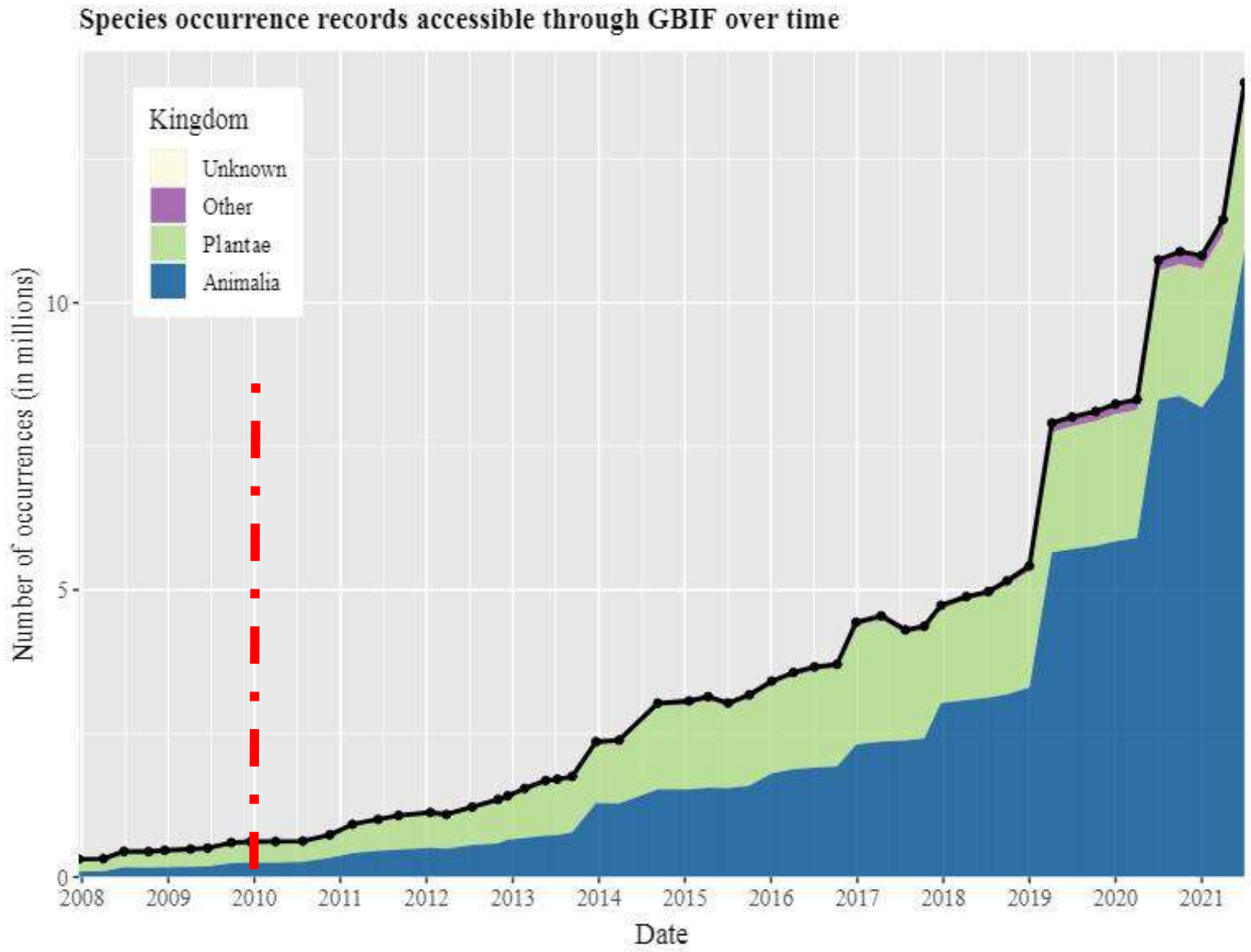
↓

Next?

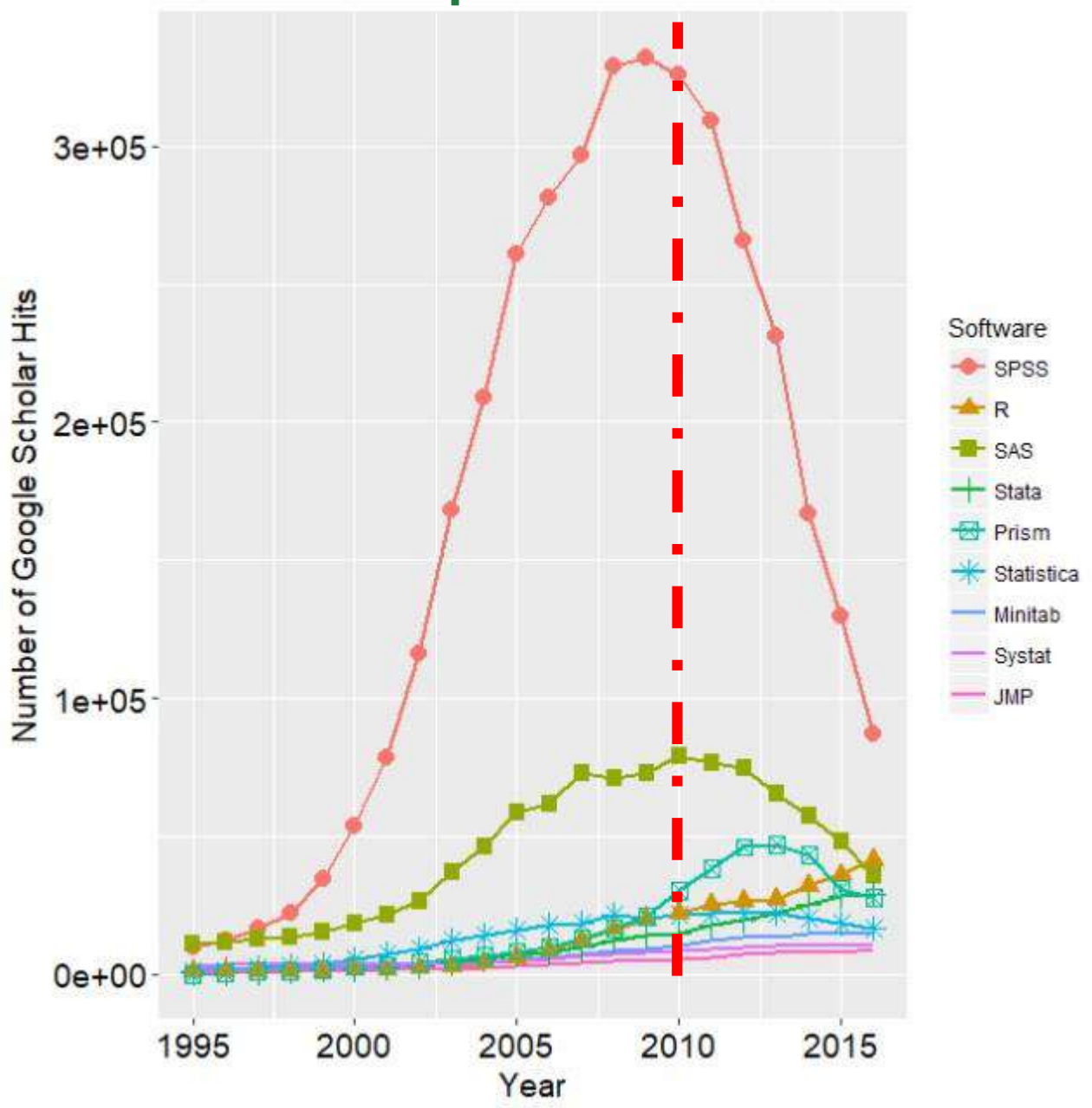
Geodatabase of Endemic vascular plants of Sardinia: next steps



