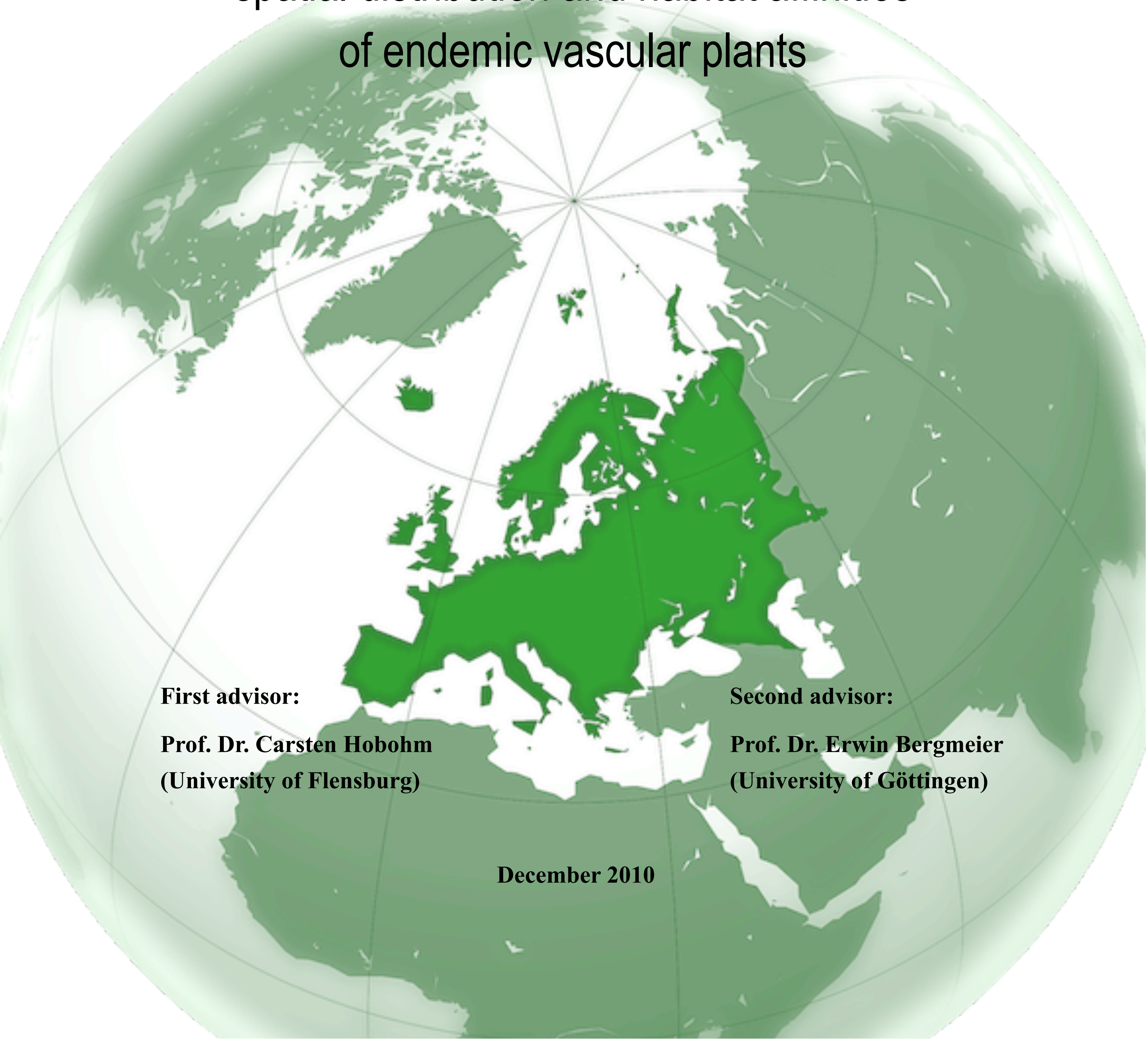
Ines Bruchmann

Environmental Scientist

Department of Biology and Education

Scientific thesis for the attainment of the PhD-Degree (Dr. phil.) of the University of Flensburg

Plant endemism in Europe: spatial distribution and habitat affinities of endemic vascular plants



First advisor:

Prof. Dr. Carsten Hobohm
(University of Flensburg)

Second advisor:

Prof. Dr. Erwin Bergmeier
(University of Göttingen)

December 2010

Cite as:

Bruchmann, I. (2011): Plant endemism in Europe: spatial distribution and habitat affinities of endemic vascular plants. Dissertation - University of Flensburg,
URL: www.zhb-flensburg.de/dissert/bruchmann.

Keywords:

CBD 2010, EvaplantE, Geographically Weighted Regression (GWR); habitat continuity, habitat diversity, isolation degree, regional species pool, vulnerability.

2010 International Year of Biodiversity

The logo of the International Year of Biodiversity was used with the friendly permission of the Secretariat of the Convention on Biological Diversity

The cover-picture ´Europe orthographic projection´ by Ssolbergj was slightly modified (colorized) and is free available under the GNU´s license.

'While climate change takes up much of the media attention,
in one fundamental way biodiversity loss is an even more serious threat.
This is because the degradation of ecosystems often reaches a point of no return
- and because extinction is forever.'

Stavros Dimas, 2006
(European Commissioner of the Environment)

Table of contents

Zusammenfassung

Die vorliegende Arbeit gibt einen grundlegenden Überblick über die Verbreitungsmuster von endemischen Gefäßpflanzen auf dem europäischen Kontinent. Die Thesis berücksichtigt dabei die floristischen und taxonomischen sowie die geographischen und ökologischen Verteilungsmuster bzw. -dimensionen des Gefäßpflanzenendemismus. Es gilt die Hypothese, dass die vorgefundenen geographischen Verbreitungsmuster endemischer Pflanzen weitgehend durch einfache Erklärungsvariablen beschrieben werden können: die regionale Artenvielfalt ('species pools'), die Vielfalt der Lebensräume ('habitat diversity'), der Isolationsgrad einer Region ('isolation degree') und die ökologische Kontinuität ('habitat continuity').

Die zugrundeliegenden Daten zum Gefäßpflanzenendemismus wurden aus der Datenbank EvaplantE entnommen. Zur Visualisierung wurden diese mittels Geographischer Informationssysteme (GIS) in ein digitales Kartenformat übertragen und mit verschiedenen anderen geographischen Themenkarten verschnitten und optimiert. Die genannten Erklärungsvariablen wurden mit Hilfe von GIS Verfahren in eine Vielzahl verschiedener Indices interpretiert. Diese Indices flossen zur Erklärung der räumlichen Verbreitungsmuster von a) kleinräumig verbreiteten, nationalen Endemiten ('local endemics') und b) von über die Nationengrenzen hinaus verbreiteten Europa-Endemiten ('European endemics') in Regressionen ein. Es wurden sowohl klassische lineare als auch räumliche Regressionsmodelle angewandt.

Die Studie bestätigt die allgemein bekannten Trends im Bezug auf Europas endemische Gefäßpflanzen, z.B. den klimatisch begründeten Nord-Süd-Gradient der Artenvielfalt oder die besondere Bedeutung von Gebirgsregionen sowie isolierten Inseln. Die geographischen Verteilungsmuster von kleinräumig verbreiteten Lokal-Endemiten konnten mit den ausgewählten Erklärungsvariablen – 'Isolationsgrad', 'Artenvielfalt` und 'Habitat-Diversität' – ausreichend erklärt werden. Die besten Regressionsmodelle für weiträumiger verbreitete Europa-Endemiten wurden mit Hilfe der Erklärungsvariablen 'Artenvielfalt` und 'Habitat-Diversität' erreicht.

Es wurde zudem gezeigt, dass einfache lineare Regressionsmodelle gegenüber dem Phänomen der räumlichen Autokorrelation eine gewisse Störanfälligkeit aufweisen. Hingegen liefern räumliche Regressionsverfahren wie z.B. die Geographically Weighted Regression (GWR) auch unter der Maßgabe von räumlichen Korrelationseffekten valide Erklärungsmodelle.

Die Untersuchung von Habitatbindung und ökologischer Präferenz der endemischen Pflanzen belegt die besondere Bedeutung der offenen Kulturlandschaften in Europa auch – und vor allem – im Hinblick auf die *in situ* Schutzbemühungen im Zuge der Biodiversitätskonvention.

Im Rahmen der Untersuchung wurde jedoch deutlich, dass es einige blinde Flecken und Wissenslücken gibt: Diese zeigen sich z.B. in der teilweise inkonsistenten taxonomischen Interpretation von endemischen Pflanzen oder in fehlenden Daten zu Ökologie, Habitatbindung oder Populationsentwicklung vieler endemischer Taxa. Im Hinblick auf den voranschreitenden Biodiversitätsverlust bleibt zudem die Frage offen, wie endemische Pflanzen gemäß ihrem 'Seltenheits' - oder 'Gefährdungsstatus' kategorisiert werden können. Um den Verlust europäischer Arten zu vermindern, wird empfohlen, ein angemessenes Kategorisierungssystem zu erstellen, um – auf diesem Wissen aufbauend – ein systematisches und engmaschiges Netz von Schutzmaßnahmen zum Schutz der Arten und ihrer Lebensräume zu entwickeln.

Abstract

The present thesis provides a general overview of endemism of vascular plants on the European continent. The study focuses on the evaluation of endemism patterns from a floristic and taxonomic, geographical and ecological perspective. It is hypothesised that most of the variability in the data on Europe´s botanical endemism can be well explained with the help of simple indices describing the explanatory variables 'species pool', regional 'habitat diversity', 'isolation degree' and 'habitat continuity'.

The investigation is mainly based on data of about 6,200 endemic vascular plants listed in the database EvaplantE (Endemic vascular plants in Europe). The endemism data was combined with geographical datasets and visualised in digital maps using GIS applications. Several indices describing the explanatory variables were derived from digital maps by blending different thematic (map-)layers with the map of the study area. Due to the incidence of spatial autocorrelation spatial accounting statistics i.e. geographical weighted regression (GWR) was applied and the results were contrasted to those obtained from non-spatial standard linear regression statistics (LR).

The study shows a general gradient of plant endemism from north to south and also proves the importance of Europe´s mountainous and isolated island regions regarding endemic diversity. The influence of explanatory variables on the current spatial patterns of endemics was quantified: Patterns of local endemism were explained by 'isolation degree', 'species pool', and 'habitat diversity', while patterns of European endemics were explained using the explanatory variables 'species pool', and 'habitat diversity'. The fragility of standard LR when dealing with spatially autocorrelated data was shown, while spatial accounting GWR was able to incorporate these spatial dependencies. Using GWR results in valid models proved the hypothesis that patterns of plant endemism can be well explained using the explanatory variables 'species pool', regional 'habitat diversity', 'isolation degree' and 'habitat continuity'.

The evaluation of habitat-dependencies of endemic plants showed that many endemics are bound to rocky habitats, grasslands and shrubland. Many stenoecious endemics are bound to coastal and saline habitats, to rock and scree habitats, but also to ruderal habitats. The study of ecological patterns proves the importance of Europe´s open cultural landscapes, for example with respect to *in situ* species conservation.

While reviewing and interpreting the data on Europe´s plant endemism some blind spots and data gaps also became evident, e.g. the inconsistency in taxonomic interpretation of endemic plants, the lack of data on ecology or on the population trends of endemics. The question of how to categorise the rarity status of endemic plants was revealed as one major question in the field of biodiversity conservation.

In order to face up to the biodiversity challenge and thus to span a systematic and tight conservation net which will help to prevent species loss, it is strongly recommended that a suitable and consistent system be established in the very near future to identify the rarity and vulnerability of those species that are confined to the European continent.

‘The current decline in biodiversity is largely the result of human activity and represents a serious threat to human development (...)
Despite mounting efforts over the past 20 years, the loss of the world´s biological diversity, (...) has continued. Biological resources constitute a capital asset with great potential for yielding sustainable benefits. Urgent and decisive action is needed to conserve and maintain genes, species and ecosystems (...). Capacities for the assessment, study and systematic observation and evaluation of biodiversity need to be reinforced at national and international levels.’

(Agenda 21,15.2 & 15.3)

Introduction

With the agreement to the Convention on Biological Diversity (CBD) during the World Summit on Sustainable Development (WSSD) in Rio de Janeiro in 1992, the importance of the biodiversity challenge was universally acknowledged (United Nations, 1992). In the course of the following World Summit in Johannesburg in 2002, the parties declared that their goal was ‘*to achieve by 2010 a significant reduction in the current rate of biodiversity loss at the global, regional, and national level [...]*’ (United Nations 2002). The importance of this target was further underlined by its incorporation in the Millennium Development Goals (MDG 7(2): United Nations General Assembly 2000) and by the proclamation of the International Year of Biodiversity in 2010 (Secretariat of the Convention on Biological Diversity: www.cbd.int/2010).

However, this ambitious decision at global level calls for the implementation at all subjacent levels. Conservation action has to be realised at all spatial scales and by all levels of governmental authority, from the continental (e.g. multinational unions, European Union) to the regional (e.g. nations) and right down to the local scale (federal states, districts or communities).

The European Union has set the objective that the ‘biodiversity decline should be halted with the aim of reaching this objective by 2010’ (6th Environmental Action Program; European Council 2001). This Action Program in turn requires the member states of the EU to corroborate this goal in their National Strategies on Biodiversity (see: www.cbd.int/reports). If the aims of the political strategies are to be achieved, the framework has to be filled with real action at local or regional scales. However, the debate on the implementation of species conservation raises some major questions: Where should conservation of biodiversity start, what regions should be prioritised and on which species should efforts be focussed?

It is not an exaggeration to say that the plant kingdom – as the primary producer and a major ecosystem component – forms the basis on which the rest of the world’s biological diversity depends (e.g. Agardy et al. 2005). This is why conservation of plant diversity should be of vital interest in the course of the biodiversity challenge.

Endemic plants may be an effective indicator for identifying and assessing regions with high biodiversity value (Orme et al. 2005): The European Plant Conservation Strategy (EPCS; Planta Europa 2002) that adapts the targets of the Global Strategy for Plant Conservation (GSPC; UNEP 2002) to the European level emphasises that conservation action must target those plants and habitats that are most in need. Objective 1.02 furthermore clearly states that all national endemic plants should be included in the European Red List. The fact that about 50% of Europe's vascular plant endemics are considered to be in danger of extinction (Planta Europa 2002) confirms the urgent need to focus conservation action on endemic species and the habitats in which they live (Planta Europa 2007; Secretariat of the Convention on Biological Diversity 2010).

Europe has a particular responsibility to protect those species that are restricted to its boundaries. However, despite the fact that Europe's flora is probably the best studied in the world, our knowledge about the actual distribution patterns of European endemic plants is quite scarce. Indeed, it is quite easy to find a large number of literature sources with checklists of plants endemic to special localities such as national parks, mountain ranges, or islands, and some data on patterns of endemism are also available from a number of macroscale assessment reports of biotic-rich hotspot areas (e.g. Davis et al. 1994; Olson and Dinerstein 2002; Mittermeier et al. 2005). However, these assessments occasionally provide only rough figures or estimations for endemism rates (Ungricht 2004). The data given by the national reports on biodiversity as required by the CBD present more precise figures on numbers or proportions of endemics for many national territories, thus providing data on endemics as related to political divisions. In order to effectively pursue *in situ* conservation (CBD article 8, United Nations 1992) data on endemism related to natural and ecological (e.g. biomes or habitats) divisions is needed. As patterns of endemism do not generally conform to political territories, it is evident that the available data is not what is needed to take conservation action. To date there is no overall assessment of Europe's endemic inventory either on a spatial level or showing the ecological distribution of endemic populations (Bruchmann and Hobohm 2010b).