Geodatabase of Endemic vascular plants of Sardinia: next steps



Geodatabase of Endemic vascular plants of Sardinia: next steps



Geodatabase of Endemic vascular plants of Sardinia: next steps

The Botanical Review
https://doi.org/10.1007/s12229-021-09245-3

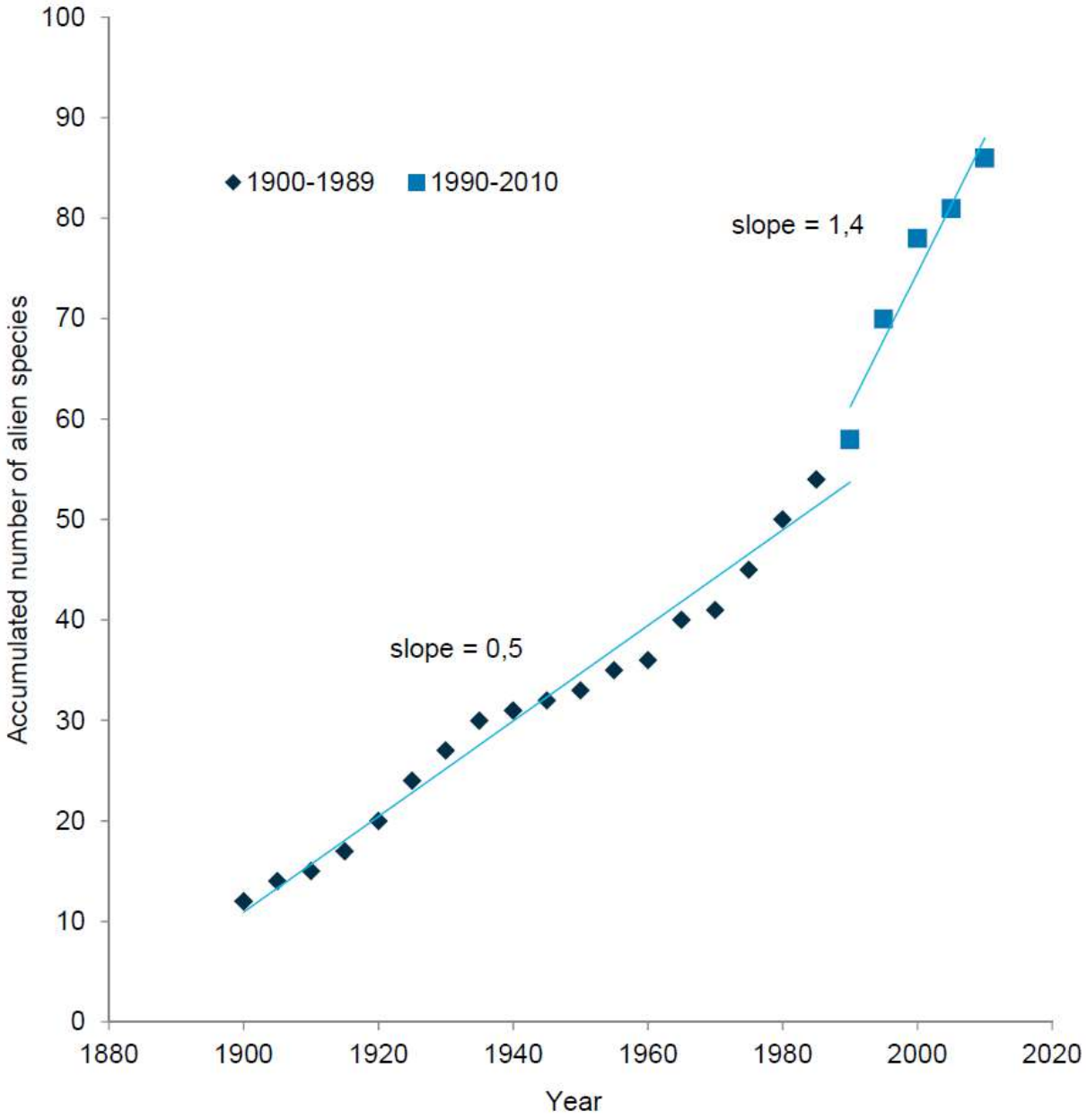
REVIEW PAPER

Plant Biogeography and Vegetation Patterns of the Mediterranean Islands

Frédéric Médail [1,2]

[1] Institut méditerranéen de biodiversité et d'écologie marine et continentale (IMBE), Aix Marseille University, Avignon University, CNRS, IRD, Campus Aix, Technopôle de l'Environnement Arbois-Méditerranée, F-13545 Aix-en-Provence cedex 4, France
[2] Author for Correspondence; e-mail: frederic.medail@imbe.fr

Island	Area (km^2)	Native plant richness	Endemic plant richness	Endemism rate	Endemic genera	Number of alien plants	% alien flora/total flora
Sicily	25,426	3250	322	10%	*Petagnaea, Siculosciadium*	ca. 440	13.5%
Sardinia	23,821	2149	290	13.5%	*Castroviejoa, Morisia, Nananthea, Soleirolia*	508	17.4%
Cyprus	9251	1633	142	8.7%	*Lindbergella*	152	8.5%
Corsica	8679	2237	284	12.7%	*Castroviejoa, Morisia, Nananthea, Soleirolia*	466	17.2%
Crete	8261	2240	395	17.6%	*Horstrissea, Petromarula*	162	6.7%
Balearic islands	4987	1551	140	9%	On eastern islands: *Femeniasia, Naufraga, Soleirolia*	124	7.3%



AQUATIC CONSERVATION
Marine and Freshwater Ecosystems

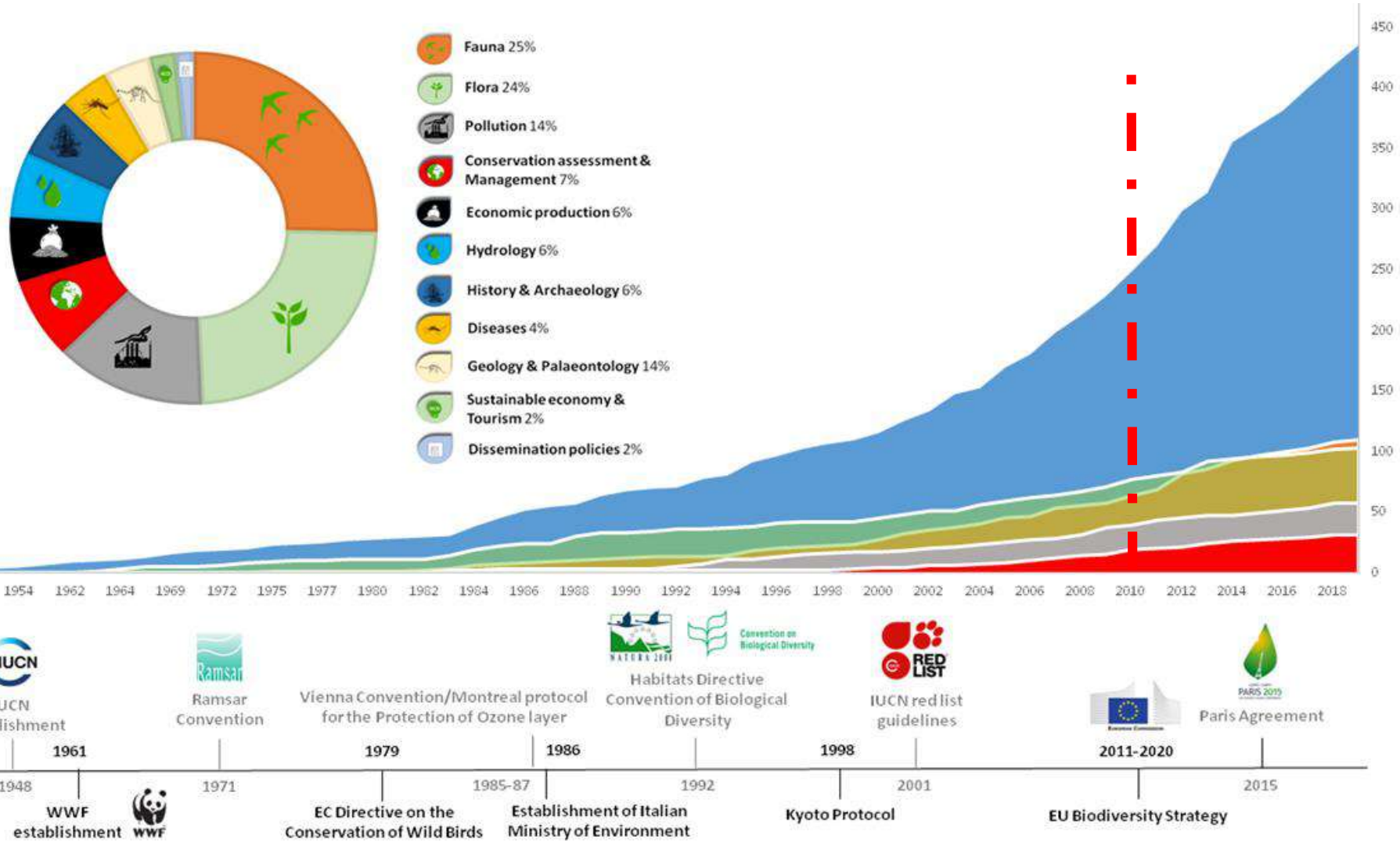
Received: 23 July 2020 | Revised: 3 March 2021 | Accepted: 27 May 2021
DOI: 10.1002/aqc.3659

CASE STUDIES AND REVIEWS

WILEY

Knowledge gaps and challenges for conservation of Mediterranean wetlands: Evidence from a comprehensive inventory and literature analysis for Sardinia

Mauro Fois | Alba Cuena-Lombraña | Gianluigi Bacchetta



Geodatabase of Endemic vascular plants of Sardinia: next steps

Master degree with Erasmus (2010-14)

PhD (2015-17)

Data and knowledge improvement

Geodatabase of Endemic vascular plants of Sardinia: next steps

Data and knowledge improvement → Sardinian scale

Distribution of **endemic** taxa

Geodatabase of Endemic vascular plants of Sardinia: next steps

Data and knowledge improvement

Sardinian scale

Distribution of **endemic** taxa

Distribution of **wetland** plants

Distribution of **exotic** plants

Geodatabase of Endemic vascular plants of Sardinia: next steps

Sardinian scale

Distribution of **endemic** taxa

Distribution of **exotic** plants

Biological Conservation 244 (2020) 108519

Contents lists available at ScienceDirect

Biological Conservation

journal homepage: www.elsevier.com/locate/biocon

Endemic and alien vascular plant diversity in the small Mediterranean islands of Sardinia: Drivers and implications for their conservation

Mauro Fois[a], Lina Podda[a,*], Frédéric Médail[b], Gianluigi Bacchetta[a,c]

[a] Centro Conservazione Biodiversità (CCB), Dipartimento di Scienze della Vita e dell'Ambiente (DISVA), Università degli Studi di Cagliari, V.le S. Ignazio da Laconi 13, 09123 Cagliari, Italy
[b] Institut Méditerranéen de Biodiversité et d'Ecologie marine et continentale (IMBE), Aix Marseille Univ, Avignon Université, CNRS, IRD. Technopôle de l'Arbois-Méditerranée, BP 80, 13545 Aix-en-Provence Cedex 4, France
[c] Hortus Botanicus Karalitanus (HBK), Università degli Studi di Cagliari, V.le S. Ignazio da Laconi 9-11, 09123 Cagliari, Italy

ARTICLE INFO

Keywords:
Biodiversity hotspots
Conservation planning
Island biogeography
Sardinia
Species distribution
Species diversity

ABSTRACT

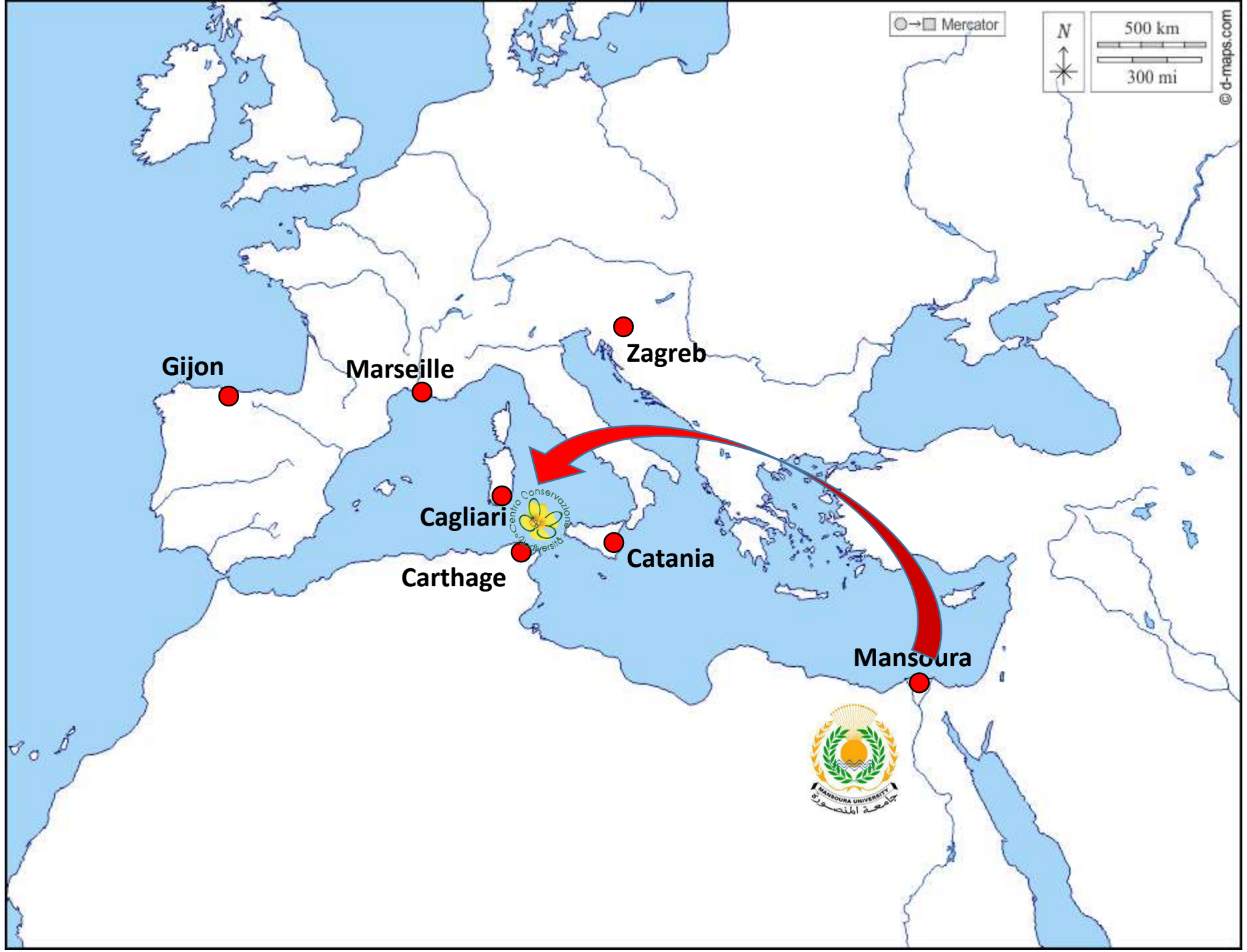
Islands are of high interest for conservationists, due to their great biodiversity within discrete territories. Nonetheless, several mechanisms of plant diversity patterns are unknown, especially for continental islands. In this paper, we explored how endemic and alien vascular plant species richness and the compositional dissimilarity of small Mediterranean continental islands vary according to factors related to human activities, geography/landscape, and climate. Actions for endemic plant conservation were also prioritised according to both endemic and alien components. To this aim, data of endemic and alien plant species for forty islands of Sardinia were considered. Species-area residuals, which express the actual species composition free of area-effects, were modelled using 19 variables related to anthropogenic, geographic/landscape and climatic domains (group of factors). The geographic/landscape domain appeared to be important for both endemic and alien species richness and compositional dissimilarity, while the climatic one was especially relevant for alien species richness. The anthropogenic domain was mostly important for the compositional dissimilarity of aliens and for the endemic species richness. Actions for endemic plant conservation were of high priority for 14 islands; 11 of which are located off the northwest coast of Sardinia. Our research confirms that the Mediterranean small islands of Sardinia are plant endemism hotspots prone to alien invasion. Our findings suggest that removing anthropogenic disturbances is not sufficient to prevent plant invasions. Other factors related to climatic and geographic/landscape domains are as or more important in determining endemic and alien plant composition.