One aim of this investigation is, therefore, to assess the general distribution patterns of Europe's endemic taxa (see also Hobohm 2008). The thesis looks into the floristic and taxonomic patterns of Europe´s endemism on the one hand and on the other hand, provides an intensively analysis of the spatial and ecological distribution (i.e. classifying endemics according to major habitat categories) patterns of endemic plants.

Based on the reviewed data on endemism given in the Database EvaplantE (currently comprising about 6,200 endemic taxa; Hobohm 2008; Hobohm and Bruchmann 2009; Bruchmann and Hobohm 2010a) the major goal of this thesis, however, is to find explanatory variables to build a model for the prediction of the distribution of endemics in Europe (evolutionary patterns/ patterns of species dispersal).

It is hypothesised that most of the variability of the data on Europe´s botanical endemism can be well explained with the help of a few indices describing the explanatory variables 'species pool', regional 'habitat diversity', 'isolation degree' and 'habitat continuity' (see also theories of Cain 1944; Kruckeberg and Rabinowitz 1985). For this purpose, the applicability of Geographical Information Systems (GIS) as well as of spatial and non-spatial regression statistics was tested and evaluated.

The comprehensive results of this thesis should help to better understand Europe's plant endemism in general and, hopefully, help to span a systematic and tight net of conservation to contain the loss of Europe's biodiversity.

Endemism – theoretical and historical background

Etymology and evolution of the term

The term 'endemic' comes from the Greek '*endemos*' which means as much as 'native to a place'. Today, two different scientific disciplines use and define this term, partly in contradictory ways. In the medical context, 'endemic' denotes a disease that is typically found among the inhabitants of a particular region and is prevalent only in this area (i.e. malaria diseases in tropical regions; (Haubrich 2003). In the ecological or biogeographical sense, however, the term 'endemic' refers to any taxonomic entity (species, genus, family), the occurrence of which is restricted entirely to a defined area.

The idea of endemism in biogeography dates back to De Candolle in 1820. De Candolle borrowed the term directly from the medical language in order to describe a botanical phenomenon of interest.

> *´Parmi les phénomènes généraux que présente l`habitation des plantes, il en est un qui me paroit plus inexplicable encore que tous les autres: c`est qu`il est certains genres, certaines familles, dont toutes les espèces croissent dans un seul pays (je les appellerai, par analogie avec le language médical, genres endémiques), et d`autres dont les espèces sont réparties sur le monde entier (je les appellerai, par un motif analogue, genres sporadiques).´*[1]

De Candolle clearly acts on the assumption that endemic taxa ('*genres endémiques'*) occur numerously within their restricted geographical ranges, while cosmopolitan species have a widespread distribution but with only low frequencies ('*genres sporadiques'*).

However, the term 'endemic' should not be confused with, or even reduced to the term 'indigenous'. Even if the etymology points to this meaning, the concept of endemism delineates much more than simply being native or indigenous.

Categories for defining endemism

The concept of endemism, as it is presently conceived, is at first a very relative one. The simple but quite rudimental definition being restricted entirely to a defined area leaves much scope for interpretation and raises several questions concerning the scales of space and time in which endemism is surveyed.

---

[1] *Translation:*
'Of all the general phenomena regarding the living places of the plants, this seems to me even more inexplicable than the rest: the fact that all species of certain genera or families grow in a single country (by analogy with the language of medicine I will call these endemic species), and that there are other species which have species distributed throughout the whole world (by the same analogy I will call these sporadic species).'

The potential biases that might result from a relative usage of spatial scales become clear when the question is considered from two extremes: For every organism on earth it is, hypothetically, easily possible to find a spatial scale that undercuts its natural range of occurrence. So a simple refinement of scale could lead to the status 'non-endemic' even if the population of the organism under consideration is limited to a habitat size of a few square kilometres, as is the case for the rare riparian plant *Oenanthe conioides* near Hamburg (Germany; Jäger and Werner 2002).
At the other extreme, an enlargement of scale leads to the conclusion that every organism is endemic, at least to the planet earth (e.g. *Canis lupus* or *Homo sapiens sapiens*). It thus becomes obvious that the basic concept of endemism could become quite farcical, and hence powerless, if the definition is followed stringently towards the extremes.

The concept needs refinements and specifications to acquire real meaning, and thus to gain biological or political significance, i.e. in order to obtain valid figures or measurements and comparable values, and indications of how and where conservation action should be taken. Over time the number of definitions, concepts, theories and hypotheses on endemism has increased continuously, and today there are a large number of terms associated with the idea of endemism (Kruckeberg and Rabinowitz 1985; Heywood 1996; Pyak et al. 2008).

In the following, some common classification systems and major subcategories of endemism e.g. endemism categorised according to spatial distribution or inferred evolutionary age, are briefly reviewed and related to the goals of the present thesis. Further, some of the problematic aspects of defining and measuring endemism are mentioned, for example the problems which result from different taxonomical rankings or the difficulties involved in categorising the rarity or vulnerability statuses of endemic plants.

Spatial categories of endemism

As noted above, the status 'endemic' strongly depends on the chosen spatial units. In fact, there are no hard-and-fast rules that determine the selection of spatial scales in biogeography or in conservation practice. A comprehensive review of data on endemic vascular plants showed that the choice of the 'appropriate scale' is often determined by the major focus of the respective studies, by the available floristic databases, and also by the study area itself. Thus, the large number of data sets (some 100 in total) which were reviewed referred to many different scales, making comparisons, statistical evaluations or calculations almost impossible (Heywood 1996; Bruchmann & Hobohm, not published).

Beside the basic quantitative dimension of area there is also a qualitative dimension to space. Thus, one should always ask what it is that divides the given space up into various regions. Is it a (hard) natural or (soft) ecological boundary that defines a region or is it an artificial one e.g. political or administrative districts?

Pyak et al. (2008: p. 59) argued that those endemics, that are confined to artificial units *'...certainly dependent upon the vagaries of geopolitical boundaries...'*.

To contrast this connotation of endemic status the authors called those endemics 'conditional endemics'. However, both 'types' of endemism have their legitimation: As endemic species function as a very powerful argument in politics, the information about conditional endemic species might be very useful for decision making and for implementing conservation and management actions. Species that are defined by natural divisions, however, deliver important ecological and biogeographical information on biodiversity in general.

Heywood (1996) concluded that endemics are commonly classified according to four spatial categories: I. Site or restricted area, II. biotope, III. biogeographical region and IV. political area. In order to better understand the spatial topic these four categories are described and substantiated by concrete examples. Further, I suggest a fifth category that includes standardised synthetic areas such as geodetic units (e.g. a gridcell of 1 by 1 degree) or investigation areas of standardised shapes and sizes.

I. Site or restricted area

This is quite a variable category, as a site may be nearly everything which is restricted by any visible natural boundary. Hence, a site may be an archipelago or a single island, a mountain range or a summit, a coastal cliff or a riverine strip, an estuary, a bog or fen or any other obvious formation. Sites may be of unequal sizes, could be nested or overlap with other sites and comprise several habitat types. For example, the Canary Islands collectively host 540 endemic taxa, of which 12 are restricted to the island of Lanzarote; 3 of the 12 Lanzarote endemics are confined to the Famara mountain range.

II. Biotope

In contrast to a site, a biotope is an area that is characterised by particular ecological features, as it is the case for many habitat types. The ecological boundaries that define the division are not necessarily visible but represent some kind of ecological restriction to the organisms' distribution range. Biotopes and habitats may also be of different range sizes, but depending on the organisms under consideration, habitats are most often not nested or overlapping, but have smooth transition zones. For example, the range of *Oenanthe conioides*, a member of the family Apiaceae is restricted to the open riparian areas of the River Elbe near Hamburg. Its total range is limited to about 10 -100 km^2 even though the available (open vegetated) riparian area is much larger (Federal Agency for Nature Conservation 2010, URL: www.floraweb.de; Rothmaler 2005). However, the plant species seems to be bound to those riparian areas that are tidally influenced but not brackish or salty. Hence, the regime of temporary flooding combined with the salt influence seems to be ecologically decisive and therefore forms the ecological boundary that limits *O. conioides* to its small living space.

III. Biogeographical region

A biogeographical region (also known as ecozone or realm) is a biogeographical division which is characterised by a similar geological and evolutionary history e.g. the Palaearctic realm. The organisms living within a realm developed over long time periods in relative isolation, due to geologic features that functioned as migration barriers (hard boundaries e.g. oceans, deserts, mountain ranges). Generally, a biogeographical region is a much larger division than the sites or biotopes and habitats defined above. Subdivisions of biogeographical regions may be ecoregions (often synonymous with biomes[2]). As an example, four species of the family Lauraceae (figure 1; *Laurus novocanariensis*, *Apollonias barbujana, Ocotea foetens* and *Persea indica)* are confined to the biome Macaronesian laurel forests ('*laurisilva*') that occurs exclusively on the archipelagos of the Azores, Madeira and the Canary Islands, which are all part of the Palaearctic realm (Hansen and Sunding 1993; Hohenester and Welß 1993).

IV. Political area

Political areas comprise political (countries, districts or political unions) as well as administrative divisions (e.g. administrative districts, nature reserves). Political and administrative boundaries are artificial but in some cases may follow natural separating lines such as rivers, coastlines, mountain ranges etc. The boundaries of political areas may be apparent, such as obvious border demarcations or fences, or invisible, e.g. open borders, administrative districts, cultural or lingual borders. However they are delineated, such borders designate territories that act in some way autonomously. In most cases, it is not desirable that political divisions are nested or overlapping, although there are a few such cases: For example, in the case of political unions such as the European Union, where the territories of member countries are nested within the territory of the EU, or trans-national nature reserves where the administrative area of a reserve coincides with that of several nations.

[2] Although the terms 'ecoregion' and 'biome' are often used synonymously in todays language the terms have slightly different meanings. Biomes are characterised by particular ecological patterns and the respective climax vegetation which develops as a result, whereas ecoregions are defined by genetic, taxonomic, or evolutionary similarities.

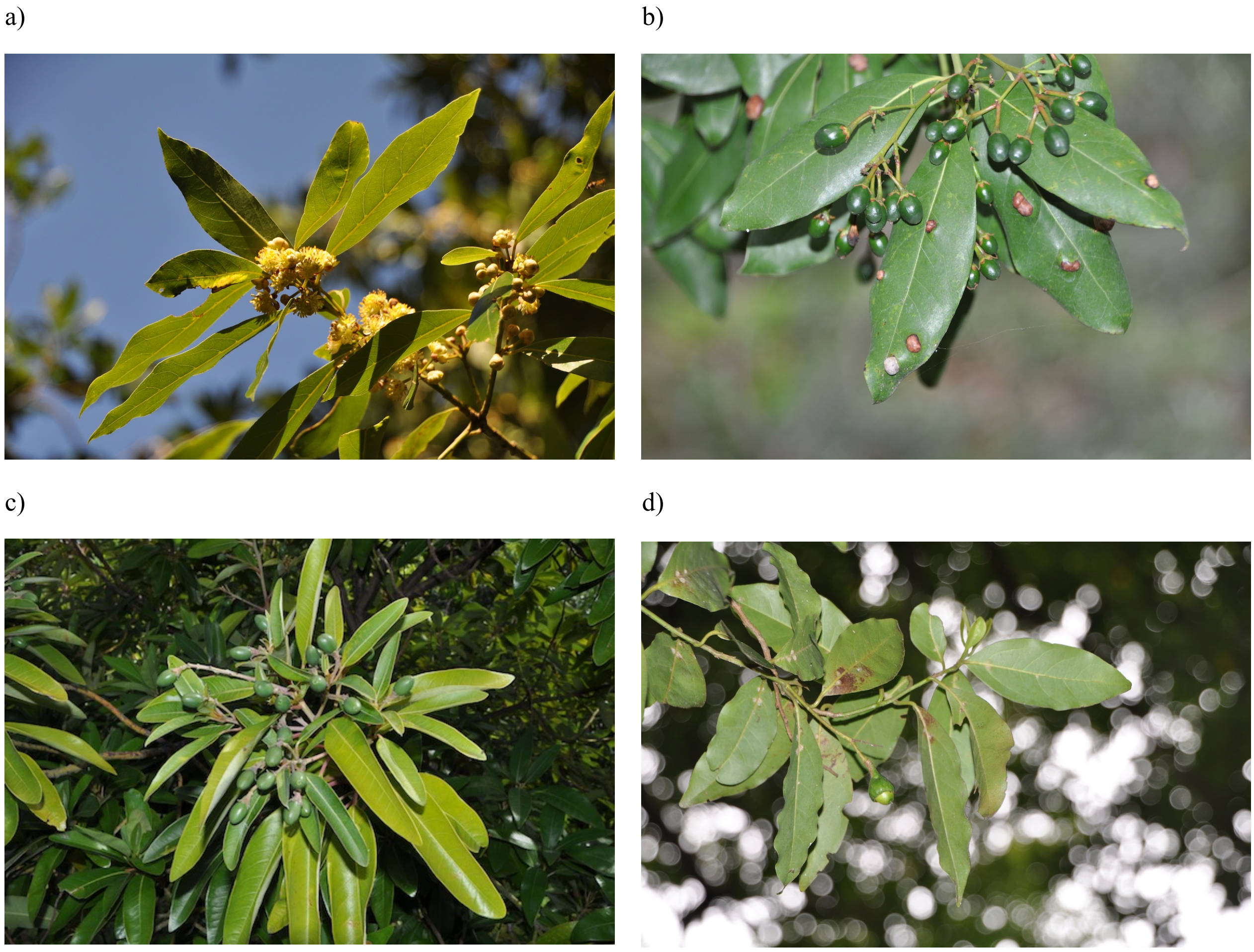


Fig.1: Species of the laurel forest - biome occuring in the Azores, the Canary- and the Madeira Archipelago:
a) *Laurus novocanariensis;* b) *Apollonias barbujana*; c) *Persea indica;* d) *Ocotea foetens* (Photographer: Wels).

Box 1: Androsace alpina – a cross-border endemic

Androsace alpina (Primulaceae) is a showcase for many other taxa in that it reveals very clearly the ambiguities and problems of defining endemic taxa according to political divisions. *A. alpina* inhabits high altitude rock and scree habitats in France, Switzerland, Austria and Italy. In none of these countries this plant is listed as an endemic species because its natural range is not confined to any of the national territories.

Fig. 2: *Androsace alpina* (Photographer: Feurich)

However, if the situation is considered from a different point of view and the focus placed on the Alps as a site or ecoregion it becomes obvious that *A. alpina i*s endemic to the Alps. It is most likely a species that is endemic to the habitat type 'rocks and scree'. If we enlarge the focus again to the dimension of the continent, Europe, *A. alpina* becomes endemic again. However, if the political division European Union (EU) is the centre of consideration, then *A. alpina* becomes non-endemic again because Switzerland is not a member of the EU.

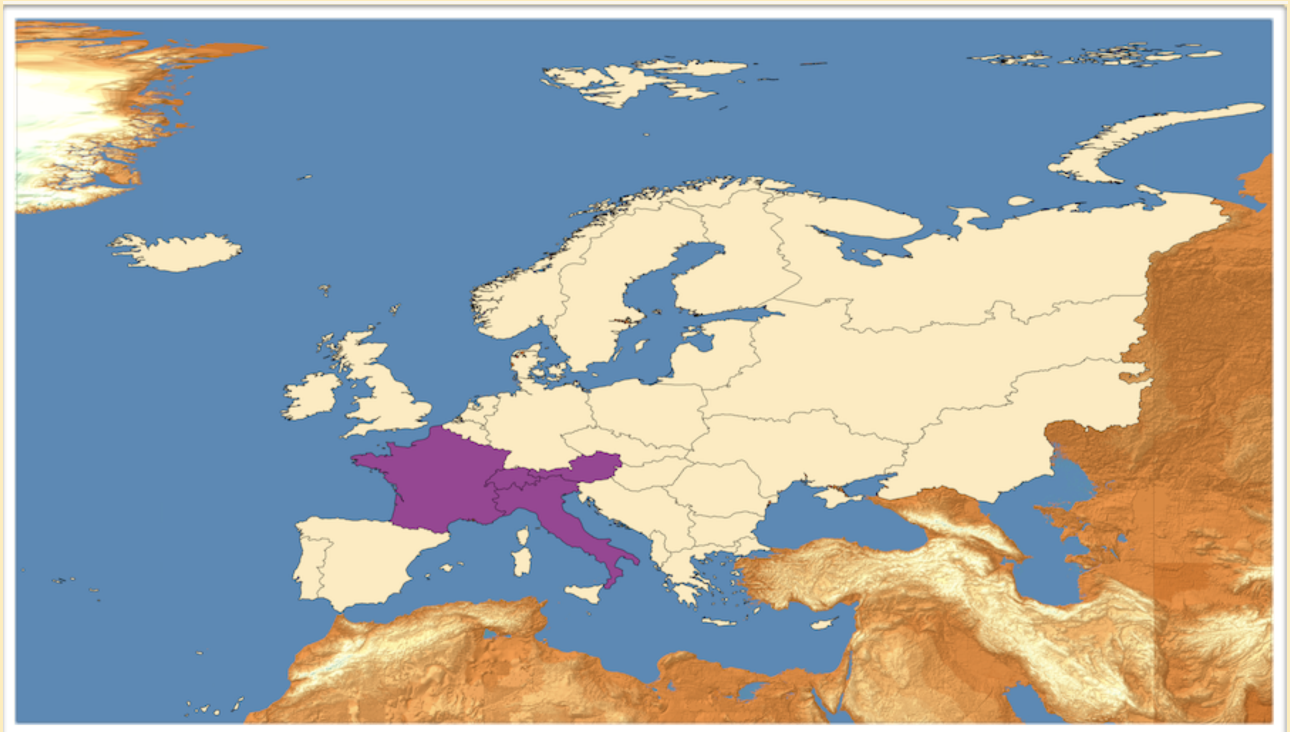


Fig. 3: Occurrence of the alpine endemic plant *Androsace alpina* according to the database EvaplantE.

V. Standardised divisions

Some authors demand the use of standardised divisions of congruent areal size in order to obtain comparable quantified data that gives greater validity to statistics or more explanatory power to model systems or future scenarios (Crisp et al. 2001; Jurasinski and Beierkuhnlein 2006; Dengler 2009). These standardised spatial divisions could be geodetic units (e.g. a gridcell of 1 by 1 degree) or investigation areas of standardised shapes (squares, circles, or hexagons) and sizes (e.g. squares of $100x100km^2$, hypothetic or real). Similar to the political divisions, standardised units also have artificial boundaries but these are of a 'purified' nature. Standardised divisions are generally rectangular or circular units that are projected on the earth's surface, so no natural line (e.g. a river or stream) could ever mark the boundaries. The reference point of the projection is either randomly chosen (random sampling e.g. grid system approaches) or systematically selected (systematic sampling e.g. comparing species-poor and species-rich units of different regions; Jurasinski and Beierkuhnlein 2006).

Several caveats and biases arise when defining endemics according to standardised divisions: On the one hand, the standardised-division-endemics are conditional endemics again because of the more or less arbitrarily chosen artificial borders of the artificial units. On the other hand, the predefined unit size implicates a minimum or maximum area for being endemic or not endemic. This issue should be discussed very carefully. Further, the position of the population centre of a species is of importance. If the population centre of a species is positioned in the centre of the predefined observation unit then the taxon has a high likelihood of being endemic even if the species has a big absolute area of distribution. However, this likelihood decreases if the population centre is displaced towards the borders of the unit (see also Box 5; Hobohm and Bruchmann 2009).

Inferred evolutionary age

Endemism may also be categorised according to the evolutionary age of the entity. The basic assumption is that taxa that are isolated at a high taxonomical level e.g. the monotypic gymnosperm plant *Welwitschia mirabilis* (Welwitschiaceae; figure 4b) or the living fossil *Ginkgo biloba* (family: Ginkgoaceae, which is even classified in its own division Ginkgophyta; Figure 4a), are very old in evolutionary terms (Khoshoo and Ahuja 1963; Royer et al. 2003). Evolutionarily young species are most often present at low taxonomical levels. Members of the genus *Dactylorhiza* (Orchidaceae) are a good example of this. In Europe the genus *Dactylorhiza* is split into a huge amount of species, subspecies, and varieties but there are still many taxonomical uncertainties. Many natural hybrids or even the existence of several intergeneric hybrids (e.g. *Dactylorhiza*×*Gymnadenia* = ×*Dactylogymnadenia;* Jäger and Werner 2002) lead to the assumption that the genetic boundaries of the *Dactylorhiza* taxa are quite weakly developed. This is why one may cautiously hypothesise that the evolution of the genus *Dactylorhiza* is still in progress and that, consequently, the taxa which exist today are quite young. On the other hand, the ancient species *Welwitschia* or *Ginkgo* are relicts of their families and do not show any evolutionary activity today.

The classification of endemics according to their evolutionary age goes back to Engler (Engler 1879-1882) who introduced the terms 'neoendemic' and 'palaeoendemic' to botany. Palaeoendemics are '*phylogenetically high ranking taxa (...) that may be regarded as evolutionary relicts*' (Heywood 1996: p.174) such as the above-mentioned *Welwitschia mirabilis* (figure 4b). Neoendemics are defined as '*clusters of closely related species and subspecies that have evolved relatively recently*' as a result of speciation and adaption to different environmental conditions (e.g. *Dactylorhiza* species; European Biodiversity Clearing House Mechanism, URL: www.biodiversity-chm.eea.europa.eu).

Fig. 4: Evolutionarily ancient species:
a) *Ginkgo biloba (Photographer: Wels)*
b) *Welwitschia mirabilis (Photographer: Wels)*

Improvements in genetic analytical methods lead to a refinement of the terms based on taxonomical rankings and ploidy levels. Favarger and Contandriopoulos (1961) argued that the formation of new species is often provoked by the multiplication of the species chromosome set (genome, polyploidy). On the strength of this, the authors recognised three categories of neoendemics: (1) 'apoendemics', which are defined as taxa with a higher ploidy level than their closest relatives; (2) 'patroendemics', which have a low ploidy level and that presumably have spawned younger taxa with higher ploidy levels; (3) 'schizoendemics', if the ploidy levels of the endemic taxon and its close relatives are equal (vicariant species). Following this scheme, palaeoendemics are polyploid taxa that are ancient and isolated because all their diploid ancestors have become extinct in the course of time.

Without any doubt, the classification of endemics according to their inferred evolutionary age is of interest in phylogenetics and raises many questions with respect to evolutionary studies. This classification scheme might also be of special interest in species conservation as it points to several ways in which conservation management can be made more effective. However, as Heywood (1996) points out there are several problems associated with Favarger and Contandriopoulos' rigidly compartmentalised system of classifying endemics so that this system should be applied with caution (Heywood 1996). For instance, there are many palaeoendemics such as *Globularia incanescens* (Globulariaceae; figure 5) that are diploid and thus have low ploidy levels (Garbari and Bedini 2006).

Fig. 5: *Globularia incanescens (*Photographer: unknown; free available under GNU-licence)
The genome of this plant is diploid although the alpine plant is listed as a palaeoendemic.

Taxonomic level of the endemic entity

It is particularly important to query the taxonomic level of endemic taxa when quantifying endemism. On the one hand, this is necessary in order to 'weight' the value of the endemic entity, which means that endemic entities of a high taxonomic level (e.g. endemic families or genera) should be weighted differently than an endemic subspecies or even a 'varietas' of a species (e.g. *Argyranthemum adauctum* ssp. *canariense;* synonym: *Argyranthemum adauctum* var. *canariense*; endemic to the Canary Islands, see figures 6). For example, the plant family *Didiereaceae* endemic to Madagascar comprises eleven endemic species divided into four endemic genera (Applequist and Wallace 2000).

Fig. 6a: *Argyranthemum adauctum ssp. dugourii,* Tenerife (Photographer: Welß)

Fig. 6b: *Argyranthemum broussonetii ssp. gomerensis* Gomera (Photographer: Bruchmann)

On the other hand, endemism figures are strongly influenced by the taxonomic interpretation of the respective botanists. Some publications reported a surprisingly high fluctuation in numbers of regional endemics depending on the taxonomic experience of the researchers. An example from the Crimean peninsula clarifies this: The number of endemic species on the Crimean peninsula was estimated at 279 species in 1996. After a comprehensive floristic revision in 2006, however, this number decreased rapidly to 127 endemic species and subspecies. About 100 former endemic species had to be 'dethroned' for taxonomic reasons, either because of aspects of synonymisation or because of a lowering of the taxonomic rank, as many so-called endemic species were recognised to be formas or varietates (Yena 2006, 2007).

> *'For example, in Thymus we have only one Crimean endemic now, whereas 9 other taxa previously recognized as endemics are simply glabrous or downy-leaved forms of other widespread species.' (Yena 2006: p. 21).*

This example shows that the number of endemics per region varies according to the stringency of the applied species concept. If a monotypic taxonomical standard is applied which presumes a narrow species limit, the number of endemics is much higher than is the case when a polytypic standard (implies broader species limits) is applied. Yena contrasted these different taxonomic standards by using the terms 'splitters' for monotypic and 'lumpers' for polytypic taxonomic interpretation (Yena 2006).

Through this line of arguments it becomes evident that all comparisons of endemic data have to consider the problems that result from the different taxonomic treatment of the floras under consideration. In the case of the Crimean peninsula the monotypic species interpretation made the sub-Mediterranean climate region much richer in endemics than the Mediterranean islands Sardinia or Sicily are (absolute numbers). The moderate endemic species number of a polytypic species interpretation brings the Crimean down to a middle score. However, even this moderate figure of about 125 endemic taxa surpasses the evaluated absolute numbers of Crimean endemics in the present study by far.

Beside these general categorisation systems regarding endemism in spatial, temporal or taxonomical dimensions, the level of stringency in using the term 'endemic' is vitally important. Hawksworth and Kalin-Arroyo (1995) pointed out that many studies on endemism are insufficiently explicit about the evaluation methods employed and that definitions of the term 'endemism' are often ambiguous. An as yet unpublished review of data on vascular plant endemism collected around the world shows that due to the inconsistent application of the term endemic it is largely impossible to use the datasets to compare the endemicity of the different regions. While comparing publications it became evident that the terms 'endemic', 'subendemic' and 'species' and 'subspecies' were not always used with precision. For example, the term 'species' was often used in the meaning of species plus subspecies (Bruchmann & Hobohm, unpublished).

As discussed above, there are many ways of defining and interpreting the concept of endemism. In general, all concepts of endemism have their own special value but should be balanced differently when using the data. When applying any data on endemism, however, it is always of great importance for the validity of an analysis of the endemic inventory of a region (e.g. for assessing the biodiversity or conservation value) to know precisely how the term endemism was defined when the data was collected.

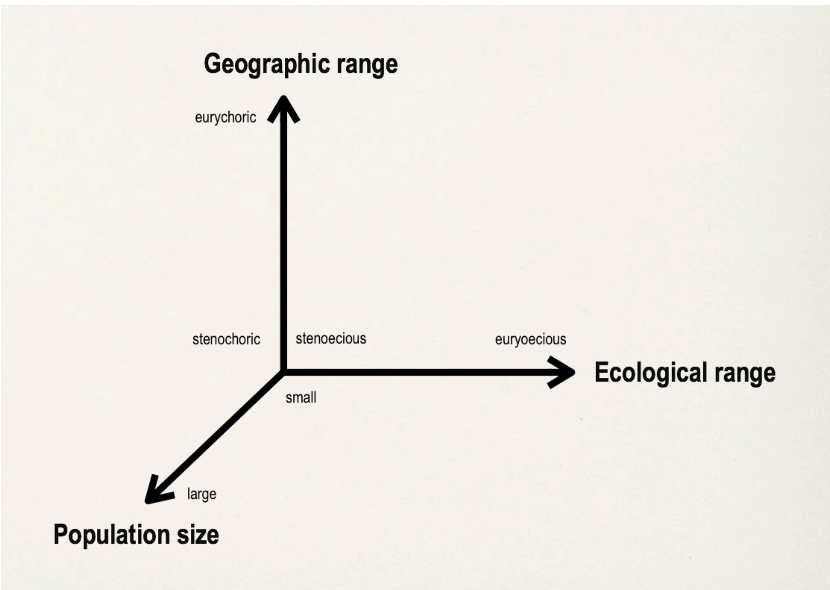
Endemism, rarity and vulnerability

Endemism is often used as a powerful political argument as species with a restricted distribution range are said to be more in danger of extinction than widespread species. Therefore, endemics should be given conservation priority (Fontaine et al. 2007; European Communities 2008).

However, to be endemic does not necessarily mean to be rare or in danger of extinction (comprehensive summary on aspects of rarity in Kruckeberg and Rabinowitz 1985). Some endemic taxa show very wide geographical distribution ranges, while others – and not exclusively the palaeoendemics – have extremely narrow ranges of occurrence (see examples in box 2).

The level of rarity may be determined by three dimensions: Range of occurrence (geographical range), habitat specificity (ecological range), and population size (demography; figure 7) Thus, if a plant is restricted to a small range (e.g. local endemics), is a stenoecious habitat specialist, and occurs in small population sizes then it suffers an extremely high risk of becoming extinct (vulnerability). A single catastrophic event may erase the plant from its existence on earth.

Fontaine et al. (2007) stressed that local endemic species '*are by far the most at risk of extinction*' (Fontaine et al. 2007: p. 11) but also underlined the aspect of demographic rarity, which means that small isolated populations that are distributed over a large geographic range are also endangered because of local extinction events. Extreme habitat specialist species may be endangered as well because they are not able to buffer habitat changes or to adapt within adequate time periods.



The appraisal and categorisation of an endemic taxon as rare or endangered should thus be conducted carefully for every single taxon. The appraisal should include all available data and take into consideration all existing data gaps on actual range sizes, abundance, habitat specificity and species traits (e.g. pollination mode, seed dispersal and others).

Fig. 7: Dimensions defining rarity: Rarity is defined by range of occurrence (geographical range), habitat specificity (ecological range), and population size (demography).

Box 2: Endemic - rare - endangered?

Good examples are amongst others the pan-Europe endemic plant *Cymbalaria muralis* (Scrophulariaceae; figure 8), which commonly grows in rocky habitats, and the extremely local endemic plant *Atractylis preauxiana* (Asteraceae; figure 9), which is exclusively found in stony habitats at the southeastern coastal fringes of the islands of Tenerife and Gran Canaria (Caujapé-Castells *et al.*, 2008).

C. muralis originates from northern Italy and was already cultivated in the 16th century and anthropogenically displaced as a garden plant[3]. As this plant has good dispersal abilities and finds suitable habitats in anthropogenic wall crevices it has now become naturalised and is even listed as neophyte throughout northwest Europe (e.g. Federal Agency for Nature Conservation 2010; www.floraweb.de). As this endemic species has a wide geographical distribution range, finds numerous suitable habitats where it occurs quite abundantly, it is evident that this species is not rare or in danger of extinction.