Geodatabase of Endemic vascular plants of Sardinia: next steps

Data and knowledge improvement → **Mediterranean scale**

↓

Collaborations with other Institutions


Mercator
N
500 km
300 mi
© d-maps.com
Gijon
Marseille
Zagreb
Cagliari
Catania
Carthage
Mansoura
Centro Conservazione Biodiversità
MANSOURA UNIVERSITY
جامعة المنصورة

Geodatabase of Endemic vascular plants: knowledge interchange!

Financed by

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

Geodatabase of Endemic vascular plants: knowledge interchange!

This article was downloaded by: [UGR-BTCA Gral Universitaria]
On: 28 May 2014, At: 03:19
Publisher: Taylor & Francis
Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK

Systematics and Biodiversity
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/tsab20

Using endemic-plant distribution, geology and geomorphology in biogeography: the case of Sardinia (Mediterranean Basin)

Giuseppe Fenu[a], Mauro Fois[a], Eva M. Cañadas[a] & Gianluigi Bacchetta[a]
[a] Centro Conservazione Biodiversità (CCB), Dipartimento di Scienze della Vita e dell'Ambiente, Università degli Studi di Cagliari, Viale Sant'Ignazio da Laconi, 11-13, I-09123, Cagliari, Italia
Published online: 24 Mar 2014.

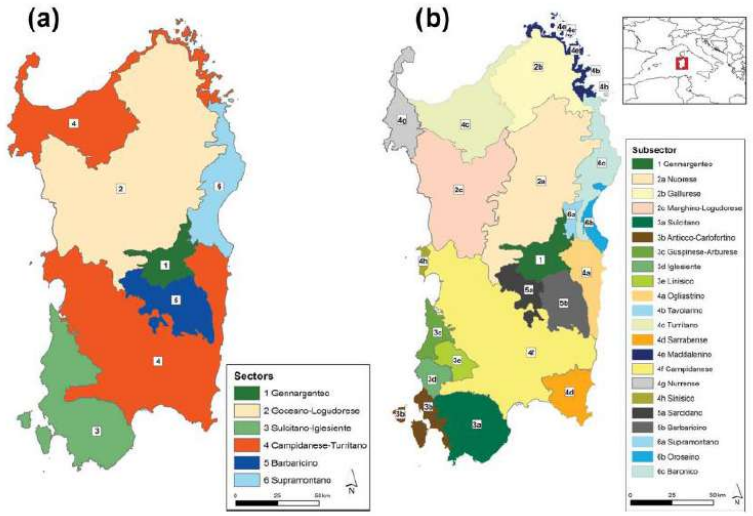


Fig. 2. Biogeographical regionalization in sectors (a) and subsectors (b) of Sardinia based on the distribution of endemic vascular plants.

Applied Geography 119 (2020) 102208

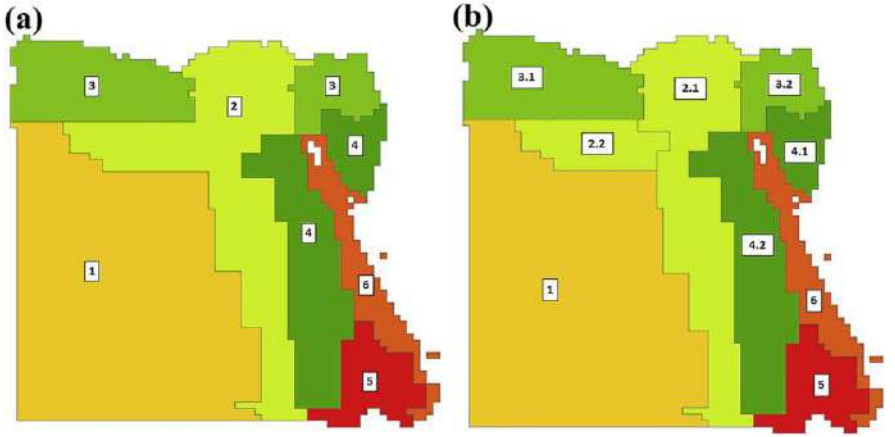
Contents lists available at ScienceDirect

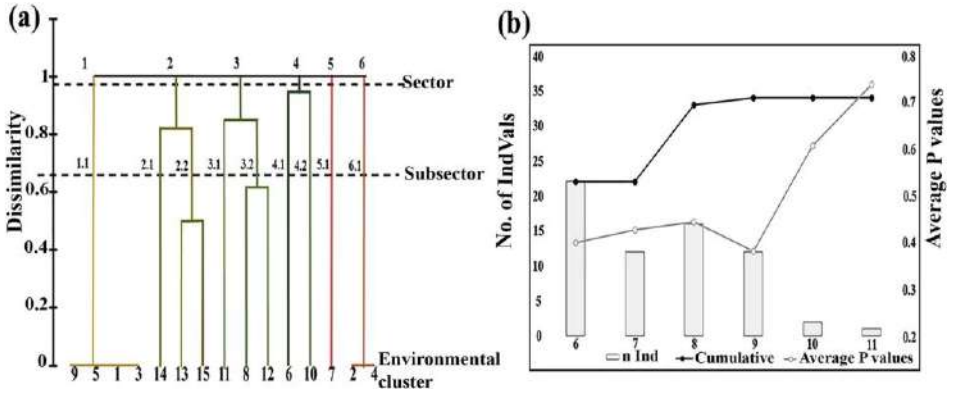
Applied Geography

journal homepage: http://www.elsevier.com/locate/apgeog

Biogeographical characterisation of Egypt based on environmental features and endemic vascular plants distribution

Mohamed Abdelaal[a,c], Mauro Fois[a,*], Giuseppe Fenu[a], Gianluigi Bacchetta[a,b]





Geodatabase of Endemic vascular plants: knowledge interchange!