*A. preauxian*a, however, is severely endangered. It is rare because it has a very narrow distribution range and its local population sizes are quite small. *A. preauxiana* further has strict ecological requirements and seems unable to shift from its original habitats. Because of strong human pressure on the remaining habitat fragments almost all subpopulations of *A. preauxiana* are declining in size and some have already gone extinct (Caujapé-Castells et al. 2008).

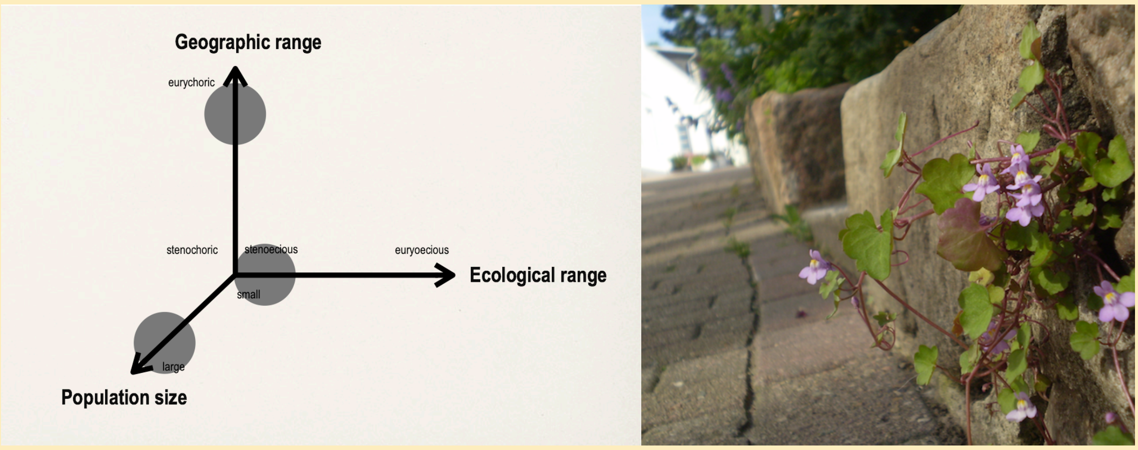


Fig. 8: *Cymbalaria muralis* (Photographer: Bruchmann)

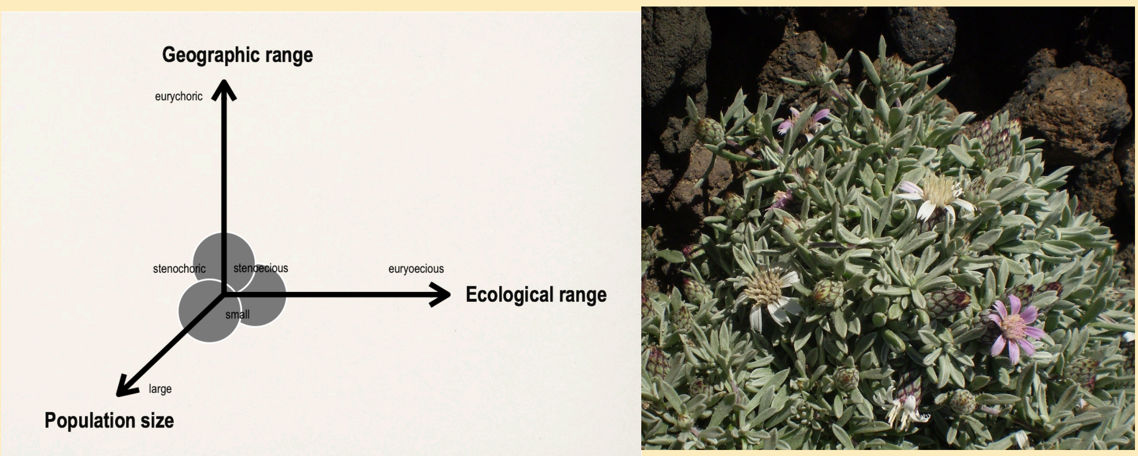


Fig. 9: *Atractylis preauxiana* (Photographer: Weiß)

[3] For the paradoxy of endemic plants that are listed as neophyte please see also box 3.

Measuring endemism

The interpretation of endemism data strongly depends on the mode in which the assessed data is quantified and reported. McDonald and Cowling (1995) noted:

> *'In quantifying patterns of endemism, the units of measurement (spatial scale and taxonomic entity) and the mode of reporting of the data (percentages or counts) influence the interpretation of results. Many studies on levels of endemism are insufficiently explicit about the evaluation methods employed. It is important to be unambiguous about defining and categorizing endemism, especially since it is often used as a criterion for identifying and prioritizing protected taxa and areas.'*

A comprehensive review on worldwide published data on regional plant endemism (Bruchmann & Hobohm, unpublished) shows that endemism is measured and quantified in quite different evaluation modes, which makes the data partly incommensurable e.g. in comparative studies. To provide an overview and an indication of the possibly occurring biases which arise when using different benchmarks and standards to evaluate endemism some of the most frequently published standard measures are briefly summarised in the following:

Regional endemism is often quantified by both the absolute number of endemic taxa (E) and the ratio of endemic taxa to the absolute number of taxa (E/S). However, great care must be taken in interpreting these numbers. Large proportions of endemics may result either from high endemic species numbers or simply from low total species numbers. The Canary Islands and continental Spain, for example, have almost the same number of local endemic taxa (540 vs. 555 taxa, respectively) but as the Canary Islands have lower absolute species numbers the rate of endemism is much higher (27%) than the endemism rate of continental Spain (11%). Also there are large differences in the area sizes: The Canary Archipelago is about 65-fold smaller than the Spanish mainland area. So the numbers are not at all comparable and do not allow any conclusion concerning the richness of endemic taxa or endemic species density.

In order to evaluate species richness over space some authors (e.g. Hobohm 2003; Georghiou and Delipetrou 2010; Panitsa et al. 2010) quantify endemic species densities (endemicity) by applying calculations on Endemic-Area-Relationship (EAR; according to the concept of Species-Area-Relationships (SAR)). Generally the displayed pattern is a positive correlation between area size and species numbers. However, the Species-Area-Relationship is not linear but fits best to the power equation with logarithmic transformation. Usually, the SAR or EAR relationship is graphically displayed in a log-log-linear plot, which means that by log-transformation of the axes the resulting graph is linear-shaped. Inherently the underlying mathematical relationship (power equation), however, is not coherent to convert species numbers according to an assumed linear relationship over space e.g for ranking areas of different sizes according to their (endemic) species richness.

In fact, there is to date no adequate measure for comparing endemism rates or species densities of regions with different area sizes: The direct ranking of regions in the course of endemic density (E/A) is only feasible if either the number of endemics or the area size is constant (see: table 4).

On a large scale Bykov´s index of endemicity (I_E) may be an appropriate quantitative measure for comparing endemism rates of different regions. It determines whether the ratio of endemism within a defined area is higher or lower than the standard value that was given by Bykov (Bykov 1979). The expected endemism value is usually read from the log-log plot of area against percentage endemism derived from Bykov's data (Bykov 1979; Major 1988; see also Hobohm 1999).
Bykov´s index of endemicity was often criticised because of the arbitrary setting of the 1% ratio to an area of 625 km^2 but it was also conceded that the slope is little influenced when downscaling the 1% value to an area of 300 km^2 (Hawksworth and Kalin-Arroyo 1995: p. 176).

The alpha-index sensu Hobohm (Hobohm 2003) enables comparisons of (endemic) species densities as it uses the residuals of the SARs or EARs. This measure is often applied in the field of applied conservation biology e.g. for the ranking and identification of species-rich or distinctive (biodiversity hotspot) areas. There has also been critical discussion of the alpha index: On the one hand, because of some mathematical problems resulting from the statistical autocorrelation and, on the other hand, because of biased results actually inherent to the usage of SARs and EARs and the ratio of endemism and total species richness (e.g. Lu et al. 2007)[3]. However, several recently published studies applied the alpha index as an appropriate measure (Werner and Buszko 2005; Lu et al. 2007; Nikolic et al. 2008; Paulini et al. 2008) for accounting and ranking biodiversity features.

Another index for quantifying endemicity is the range-size-rarity (or, more precisely, the inverse range size rarity). Its calculation is based on counts of grid-cell units in which a taxon is present or, conversely in which the taxon is absent. The range size rarity is defined as the inverse number of cells occupied by the taxon under consideration (Heywood 1996). Further, the sum of range size rarities of taxa occurring within a grid cell is often calculated in order to quantify the endemism richness of the grid unit.
As the range-size-rarity measure is based on absence data in grid-cell units of congruent areas, this measure does not suffer the biases caused by spatial autocorrelation or the errors resulting from an underlying species-area-relationship across scales – as is the case for Bykov's index and the alpha-index. This measure has, therefore, frequently been applied in the recent literature (e.g. Knapp 2002; Reyes-Betancort et al. 2008 also, Biodiversity and WorldMap project of the Natural history museum URL: www.nhm.ac.uk).

When applying the range-size-rarity measure it should kept in mind that this measure strongly depends on the spatial scale of the respective study. As there is no global uniform standard area size

[3] Authors mainly critised that it is difficult to decide if either species diversity or endemism (distinctiveness) plays the more important role in assessing hotspot areas.

for measuring range size-rarity all previously mentioned biases and errors which occur when comparing endemism data across scale must be accounted for when comparing range-size-rarity measure of different studies using different scales.

Box 3: The paradox of being an endemic and also a neophyte

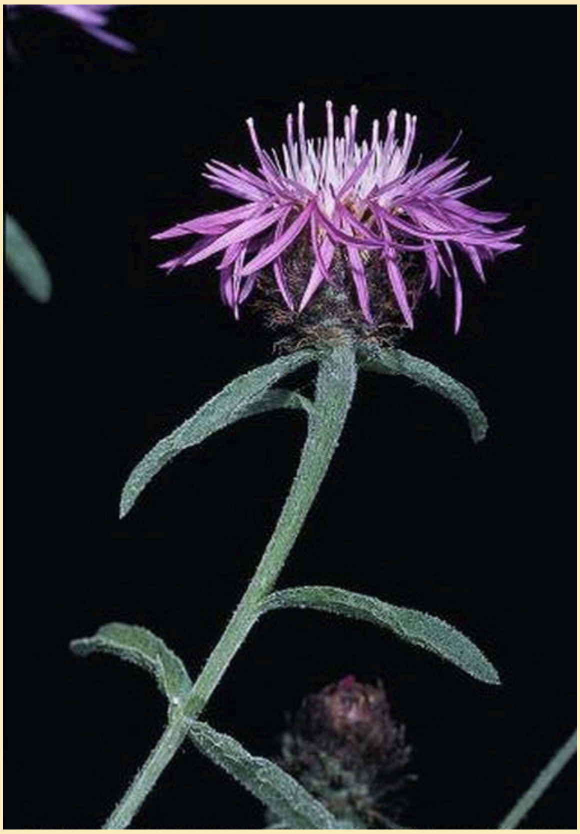


Fig. 10: *Centaurea alpina*
(Photographer: DiTomaso, University of California)

Interestingly, there are some endemic plants that seem to have good adaptive abilities and may become neophytes in regions outside Europe. It can be assumed that these plants have attractive flowers and thus were grown as garden plants before spreading

One example may be the Alpine Knapweed (also Tyrol or Short-fringed Knapweed) *Centaurea transalpina* (syn. *Centaurea nigrescens* ssp. *transalpina; Centaurea nigrescens;* figure 10) that is native to the Alps in Europe and inhabits alpine meadows there. This plant is known as a neophyte and is even listed as an invasive species in North America and colonises roadsides, fields, and waste areas (Center for Invasive species and National Park Service, URL: www.invasiveplantatlas.org).

Paradoxically, this plant is also listed as an European endemic species in the Flora Europaea (Tutin *et al.*, 1996). The truth is certainly to be found somewhere in the middle. However, it should be noted that there has been much controversy regarding the correct taxonomy applied to the North American Alpine Knapweed. A taxonomic revision is needed to finally validate the plants identity (Encyclopedia of life, 2010; eFloras, URL: www.efloras.org).

Material and Methods

Study area

The study area (figure 11) comprises the entire European mainland and several islands or archipelagos and is congruent with the biogeographic definition of Europe in Fontaine et al. (2007). The mainland area is bordered by the major oceans, the Atlantic and the Mediterranean Sea, and is, to the east, confined by the Ural Mountains and the River Ural. The eastern part of the Republic of Kazakhstan (separated from the western part of the country by the River Ural) and the Caucasus region (following the Rivers Volga and Don) are excluded.

The Atlantic islands[4], Svalbard, Iceland, the Faeroes, Ireland, (Great) Britain, Azores, Madeira (incl. Selvagem) and the Canary Archipelago, and some of the bigger Mediterranean islands, namely the Balearic Islands, Corsica, Sardinia, Sicily, Crete, and Cyprus are included and are treated as autonomous geographic regions. In all, the study area is divided into 42 regions (28 mainland and 14 island regions). Thirty-nine of these are identical to the 39 regions described in Flora Europaea (Tutin et al. 1996a-e), but three new regions - the Canary Islands, Madeira Archipelago and Cyprus - have been added (for more detailed descriptions of the regions see table A1, appendix).

Fig. 11: Study area (Scale 1:53,000,000)

[4] The North-Atlantic islands Franz-Josef-Land and Novaya Zemlya are confined to the Northern Russia region.

In most cases, the boundaries of the 42 divisions are artificial (political divisions) and it quickly becomes obvious that there is no correspondence with the natural biogeographical divisions of the European continent. Only the 14 island regions have natural boundaries (shoreline).

The regions vary substantially in their area: the smallest region is the Madeira Archipelago (Ma) with less than 800 km^2 which is heavily contrasted by the more than 2000fold larger Russian Central region (Rs (C)) that comprises more than 1,625,800 km^2.

Floristic database EvaplantE

For the purpose of assessing Europe's endemic flora, a spreadsheet database named EvaplantE (Endemic vascular plants in Europe) was evaluated. The database which currently comprises about 6190 endemic vascular plant taxa, was designed and is regularly updated by a working group at the University of Flensburg (see Hobohm 2008). In the course of the research activities apparent in the present thesis a comprehensive work on the endemic flora of Madeira and the Canary Islands was added in 2009[5].

The lowest accepted taxonomic level is the rank of subspecies; thus, microspecies such as apomicts, or varietates are excluded as are all plant taxa for which the endemic or the taxonomic status is uncertain. Beside information on literature sources and taxonomic synonyms for each of the listed taxa the database contains coded data on taxonomical features, spatial distribution (presence-absence in the 42 regions), altitudinal ranges of occurrence, ecological affinities, habitat attribution and other data. An abstract of the database showing the rich Canary Island region is given in the appendix (see table A2).

A large number of literature sources were evaluated to generate the datasets: basic supra-regional floras (e.g. the Flora Europaea, the Nordic Flora, the Flora of Russia, the Flora Alpina, the Flora Iberica, or the Flora of Macaronesia) as well as regional or local floras, e.g. the Flora dels Paisos Catalans; Flora Hrvatske, Flora de Mallorca, Flora of Cyprus, Flora of Madeira, New Flora of the British Isles and many others. Further, all monographies on endemism within distinct regions e.g. the Atlas of Bulgarian Endemic Plants (Petrova 2006), the Atlas of rare endemic vascular plants of the Arctic (Talbot et al. 1999), the endemic plants of Cyprus (Tsintides and Kourtellarides 1998), and several geobotanical field guides were consulted. Some species data were acquired or validated from online databases (e.g. digital herbaria) or was taken from research papers. All the literature consulted is listed in table A3 (appendix). As far as possible, endemic taxa were assigned to predefined habitat categories.

---

[5] The work on EvaplantE was initiated by C. Hobohm, and was enriched with data of J.Dengler (University of Hamburg) and S. Boch (University of Bern). The addendum with more than 600 endemic plant taxa of the Madeira and the Canary Island flora was mainly done by I. Bruchmann and supported by C. Hobohm (University of Flensburg).

In view of the many difficulties and biases which result from the use of different habitat terminology in the various European languages or from different international regulations and classification standards, an attempt was made to make comparisons valid by defining eight habitat categories which correspond well with those of the Habitat Directive of the European Commission (European Commission DG Environment 2007).

EvaplantE distinguishes between rocky habitats and screes, (non-woody) grassland ecosystems, scrubs and heaths, forests (including tree plantations), coastal and saline habitats, arable lands and other man-made habitats, inland water bodies (standing and running waters), and mires (including bogs, fens, swamps). For more detailed information on database structure see Hobohm (2008) and Hobohm and Bruchmann (2009).

Compilation of geographical data (GIS)

Compilation of spatial dataset and map visualisation

The study area was drawn in a digital map with the help of desktop Geographic Information System (GIS) applications. The base maps are 1) the map of the Flora Europaea which was digitised and geo-referenced and 2) the World Countries (generalised boundaries[6]).

The map was projected using the spatial reference system WGS 84. Geometrical data such as 'area' (in km^2), 'perimeter' (km), the length of 'shoreline' (km), the lengths of shared borders with every neighbouring region ('borderline'; km) and the 'centroids' were calculated for each of the 42 regions. An overview of all queried geometrical data is given in table A5 (appendix).

To enable later queries the attribute data-table (.dbf) that obligatorily accompanies the spatial dataset (polygon shape file: .shp) was further supplemented by labelling attributes: geographical features (area, perimeter etc.), attributes of vegetation and geology, and also attributes of the diversity of endemic taxa per region and per habitat type (the latter were taken from EvaplantE - database).

All work on spatial data was carried out using the free software application Quantum GIS (Version 1.2.0 Daphnis[7]) and the open source software Geographic Resources Analysis Support System (GRASS version 6.4[8]).

---

[6] The shapefile cntry2008.shp is free accessible within ESRIs worldmap-data 3.0-package. The World Countries map represents generalised boundaries for the countries of the world as they existed in January 2008. Generalised political boundaries improve drawing performance and effectiveness at a global level.

[7] Quantum GIS products available from www.qgis.org

[8] GRASS available from www.kyngchaos.com/software/grass

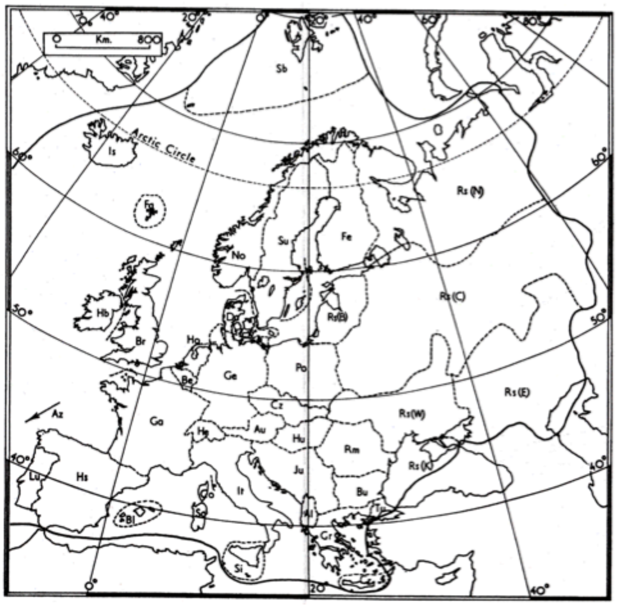


Fig. 12a: Original map of the regions in Flora Europaea

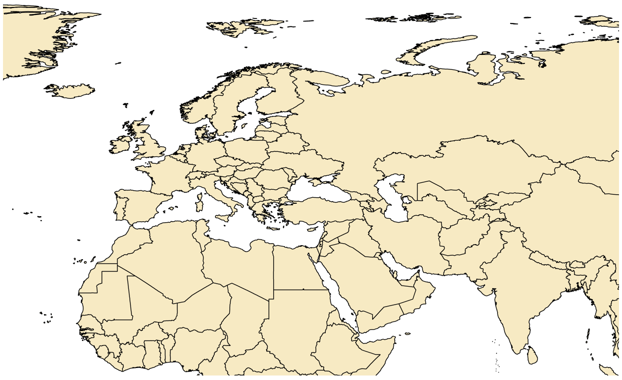


Fig. 12b: Generalized World Countries map by ESRI.

Fig.12c: Resulted digital map of the study area.

Compilation of explanatory variables

The contemporary distribution patterns of (endemic) species should result to varying degrees from influencing factors, such as 1) 'habitat continuity', thus evolutionary stability 2) 'habitat diversity' 3) 'isolation degree' and 4) regional 'species pool'.

Several indices describing these different explanatory variables were derived from digital maps by blending different thematic (map-)layers with the map of the study area (see figures 12a-c). Each explanatory variable for the calculation of the regression models was interpreted in at least two indices.

Table A5 (appendix) provides an overview in alphabetical order of the indices and how they were calculated, as well as detailing all dependent and independent (explanatory) variables.

Habitat continuity

The extent of the last glaciation events in Europe, and thus of severe ecological disturbance events, is considered to be an appropriate indicator of ecological continuity, or better of ecological discontinuity.

The data on the extent of Quaternary glaciations in Europe was compiled from digital maps that were presented by a workgroup of the International Union for Quaternary Research (INQUA, 2004). The mapping of the glacial limits (figure 13a-b; also 15a-c) is based on the Digital Chart of the World (DCW)[9] at a scale of 1:1,000,000 (Ehlers and Gibbard 2003; Ehlers and Gibbard 2004). The spatial data for the succeeding glacial events was merged into one single shapefile that displays a 'total glacial maximum' (TGM) for the Quaternary era. The layer which shows the different glaciation events were referenced to the coordinate reference system WGS 84 and blended with the layer of the study regions (figures15a-c).

Six different indices for ecological continuity were generated from these data: the glaciated area (km^2) per region and the corresponding figures for the non-glaciated areas per region (i.e. the areas of refuge (km^2)) for a) the maximum glaciation of the Saalian period ('SGM ice', 'SGM refugia') b) the last glacial maximum ('LGM ice', 'LGM refugia') and c) the total glacial maximum ('TGM ice', 'TGM refugia')[10] from the merged layer.

---

[9] DCW is a product of Environmental Systems Research Institute, Inc. (ESRI) but was originally developed for the US Defence Mapping Agency.

[10] TGM layer comprises all glacial events of the Quaternary and comprises the extension of the Pleistocene glacials, the Don-, the Elsterian, the Saalian, the Weicheselian and glacial maximum.

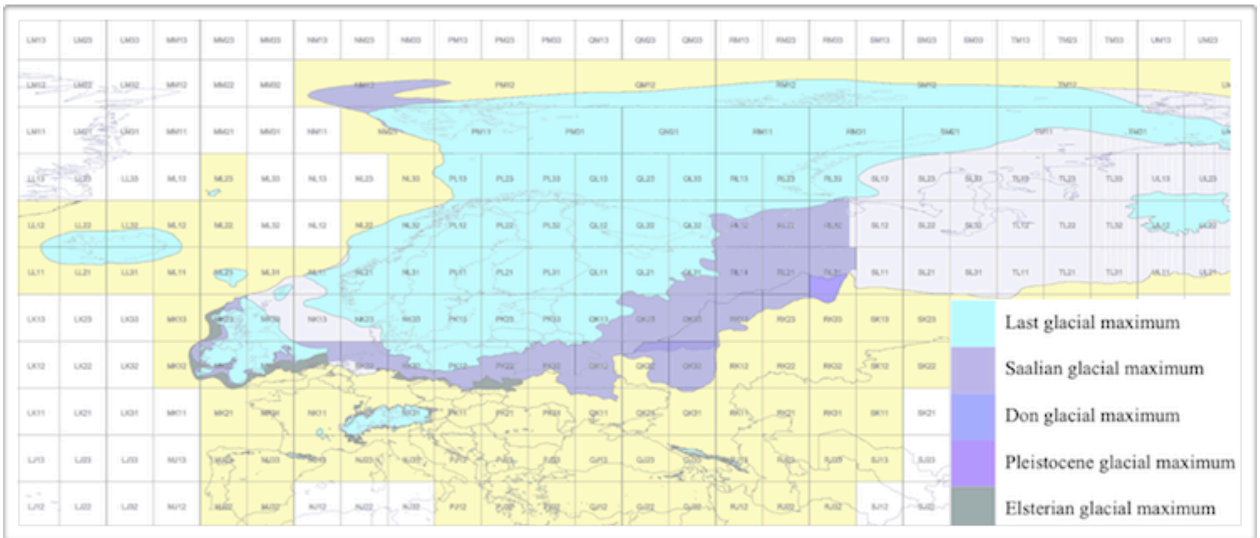


Fig. 13a: INQUAS´ original map on Quarternary glaciation in Europe.

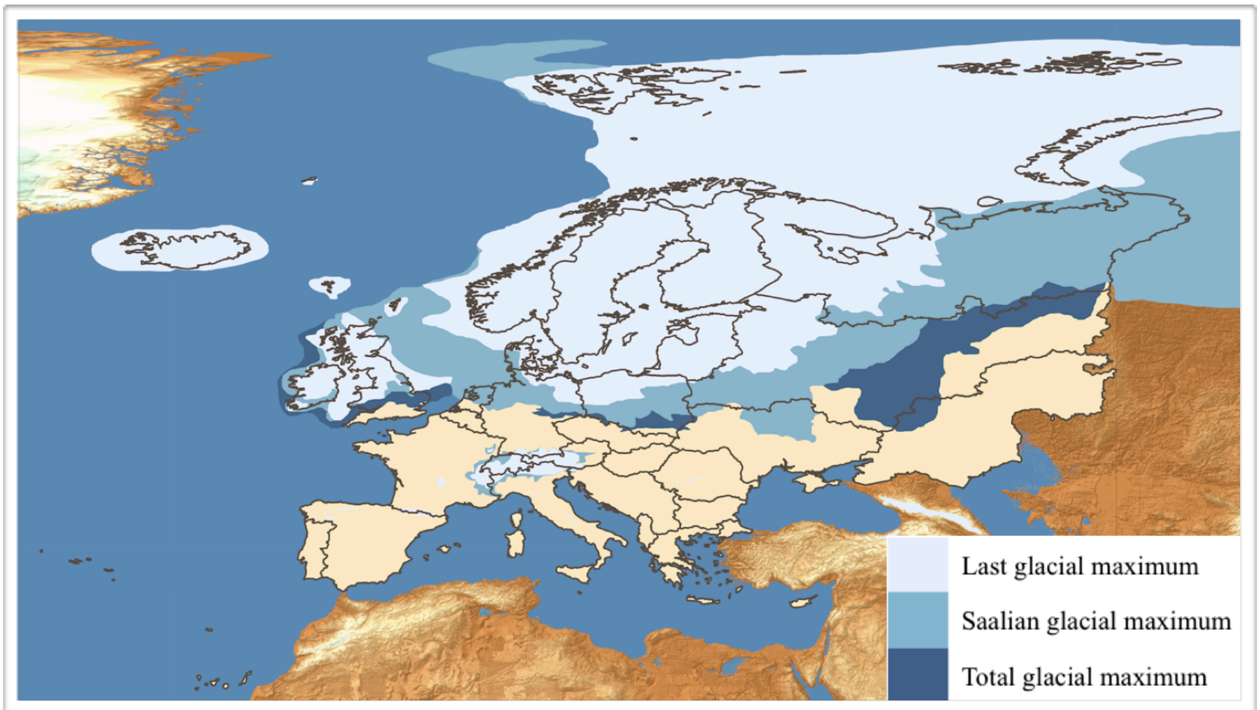


Fig. 13b: Resulted digital map of the study area overlaid with the layers of the last glacial maximum (LGM), the Saalian glacial maximum (SGM), and the total glacial maximum (TGM).

Habitat diversity

Habitat diversity is often described in terms of altitudinal gradients, geological diversity of soils or vegetation cover (e.g. Kallimanis et al. 2010; Panitsa et al. 2010).

Vegetation data was derived from the digital maps of the natural vegetation of Europe compiled by the Federal Agency for Nature Conservation (Bohn and Neuhäusl 2004)[11]. The digital map was referenced to the coordinate reference system WGS 84 and blended with the layer of the study regions. The 'vegetation index' was based on the number of vegetation types per study region. Missing vegetation data from the regions Azores, Madeira and the Canary Islands were evaluated from other literature sources (Jardim and Francisco 2000; Rivas-Martínez et al. 2002; Borges et al. 2008).

The 'soil index' was based on counts of soil groups per study region and was derived from the latest version of the Harmonized World Soil Database (HWSD[12]; Nachtergaele et al. 2009). This map is already available in the coordinate reference system WGS 84. However, a new shapefile merging the study map with soil data was created to enable the counting of soil types per region (figure 16).

Elevational data on minimum and maximum elevation was derived from the Digital Elevation Model (DEM) GTOPO 30[13].

The following indices for describing habitat diversity were calculated: absolute numbers of soil and vegetation types and two measures of altitude: The 'relief index', which is calculated as the difference between maximum and minimum elevation within a region, and the 'relief-area index', which is defined as the squared altitudinal range divided by area and gives an idea of how altitude is allocated across the area (Formula: 'relief-area index' = $(\text{altitude}_{min} - \text{altitude}_{max})^2/\text{area}$).

Isolation degree

Four different indices were calculated to describe the explanatory parameter isolation and geographical separation:

1) The 'coastline index', which is the proportion of coastline per perimeter of each region.
   Formula: 'coastline index' = $\text{coastline}_{\text{region x}}/\text{perimeter}_{\text{region x}}$
2) The 'isolation index', is also based on the proportion of coastline per perimeter but includes distance measures of the island regions. All measures are calculated by dividing the distance

---

[11] Scale 1:2,500,000; Albers-projection

[12] The HWSD is given as uniform raster data with a resolution of 30 arc seconds; projection: WGS84.

[13] The global digital elevation model GTOPO30 is based on a horizontal grid spacing of 30 arc seconds and was derived by the United States Geological Survey (USGS) from several rasters and vector sources of topographic information.

values by 1,500[14], which is the maximum distance of a region within this study and thus the maximal isolated area.
Formula: 'isolation index' = $(distance_{region\ x}/1500) + (coastline_{region\ x}/perimeter_{region\ x})$

3) The 'distance index' is calculated with the natural logarithm of the minimum distance of a division to the nearest continent. As the distance is zero in the case of the 28 continental divisions, the calculation uses the formula: 'distance index' = $\ln(distance_{region\ x} + 1)$.

4) The 'shape index' was calculated as follows: 'shape index'= $area_{region\ x} / (^1/_2 perimeter_{region\ x} * \pi 2) * \pi$. This index is based on the assumption that the geometrical shape of a region might influence the chances of species immigration. The longer the borders towards the neighbouring regions are the higher the chances of species immigration. However, the perimeter of a region is strongly influenced by the shape of the region or rather by its compactness. Regions that are geometrically approximately circular are more compact than regions of other forms. This is why a non-compact region (with wide perimeter-area-proportion) that has a relatively long border compared to its area should have a greater probability of colonisation than a more compact region of the same area.