Contents lists available at ScienceDirect

Journal for Nature Conservation

journal homepage: www.elsevier.de/jnc

The reliability of conservation status assessments at regional level: Past, present and future perspectives on *Gentiana lutea* L. ssp. *lutea* in Sardinia

Mauro Fois[a], Alba Cuena-Lombraña[a,*], Giuseppe Fenu[b], Donatella Cogoni[a], Gianluigi Bacchetta[a]

[a] Centro Conservazione Biodiversità, Dipartimento di Scienze della Vita e dell'Ambiente, Università degli Studi di Cagliari, Viale S. Ignazio da Laconi, 11-13, Cagliari 09123, Italy
[b] Dipartimento di Biologia Ambientale, 'Sapienza' Università di Roma, P.le A. Moro 5, 00185 Roma, Italy

Journal for Nature Conservation 24 (2015) 42–48

Contents lists available at ScienceDirect

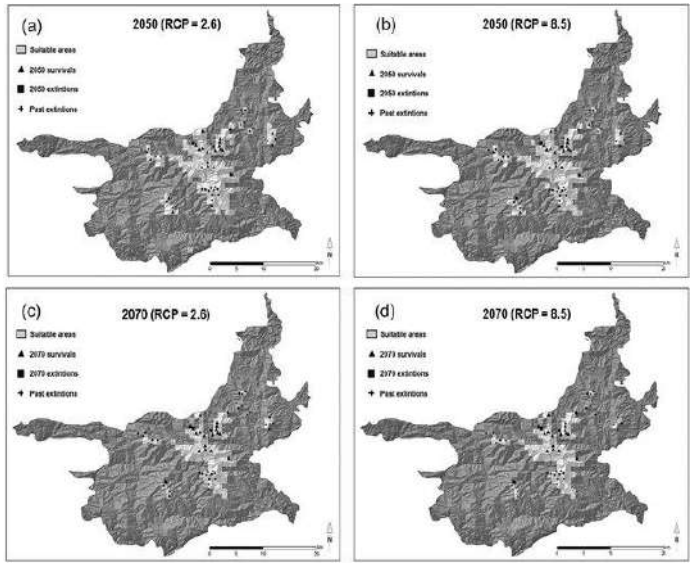
Journal for Nature Conservation

journal homepage: www.elsevier.de/jnc

A practical method to speed up the discovery of unknown populations using Species Distribution Models

Mauro Fois[a], Giuseppe Fenu[b], Alba Cuena Lombraña[a,*], Donatella Cogoni[a], Gianluigi Bacchetta[a]

[a] Centro Conservazione Biodiversità, Dipartimento di Scienze della Vita e dell'Ambiente, Università degli Studi di Cagliari, Viale S. Ignazio da Laconi, 11-13, Cagliari 09129, Italy
[b] Dipartimento di Biologia Ambientale, 'Sapienza' Università di Roma, P.le A. Moro 5, 00185 Roma, Italy



Ecological Informatics 50 (2019) 68–75

Contents lists available at ScienceDirect

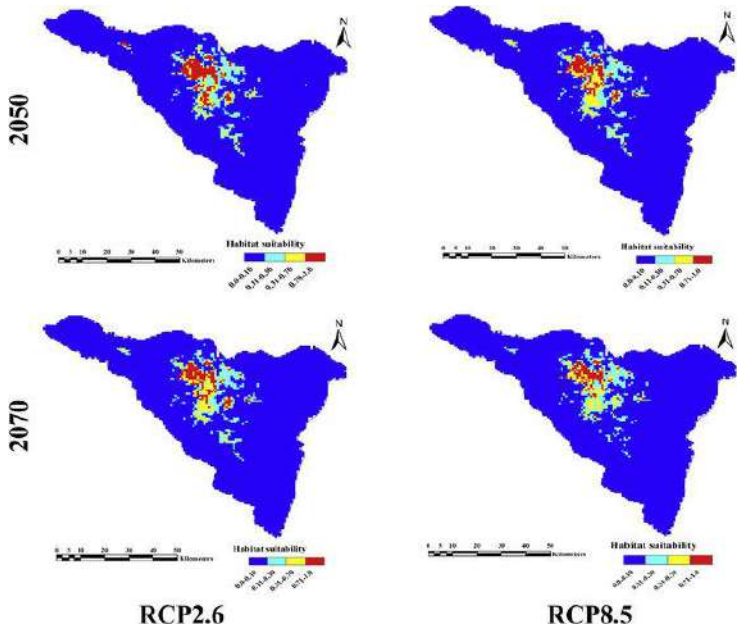
Ecological Informatics

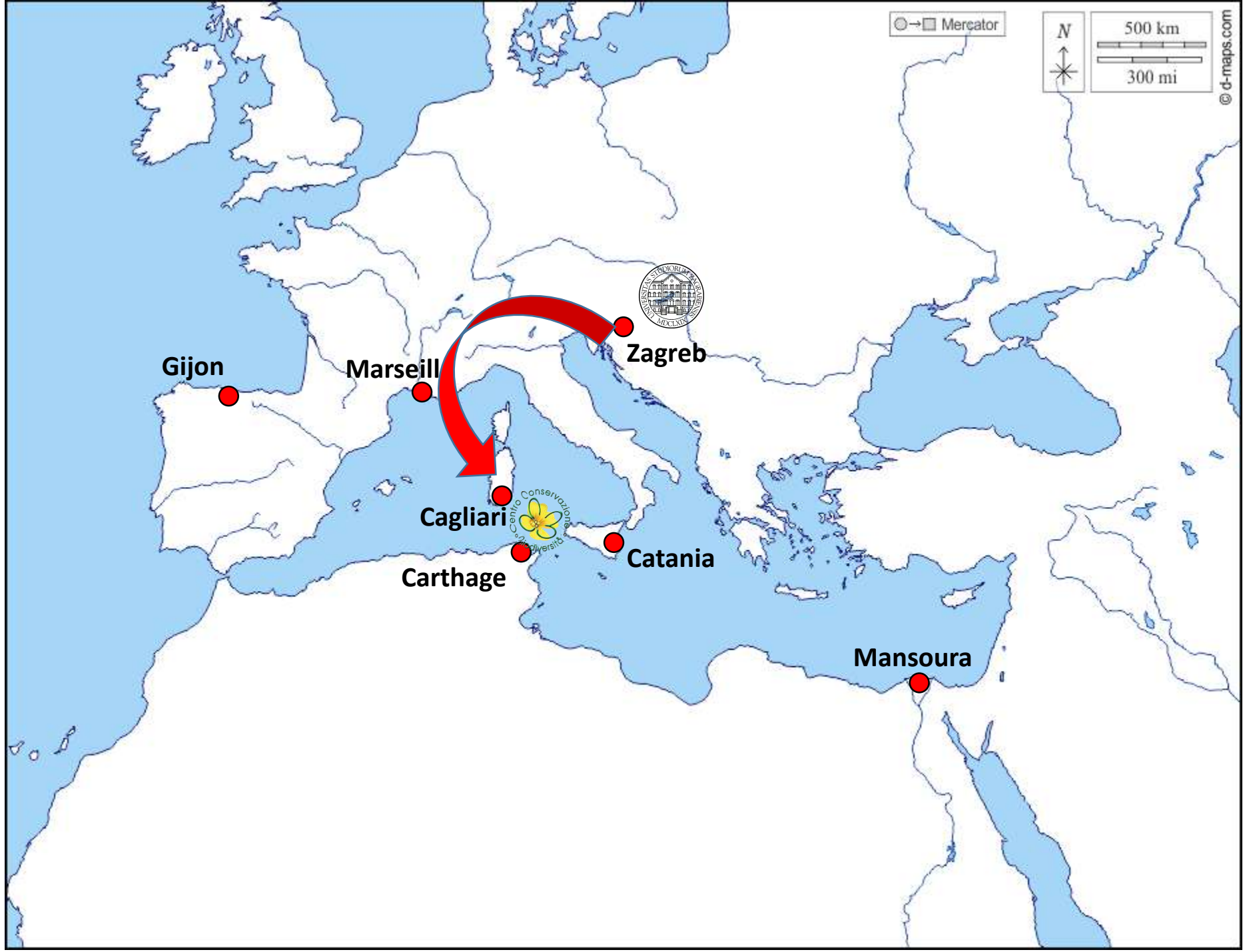
journal homepage: www.elsevier.com/locate/ecolinf

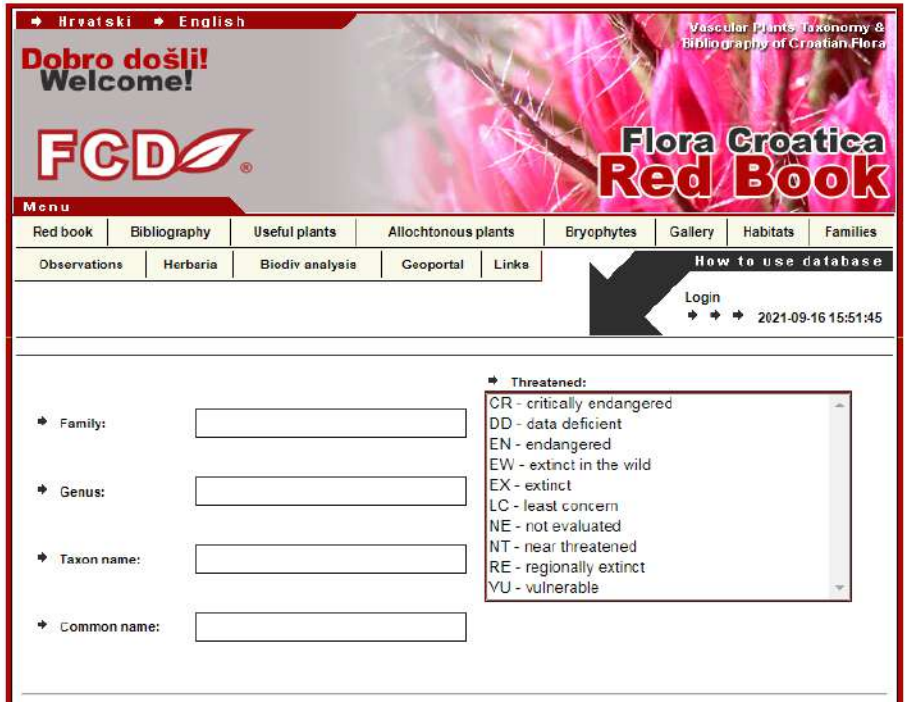
Using MaxEnt modeling to predict the potential distribution of the endemic plant *Rosa arabica* Crép. in Egypt

Mohamed Abdelaal[a,b], Mauro Fois[a,*], Giuseppe Fenu[a], Gianluigi Bacchetta[a,c]

[a] Centro Conservazione Biodiversità (CCB), Dipartimento di Scienze della Vita e dell'Ambiente, Università degli Studi di Cagliari, Viale S. Ignazio da Laconi 13, 09123 Cagliari, Italy
[b] Department of Botany, Faculty of Science, Mansoura University, 35516 Mansoura, Egypt
[c] Hortus Botanicus Karalitanus (HBK), Università degli Studi di Cagliari, Viale S. Ignazio da Laconi 9-11, 09123 Cagliari, Italy




Mercator
N
500 km
300 mi
© d-maps.com
Gijon
Marseill
Zagreb
Cagliari
Carthage
Catania
Mansoura



Phytotaxa 000 (0): 000–000
https://www.mapress.com/j/pt/
Copyright © 2020 Magnolia Press

Article

ISSN 1179-3155 (print edition)
PHYTOTAXA
ISSN 1179-3163 (online edition)

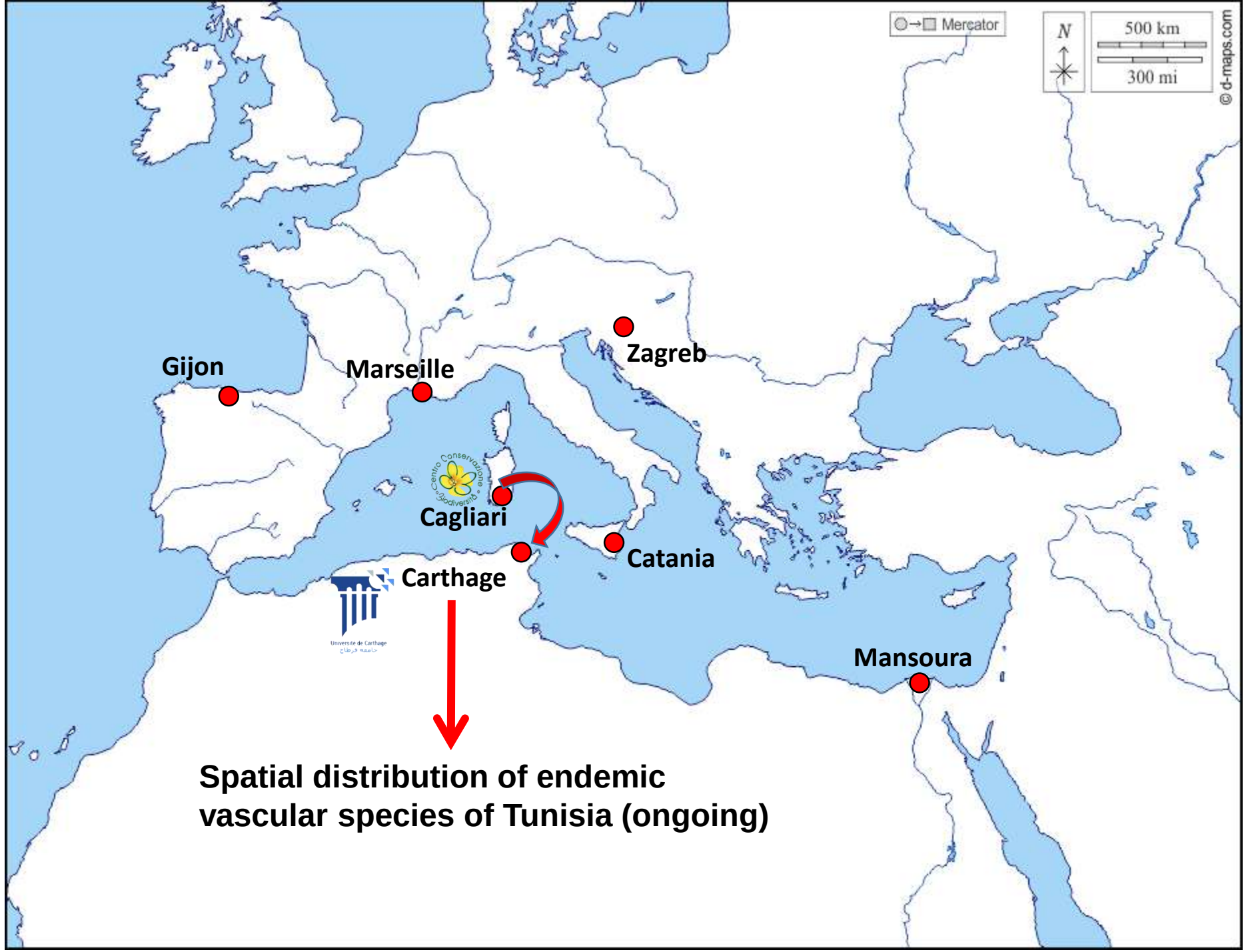
https://doi.org/10.11646/phytotaxa.00.0.0