Regional species pool

It is most likely that endemic species are recruited from the regional species pool; thus, endemics evolve from existing maternal species e.g. because of adaption, radiation, gene drift or for other stochastic reasons.

Features of regional species diversity were mainly evaluated using literature data or were communicated by local experts. In very few cases, e.g. in the case of the Russia Central region, the absolute species number was estimated on the basis of national species numbers and species numbers of neighbouring regions. Two species pool indices were calculated. The 'species pool' index is the total species number per region and the index 'non-endemics' is the number of non-endemics per region, i.e. total species number minus total number of local endemics.

---

[14] Azores Archipelago

Statistics

Table A5 (appendix) gives an overview (in alphabetical order) of the names and respective calculations of all the data generated and used in the statistics; this encompasses geometrical and spatial information, data describing floristic, geographical, and ecological patterns and the respective indices, and the dependent and independent (explanatory) variables used in the predictive regression.

Floristic and taxonomic data

The numerical analyses of endemic species numbers per region and per taxonomic level were counted from the database using spreadsheet application Open Office Calc 2. Every calculation was carried out separately for the European endemics (all 42 study regions; $E_{local+41}$) and for the endemics restricted to the single regions ('local endemics'; E_{local}). The resulting data were listed (e.g. numbers of plant families and genera), incorporated in GIS-maps as attribute information and visualised in diagrams and maps (e.g. numbers of endemics per region), or used to prepare comprehensive region profiles of the 42 study regions (e.g. the 10 most species-rich plant families).

Geographical and spatial data

To enable a tentative comparison of endemic species densities by region, clusters of regions with a deviance of area of maximum 10% were selected (Formula: $(area_{large} - area_{small}) / area_{large})*100 < 10\%$). To contrast the richness of the different regions the absolute numbers of endemics (local and European endemics) were counted and listed. Further, Bykov's Index of endemicity (I_E) which indicates whether the proportion of endemism of regions is high or low was calculated on the basis of absolute numbers of local endemic taxa.

Ecological data

The numbers of endemics that were assigned to one or more habitat types were counted from the EvaplantE-database using a spreadsheet application (Open Office Calc 2). The numbers of endemic plants per habitat type were counted separately for a) all local, b) local-stenoecious endemics and c) all European and d) stenoecious-European endemics. Further, the numbers of local and European endemics (stenoecious and euryoecious) per habitat type were carried out for every study region and added to the region profiles (see appendix: p. 220 ff.).

Methods of reducing explanatory variables

Bivariate correlation (Spearman rank)

To detect highly correlated and thus redundant explanatory variables within the index groups a (two-tailed) Spearman rank correlation was applied using the program PASW Statistics 18.

Highly correlated indices (threshold >0.50) were fed alternately into regression calculations or had to be excluded. The explanatory variable regional 'species pool' was always described by the index 'non-endemics'[15]. The index 'total species', however, was excluded from all regression models. This was done to eliminate ambiguity due to the fact that endemic species also count as species in the counts of total species numbers.

Tests on Multicollinearity

To detect and to quantify model errors caused by multicollinearity within the multiple regression model the variance inflation factor (VIF) and the tolerance value were calculated for each of the explanatory variables. The smaller the tolerance value and thus the higher the VIF, the higher the standard error of R^2 (O'Brien 2007). The threshold for exclusion was set at a level of 0.1 (compare Hair et al. 2010; Panitsa et al. 2010). Calculations were performed using the program PASW Statistics 18.

Predictive regression models

Transformation of explanatory variables

All data were tested for Gaussian distribution as required for linear regression. As almost all variables show a positively skewed distribution, variables were square-root transformed to ensure approximately normally distributed data.

To compare the relative strength of the various explanatory variables standardised regression coefficients (beta-coefficients) are needed. Therefore, all variables were transformed to standard z-scores[16] before being fed into calculation of regression.

All tests and transformation-procedures of explanatory variables were conducted in PASW Statistics 18.

---

15 In the case of the explanatory index 'non-endemics' a correlation value of higher than the set threshold of 0.5 was accepted. This had to be done because there were no other indices describing the explanatory variable 'regional species pool' available.

16 Formula: $z(x) = (x - \bar{x}) / SD(x)$

Incidence of spatial autocorrelation

Regression models are generally used to quantify the relationship between the dependent variables of interest and one or more independent, explanatory variables. However, linear regression is also often applied to approximate a predictive model to a given dataset.

The data of the present study is combined with mapped data, i.e. with spatial features, and it is possible that the dataset includes some kind of inherent spatial patterns that might somehow influence the explanatory or predictive power of the regression model.

The phenomenon of spatial autocorrelation, i.e. that the spatial distribution of the variable of interest shows some kind of systematic pattern, occurs frequently in ecological datasets. In fact, autocorrelation of variables is more or less inherent to ecology because all ecosystems are defined by abiotic and biotic factors and their interrelations over space and time, which of course includes all spatial structures or spatial settings of the single components (Legendre 1993; Dormann 2007). However, if it is known that the variable of interest is autocorrelated over space, the assumption of independence, which is a major precondition of most standard statistical procedures, is violated. Thus, results of the method are not reliable (Kühn 2007). To achieve reliable results, methods are needed that account for the spatial components within data set regression, e.g. the method of geographically weighted regression (GWR; Fotheringham et al. 2002; Selb 2006), rather than the traditional aspatial models.

Measures of spatial autocorrelation

There are several mathematical procedures for calculating the intensity of the autocorrelation effect (Pisati 2001; Dormann 2007; Kühn 2007). In the present study, the most widely used coefficients of spatial autocorrelation are applied: 1) Moran's I (Moran 1948; Moran 1950) and 2) Geary's C (Geary 1954). Moran's *I* as a measure for global spatial autocorrelation[17] deals with the covariance of the data. Geary´s *C* (synonymously: Geary's contiguity ratio) is inversely related to Moran's *I*, but uses paired comparisons of the data.

Moran's *I* is defined as

$$I = \frac{N}{\sum_i \sum_j w_{ij}} \; \frac{\sum_i \sum_j w_{ij} (x_i - \bar{x}) (x_j - \bar{x})}{\sum_i (x_i - \bar{x})^2}$$

[17] In the statistical context the term 'global' means the inclusion of all available data while, in cotrast, the term 'local' refers to pairs of points (Fotheringham et al. 2002).

where x as the variable of interest; N the number of observations and w_{ij} a weight matrix of the spatial weights.

Geary´s C is defined as follows, where W is the sum of all w_{ij}

$$C = \frac{(N - 1) \sum_i \sum_j w_{ij} (x_i - x_j)^2}{2W \sum_i (x_i - \bar{x})^2}$$

Both procedures require a so-called weight matrix that makes it possible to relate spatial weights to the measured values. This weights matrix is usually generated by the latitude and longitude data of the study locations (Pisati 2001). As a simple distance-measure of the centroids of the large study regions seems an inappropriate means of displaying the ecological mutual influences among the regions (e.g. species migration or species invasion; figures: 14a-c), a further symmetric weight matrix was calculated. It combines distance measures with the length of the borders of neighbouring regions (regarded as possible dispersal corridors):

For every pair of neighbouring regions the 'neighbour-values' that described the mutual influence of the respective regions were calculated. It is assumed that neighbourhood across an ocean has less influence than terrestrial neighbourhood (e.g. with respect to species invasion). This is why islands and archipelagos are most isolated, while regions without any access to the sea are least isolated. For mainland regions, the 'neighbour-value' was calculated by dividing the length of the adjoining border by the distance of the centroids of the respective neighbouring region. For single island regions and archipelagos, the 'neighbour-values' were calculated by dividing the artificial borderline value of 10 km (Fußnote) by the distance of the centroid to the respective neighbouring region (to avoid division by zero)[18].

[18] Coastlines are considered as borders to the sea which, in theory, should minimise species migration to zero. In certain cases, however, it is most likely that there is quite fluent species migration across short distances of water: Sicily, for example, is situated very close to (mainland region) Italy. The shortest distance between the coastlines of different regions is about 10 km, a distance easily overcome by seeds of many plant species.
Another example is the region Denmark, which is almost an island, having only one terrestrial border – with Germany (56 km). However, it is situated very close to Norway and Sweden, so it is most likely that the Denmark region is also influenced by the species pools of these two countries.
In order to include and to weight these types of neighbourhood across an ocean an artificial border value of 10 km was given as the border length of every island.

Fig. 14a :Map of study area showing the centroids

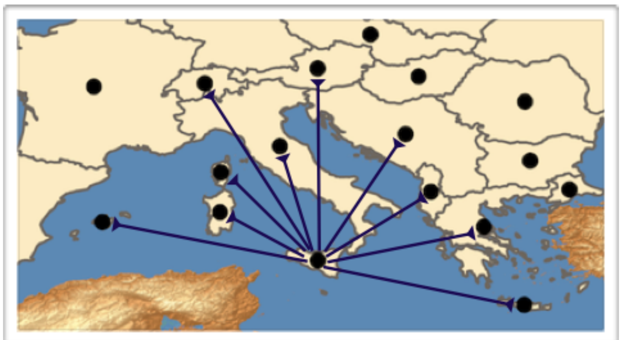


Fig. 14b: Distances between centroids of regions

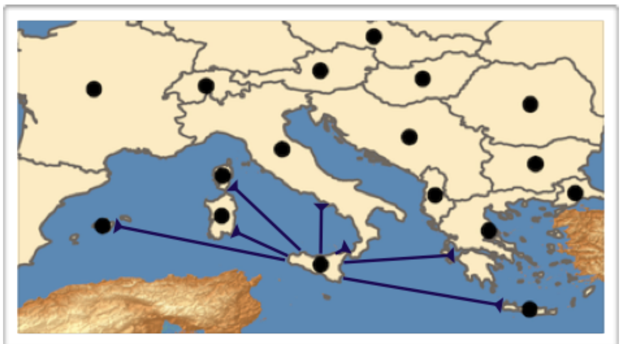


Fig. 14c: Nearest distances between coasts of neighbouring regions relevant for species migration

The threshold for deciding if spatial autocorrelation is present within the variables of interest is defined in the case of Moran´s *I* by the *z*-scores of the calculated *I*-value. If the *z*-score values are smaller than -1.96 or higher than 1.96, spatial autocorrelation is indicated[19]. Values of Geary´s *C* range between 0 and 2, whereas values smaller than 1 indicate positive and values larger than 1 indicate negative spatial autocorrelation[20].

[19] Values of Moran´s *I* range between -1 and +1. Whereas negative values of Morans *I* indicate negative autocorrelation, positive values of Morans *I* indicate positive spatial autocorrelation. *I* = 0 means a random spatial pattern.

[20] Geary´s *C* values of 1 means no spatial autocorrelation.

If spatial autocorrelation was identified within the dependent variable then spatial regression models need to be applied rather than the traditional aspatial regression methods. The standard term of a multiple linear regression model $y_i = f(x_1+x_2+x_3+\ldots + x_n) + \mu_i$ is expanded by the values of weight matrix $W * y_i = f(x_1+x_2+x_3+\ldots + x_n) + \mu_i$.

Standard linear regression (LR) vs. geographically weighted regression (GWR)

As the calculated values of Moran´s *I* and Geary´s *C* indicate spatial autocorrelation spatial regression models (GWR) need to be applied instead of standard linear regression (LR). There are two different methods of accounting for spatial dependence - the lag model and the error model available to calculate the GWR. The spatial dependence in the lag-model is incorporated by the inclusion of an additional variable defined by a function of the dependent variable observed at neighbouring locations whereas the spatial dependence in the error model is incorporated by specifying a spatial process for the random disturbance term. Following Selb (2006) the GWR lag method was used in the present study.

Standard linear regression (LR) was applied as well in order to contrast and discuss both statistical procedures critically.

The calculation of measures of autocorrelation for the variable of interest, i.e. the number of endemics per region (national and European), and also the calculations of spatial and linear regression were conducted with the program STATA 9.2 (for further information on the algorithm see Pisati 2001).

Results

Geographical data, maps, and visual presentation (GIS)

The generation of a digital spatial dataset for the study area was the groundwork that made it possible to conduct efficient measurements and calculations of the necessary geometrical and geographical data (centroid data, distance measures, etc.) with the help of GIS applications. The datasets of all 42 study regions are summarised in table A4 (appendix) and are a supplementary element of the 42 region profiles (see appendix pp. 220). This geometrical and geographical data was, for example, used to calculate the Bykov´s index values, to compare endemism in similar sized regions, and to generate the explanatory indices for 'isolation degree'.

The digitalization of endemism data in GIS also made it possible to combine the spatial dataset of the study area with other datasets. This blending of spatial data enabled the calculation of several of the explanatory indices needed to calculate the regression, e.g. the indices of 'habitat continuity' or 'habitat diversity'.

The visualisation of some aspects of endemism in maps, as in figures 17, 18 and figures 21, 22 gives some first impressions of the spatial dimensions of the data which EvaplantE provides. It further reveals some spatial aspects that enable us to postulate first trends in data structure (e.g. north-south gradient of endemism) and points towards more detailed formulations for future research questions.

The blending of different thematic maps provides first visual impressions of the influence that several abiotic factors might have regarding the current distribution patterns of endemic plants, e.g. the assumed influence of the maximum extent of the Quaternary ice sheets or the major soil groups (figures 15 a-c, 16).

Fig. 15a: Maximum extent of the Saalian glaciation (SGM) in Europe.

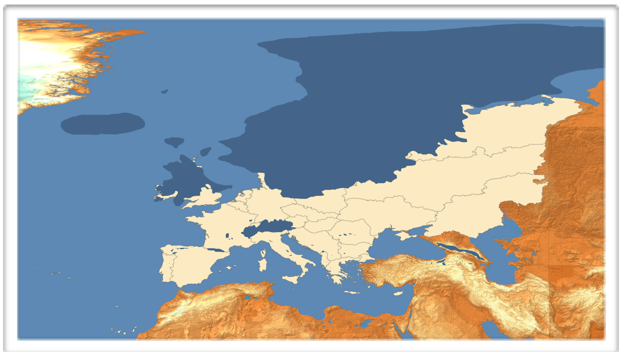


Fig. 15b: Maximum extent of the Weichselian glaciation. (LGM) in Europe.