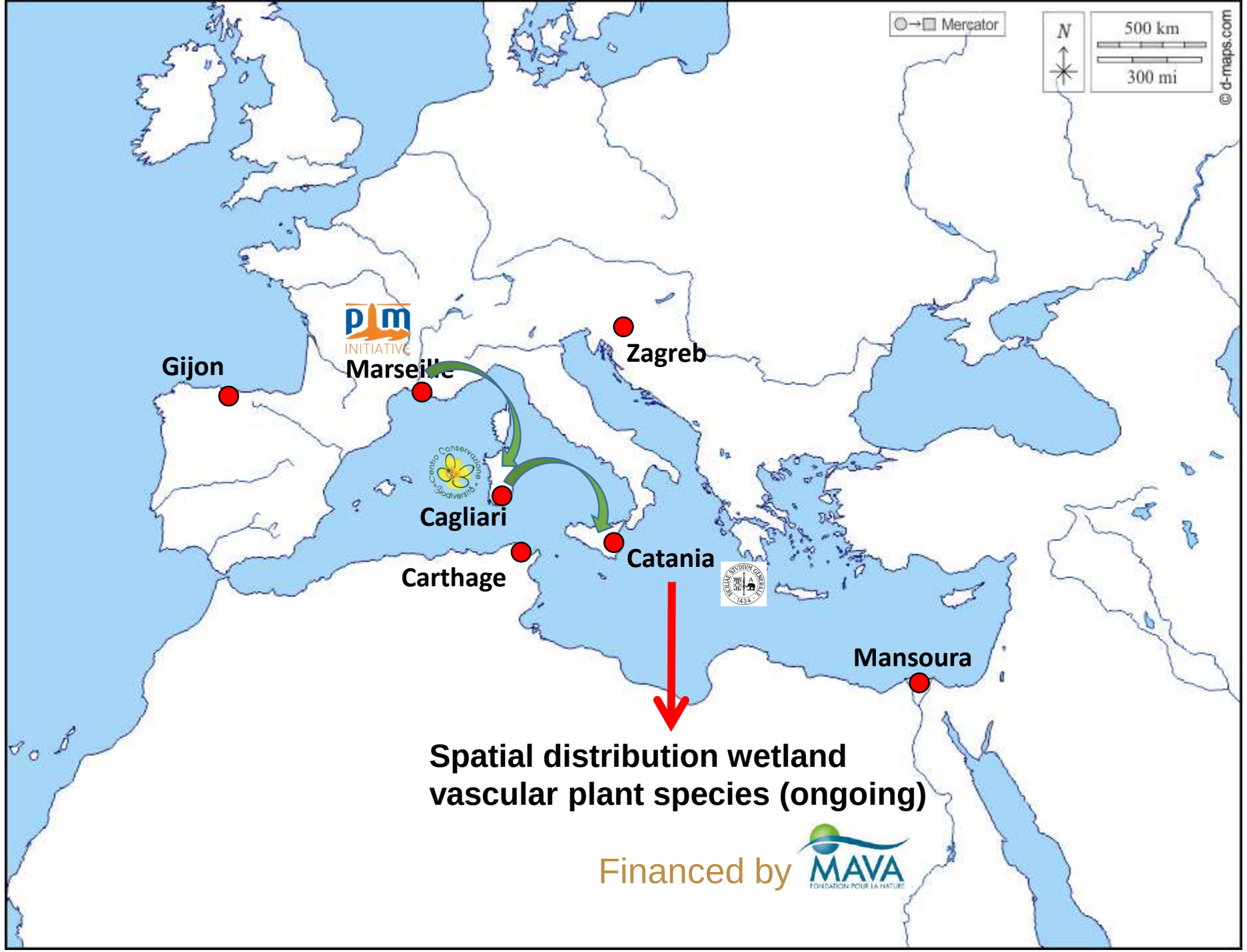
The endemic and range restricted vascular plants of Croatia: diversity, distribution patterns and their conservation status

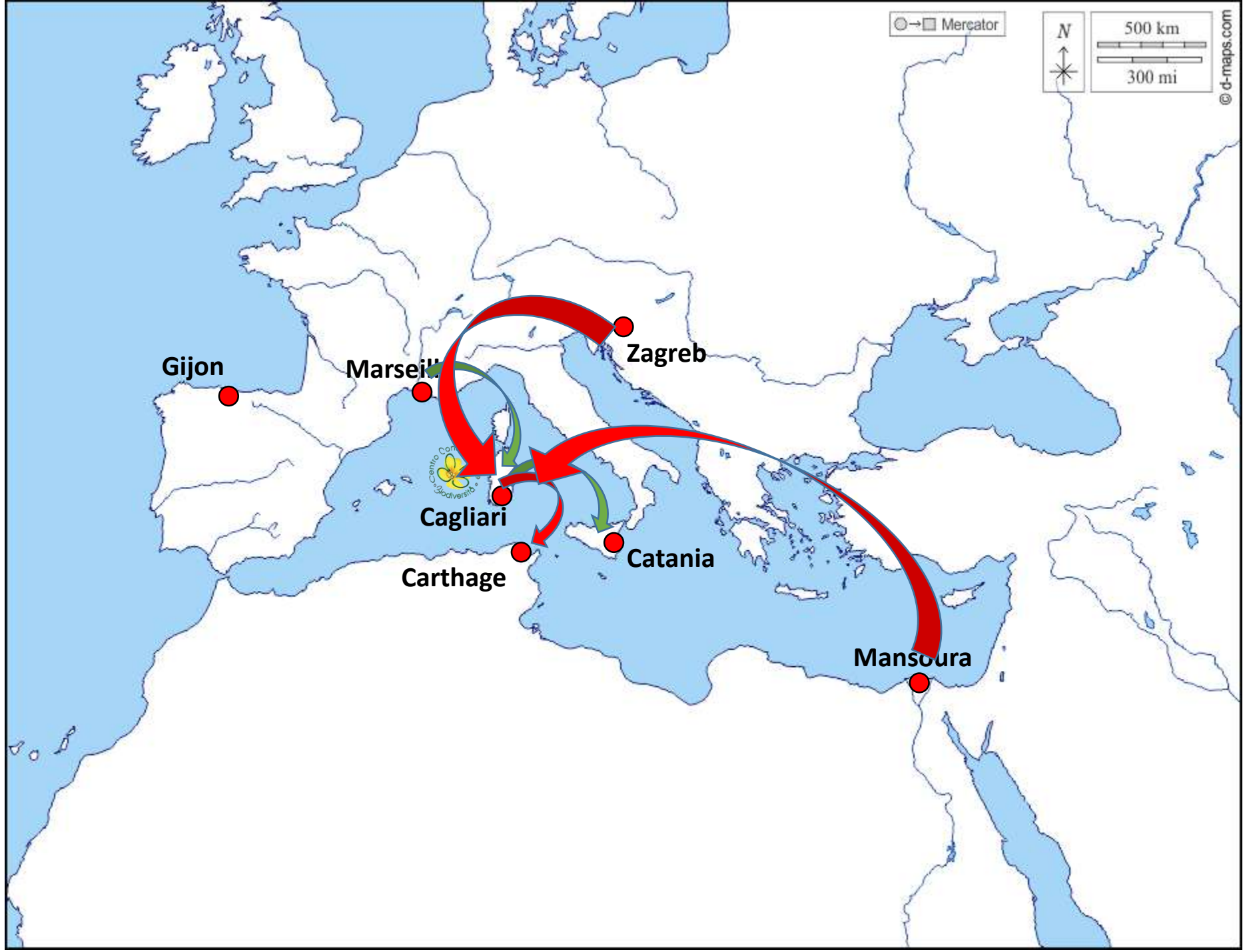
TONI NIKOLIĆ[1], MAURO FOIS[2*], BORIS MILAŠINOVIĆ[3]