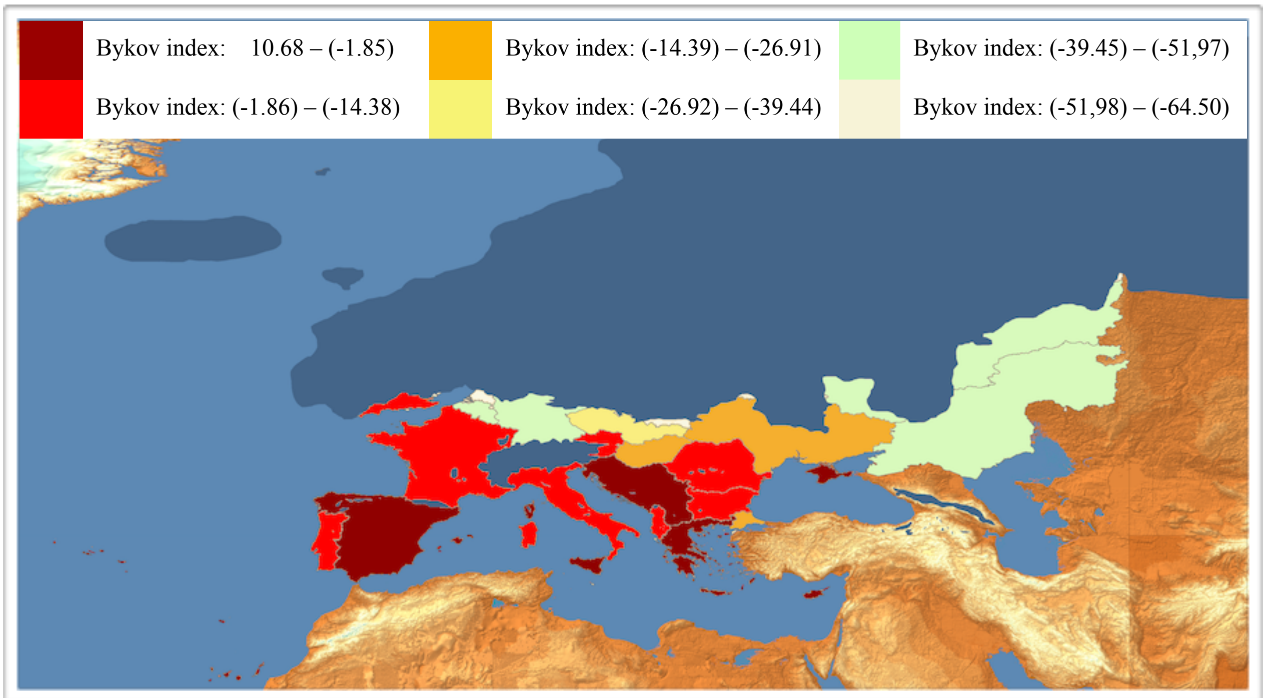


Fig. 15c: Extent of the total glacial maximum (TGM) in Europe (Scale: 1:53,000,000)

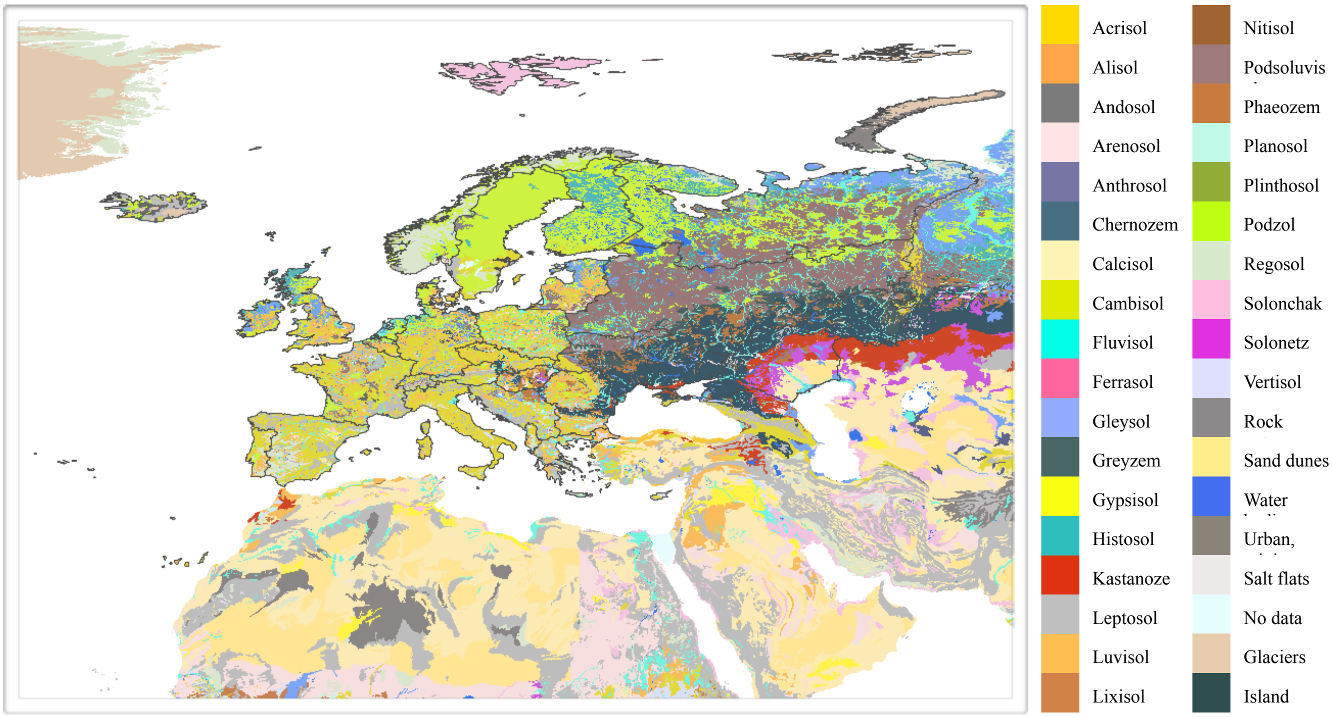


Fig. 16: Map of the major soil groups in Europe. Original map published by Nachtergaele et al. 2009 was georeferenced to the study region.

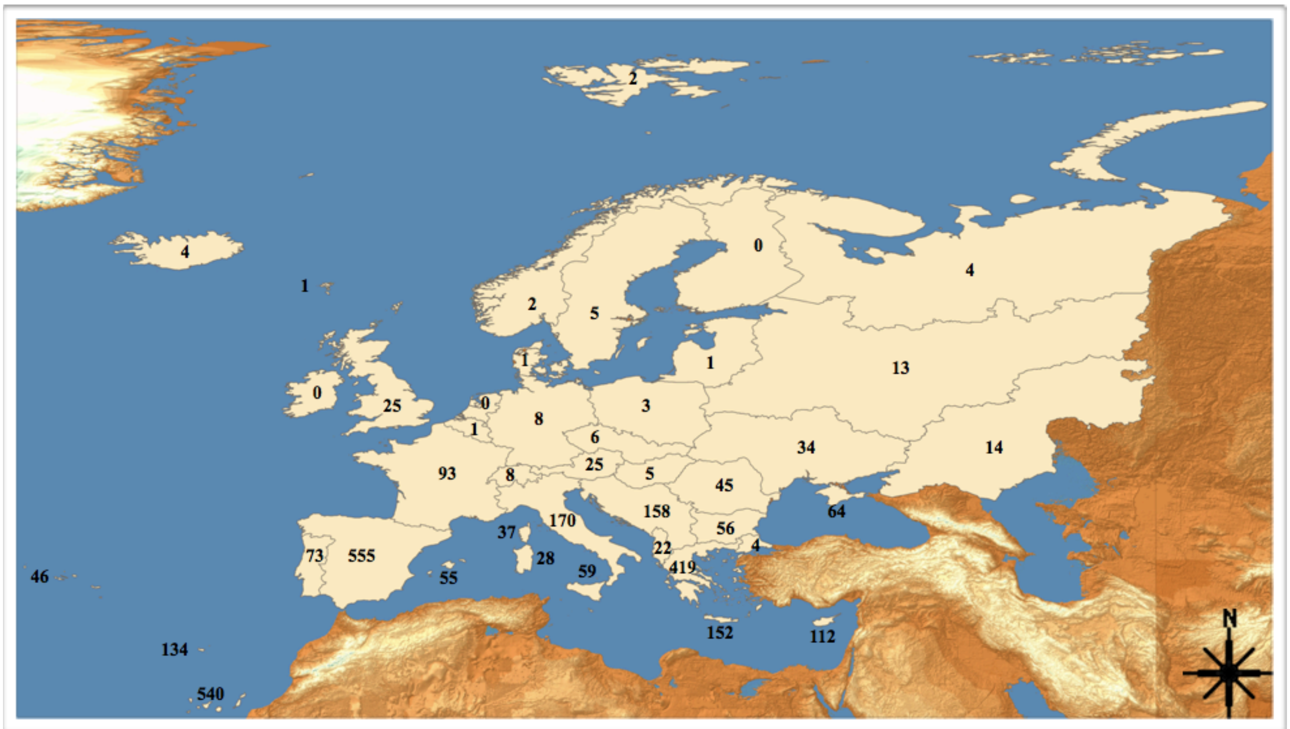


Fig. 17: Absolute numbers of local endemics per study region (Scale: 1:53,000,000)

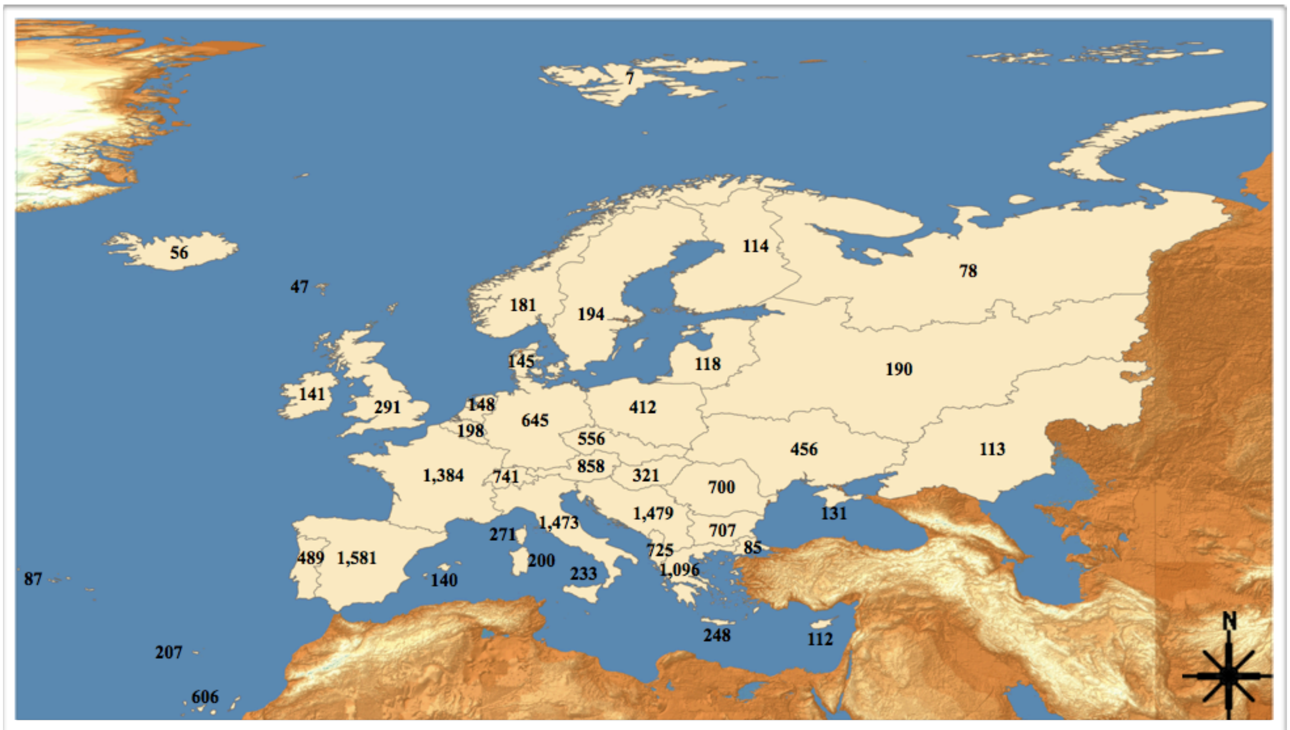


Fig. 18: Absolute numbers of European endemics per study region (Scale: 1:53,000,000)

Endemic diversity in Europe

Floristic and taxonomic view

The database EvaplantE currently comprises 6,190 endemic taxa with 164 species groups, 5,191 species and 835 subspecies (table 1). Europe's endemic vascular plants belong to 110 plant families (table 2) and 719 genera (table A7, appendix). The richest plant family is the family of Asteraceae, which comprises 1,135 taxa and thus holds the lion's share of the listed endemics. The top ten among the endemic-rich plant families are Caryophyllaceae (436 taxa), Brassicaceae (405), Scrophulariaceae (371), Fabaceae (367), Poaceae (366), Lamiaceae (307), Apiaceae (226), Rosaceae (207) and Campanulaceae (197). The list of the ten most endemic-rich genera shows a similar pattern: The richest genera are members of the Asteraceae, namely *Centaurea* and *Hieracium* with 250 and 174 endemic taxa respectively. These are followed by *Festuca* (Poaceae, 144); *Campanula* (Campanulaceae, 132), *Silene* (Caryophyllaceae, 113); *Galium* (Rubiaceae, 99); *Saxifraga* (Saxifragaceae, 95), *Alchemilla* (Asteracea, 94); *Dianthus* (Caryophyllaceae, 88); *Limonium* (Plumbaginaceae, 85).

Europe does not host any endemic plant families but there are approximately 112 genera (Davis et al. 1994) that are strictly restricted to the study area. For a complementary overview of the plant genera with endemics see appendix table A7.

Tab. 1: Overview of taxonomic ranking of European and local endemics, and endemics for two and three regions.

Taxonomic rank	No. of European endemics	No. of local endemics	Endemics of 2 regions	Endemics of 3 regions
species group	164	13	40	22
species	5,191	2,576	1,053	442
subspecies	835	385	171	90
total	6,190	2,974	1,264	554

Tab. 2: Plant families of the European endemic taxa sorted according to the total number of endemic taxa per family

Family	No. of endemic taxa	Family	No. of endemic taxa	Family	No. of endemic taxa	Family	No. of endemic taxa	Family	No. of endemic taxa
Asteraceae	1,135	Iridaceae	53	Asclepiadaceae	14	Gesneriaceae	5	Palmaceae	2
Caryophyllaceae	436	Orchidaceae	53	Globulariaceae	14	Aceraceae	4	Ulmaceae	2
Brassicaceae	405	Cyperaceae	47	Dryopteridaceae	13	Lauraceae	4	Woodsiaceae	2
Fabaceae	367	Gentianaceae	44	Linaceae	13	Apocynaceae	3	Alismataceae	1
Poaceae	366	Geraniaceae	36	Rhamnaceae	13	Aquifoliaceae	3	Araliaceae	1
Scrophulariaceae	356	Cistaceae	34	Resedaceae	12	Grossulariaceae	3	Areaceae	1
Lamiaceae	310	Amaryllidaceae	30	Malvaceae	11	Marsileaceae	3	Buxaceae	1
Apiaceae	229	Polygalaceae	28	Orobanchaceae	11	Paeoniaceae	3	Clethraceae	1
Rosaceae	207	Hypericaceae	27	Plantaginaceae	11	Pyrolaceae	3	Cucurbiaceae	1
Campanulaceae	197	Papaveraceae	24	Urticaceae	11	Acanthaceae	2	Dicksoniaceae	1
Liliaceae	174	Polygonaceae	24	Araceae	10	Adiantaceae	2	Hippocastanaceae	1
Rubiaceae	162	Salicaceae	24	Aristolochiaceae	10	Amaranthaceae	2	Lomariopsidaceae	1
Boraginaceae	155	Chenopodiaceae	23	Oleaceae	10	Berberidaceae	2	Loranthaceae	1
Ranunculaceae	154	Juncaceae	23	Onagraceae	10	Celastraceae	2	Ophioglossaceae	1
Plumbaginaceae	141	Thymelaeaceae	23	Caprifoliaceae	8	Cneoraceae	2	Pittosporaceae	1
Crassulaceae	124	Valerianaceae	22	Isoetaceae	8	Hymenophyllaceae	2	Polypodiaceae	1
Saxifragaceae	97	Ericaceae	21	Solanaceae	6	Lycopodiaceae	2	Rafflesiaceae	1
Dispacaceae	90	Aspleniaceae	19	Betulaceae	5	Lythraceae	2	Sapotaceae	1
Primulaceae	67	Santalaceae	16	Callitrichaceae	5	Myricaceae	2	Theaceae	1
Euphorbiaceae	60	Convolvulaceae	15	Cupressaceae	5	Myrsinaceae	2	Tiliaceae	1
Violaceae	56	Pinaceae	15	Fagaceae	5	Najadaceae	2		

Fig. 19: *Draba muralis*
(Photographer: Hackney)

Of the 6,190 endemic taxa in Europe about 2,974 are restricted to a single region (table 3); thus 48% of Europe´s endemic plants are local endemics. Figure 20 presents a rough range distribution showing the numbers of endemics as related to the number of inhabited regions. No endemic plant inhabits more than 32 regions. The endemic taxon with the widest range is the Wall-Whitlowgras *Draba muralis* (Brassicaceae).