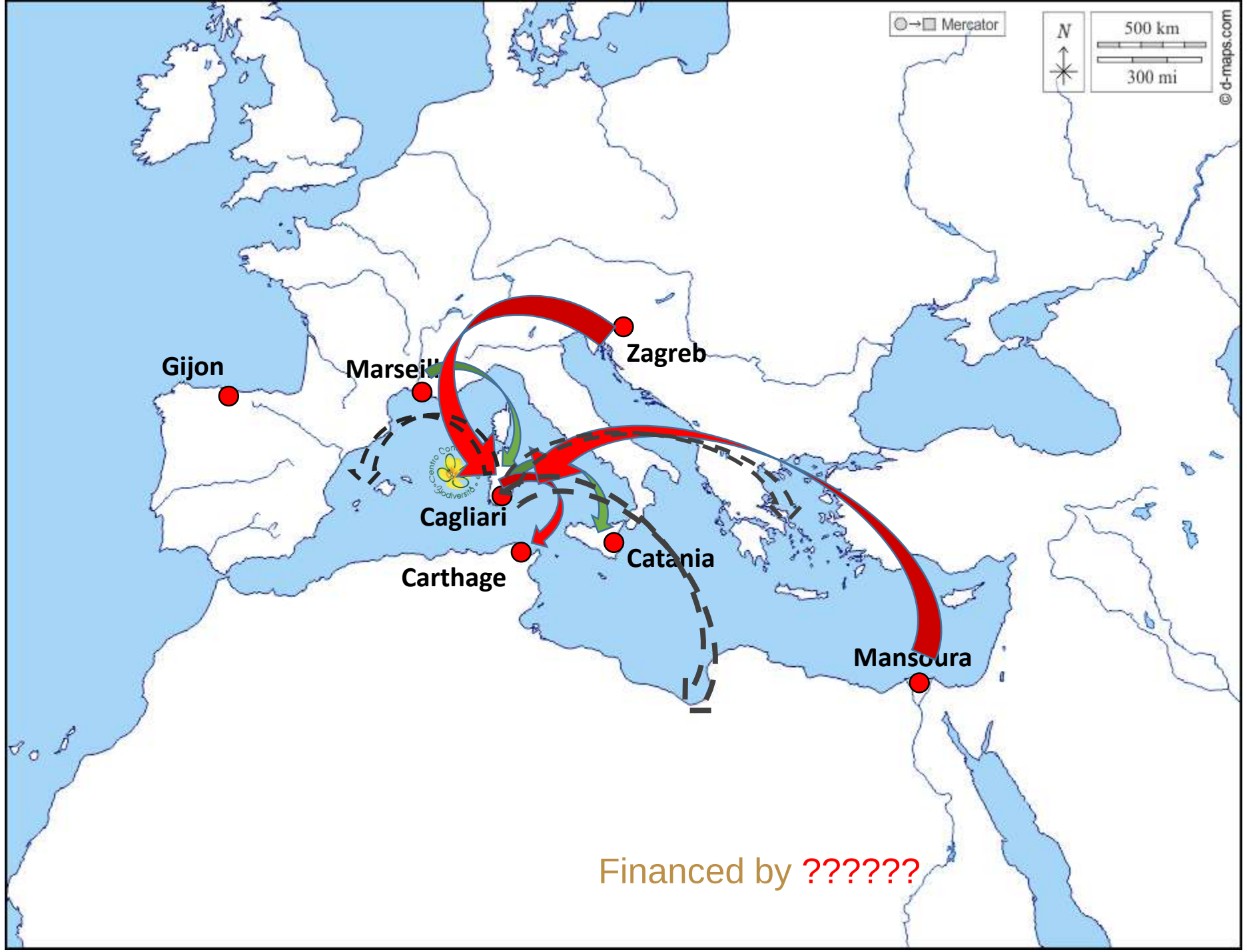
[1] *Department of Botany, Division of Biology, Faculty of Science, University of Zagreb, Marulićev trg 9a, HR-10000 Zagreb, Croatia.*
[2] *Centro Conservazione Biodiversità (CCB), Dipartimento di Scienze della Vita e dell'Ambiente, Università degli Studi di Cagliari, Cagliari, Italia.*
[3] *Department of Applied Computing, Faculty of Electrical Engineering and Computing, University of Zagreb, Unska 3, HR-10000 Zagreb, Croatia.*
* *Author for correspondence. E-mail: foisma@yahoo.it*

...


Mercator
N
500 km
300 mi
© d-maps.com
Gijon
Marseille
Zagreb
Cagliari
Catania
Carthage
Mansoura
Spatial distribution of endemic
vascular species of Tunisia (ongoing)


Mercator
N
500 km
300 mi
© d-maps.com
Gijon
Marseille
Zagreb
Cagliari
Carthage
Catania
Mansoura
Spatial distribution wetland
vascular plant species (ongoing)
Financed by
MAVA
FONDATION POUR LA NATURE


Mercator
N
500 km
300 mi
© d-maps.com
Gijon
Marseille
Zagreb
Cagliari
Catania
Carthage
Mansoura


Mercator
N
500 km
300 mi
© d-maps.com
Gijon
Marseille
Zagreb
Cagliari
Carthage
Catania
Mansoura
Financed by ??????

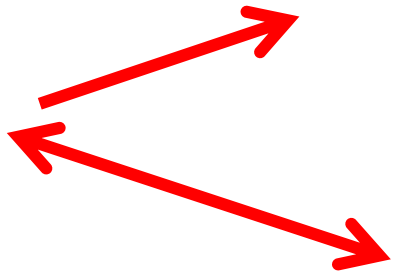
Conclusions

✓ We show a replicable and relatively low-cost experience

✓ There is an increasing availability of data, including unconventional sources

✓ Local expertise is still crucial

✓ Union is strength!



✓ Improve research outputs

✓ **Find funding opportunities**

Thank you

Contacts

Centro Conservazione Biodiversità (CCB),
Università degli Studi di Cagliari

M. Fois: mfois@unica.it

Facebook: @ccbsardegna