The distribution of endemic plants across the study area is very uneven. As shown in figures 21 and 22 the tendency is that the northern regions host fewer endemics than the southern regions. Large endemic diversity for both local and European endemics is found in the Mediterranean regions of Europe (including Macaronesia):

In terms of European endemics per region, Spain (mainland 1,581), the states of former Yugoslavia (1,479), Italy (1,473), mainland France (1,384), Greece (1,096), Austria (858), Switzerland (741), Albania (725), Bulgaria (707), and Romania (700) are the ten most endemic-rich regions of Europe (see figure 21).

In terms of the number of local endemics per region, the southern island regions seem to play an important role (figure 22). The richest regions are: mainland Spain (555), the Canary Archipelago (540), Greece (419), Italy (170), former Yugoslavia (158), Crete (152), the Madeira Archipelago (134), Cyprus (108), mainland France (93), and the mainland regions of Portugal (73; see figure 22).

An overview of the number of European and local endemics per region is given in table 4.

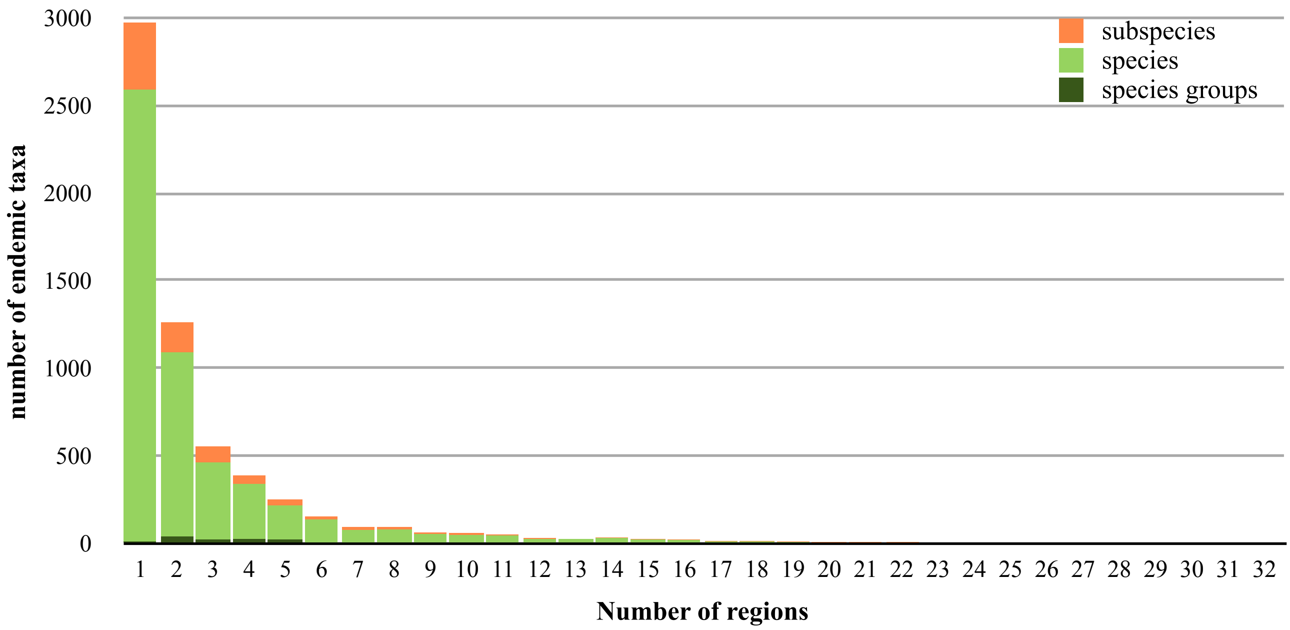


Fig. 20: Range distribution of endemic plants in Europe

Tab. 3: Range distribution of endemic plants in Europe

No. of regions	total taxa	species group	species	sub-species	No. of regions	total taxa	species group	species	sub-species
all	6,190	164	5,191	835					
1	2,974	13	2,576	385	17	16	1	11	4
2	1,264	40	1,053	171	18	15	3	10	2
3	554	22	442	90	19	11	0	10	1
4	389	25	315	49	20	8	0	7	1
5	251	23	195	33	21	8	0	7	1
6	156	7	130	19	22	9	0	7	2
7	96	5	74	17	23	5	0	4	1
8	95	5	76	14	24	3	0	2	1
9	64	3	53	8	25	3	0	2	1
10	60	3	46	11	26	3	0	3	0
11	52	1	44	7	27	3	0	3	0
12	33	3	25	5	28	1	0	1	0
13	28	2	24	2	29	1	0	1	0
14	36	2	29	5	30	1	0	1	0
15	27	3	21	3	31	0	0	0	0
16	23	3	18	2	32	1	0	1	0

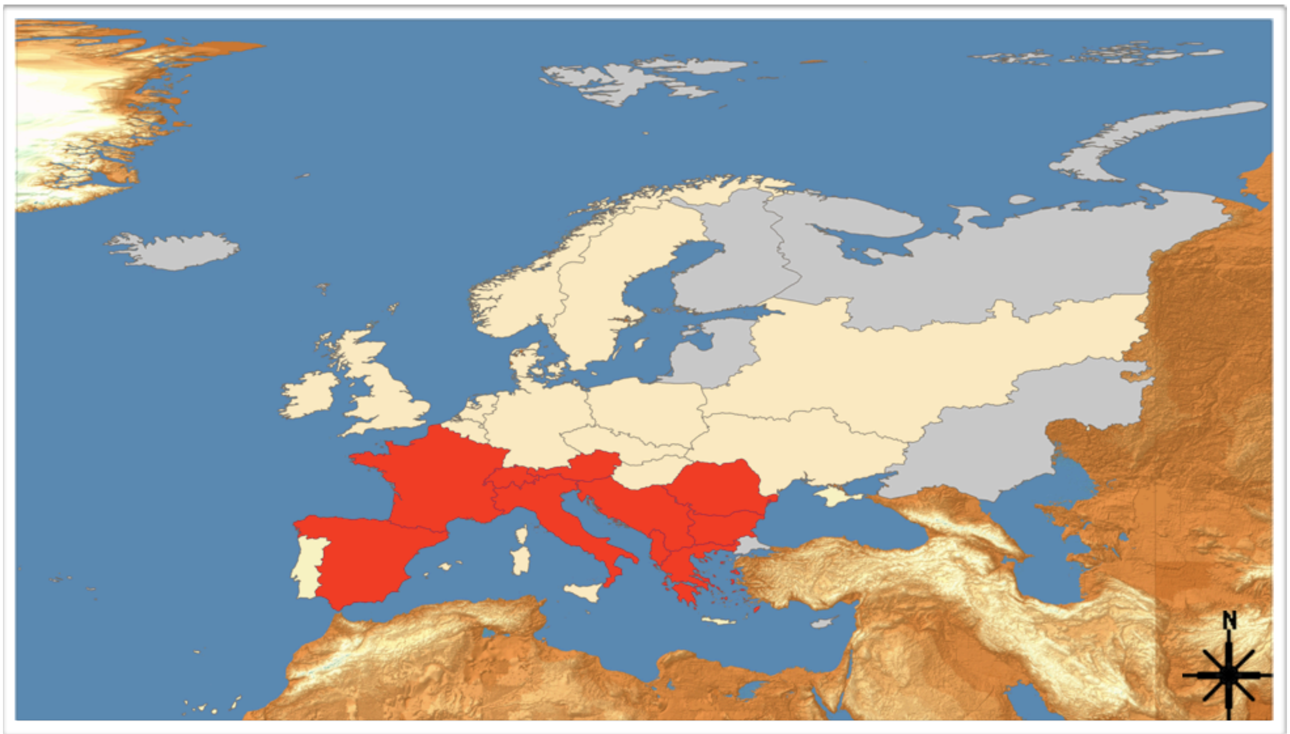


Fig. 21: Spatial distribution of European endemics: The ten most endemic-rich (red) and the ten most endemic-poor regions (grey).

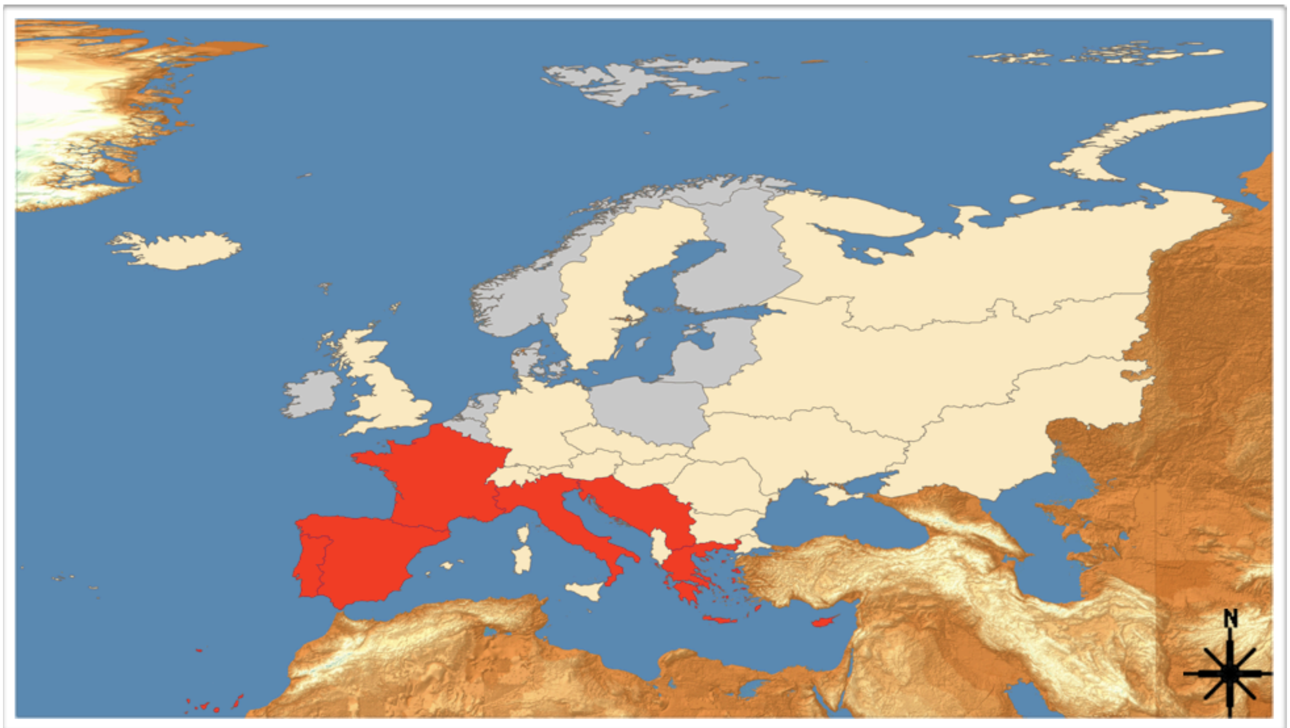


Fig. 22: Spatial distribution of local endemics: The ten most endemic-rich (red) and the ten most endemic-poor regions (grey).

Endemism ratios and Bykov´s index are summarised in table 4.

The Macaronesian and Mediterranean islands and archipelagos have the highest Bykov´s index values. The highest values are held by the Canary and Madeira Archipelago with 10.68 and 10.36 respectively, followed by the Azores Archipelago (3.29), the Mediterranean Islands of Crete (3.08) and Cyprus (2.00), the Balearic Islands (1.69) and mainland Greece (1.18). The regions with the lowest values, i.e. values much lower than would be expected from their respective areas, are all in northern Europe: Finland (-114.65), Russia Baltic division (-84.18), Russia Northern division (-72.24), Ireland (-62.17), Poland (-60.20), mainland Norway (-58.10), and the Netherlands (-55.10).

These results are congruent with the endemism ratios that were found for the Canary (27.0%) and Madeira (11.13%) archipelagos as the regions with the highest endemism ratios, followed by mainland Spain (10.10%), Greece (8.38%), Crete (8.10%), Azores (5.46%) and Cyprus (5.40%). The lowest ratios are again found in certain regions in the north of the continent: Netherlands (0%), Ireland (0%), Finland (0%), the Baltic region (0.05%), Belgium with Luxembourg (0.06), Denmark (0.07%), Norway (0.12%) and Poland (0.13%).

Tab. 4: Number of endemics per region: European endemics, local endemics, endemics for two and three regions, and Bykov´s index and endemism ratios based on the number of local endemics per region.

Region	No. of European endemics	No. of local endemics	endemics of two regions	endemics of three regions	endemism ratio (%)	Bykov´s Index
Al	725	22	143	137	0.7	-5.49
Au	858	25	31	66	0.8	-7.06
Az	87	46	9	9	5.5	3.29
Be	198	1	1	5	0.1	-39.61
Bl	140	55	14	18	3.6	1.69
Br	291	25	22	17	1.8	-4.88
Bu	707	56	99	118	1.6	-4.33
Ca	606	540	47	9	27.0	10.68
Co	271	37	47	27	1.5	-1.76
Cr	248	152	62	9	8.1	3.08
Cy	112	108	2	0	5.4	2.00
Cz	556	6	17	23	0.2	-34.28
Da	145	1	0	0	0.1	-35.04
Fa	47	1	2	2	0.4	-1.81
Fe	114	0	3	4	0.0	-114.65
Ga	1,384	93	320	153	2.1	-5.96
Ge	645	8	12	19	0.2	-39.72
Gr	1,096	419	188	145	8.4	1.18
Hb	141	0	14	9	0.0	-62.17
He	741	8	31	57	0.3	-13.13
Ho	148	0	0	0	0.0	-55.1
Hs	1,581	555	449	105	11.1	-1.08
Hu	321	5	9	13	0.2	-25.96
Is	56	4	3	0	1.1	-5.06
It	1,473	170	221	181	3.3	-2.84
Ju	1,479	158	211	240	3.9	-2.43
Lu	489	73	218	59	2.4	-2.57
Ma	207	134	56	7	11.1	10.36
No	181	2	10	6	0.1	-58.1
Po	412	3	15	14	0.1	-60.2
Rm	700	45	54	58	1.3	-6.77
Rs (B)	118	1	1	3	0.1	-84.18
Rs (C)	190	13	20	19	0.4	-40.25
Rs (E)	113	14	23	19	0.4	-41.04
Rs (K)	131	64	18	8	3.2	-1.23
Rs (N)	78	4	4	2	0.2	-72.24
Rs (W)	456	34	43	44	0.7	-18.56
Sa	200	28	50	24	1.3	-2.83
Sb	7	2	0	0	1.0	-3.72
Si	233	59	53	20	2.4	-1.67
Su	194	5	11	7	0.3	-33.24
Tu	85	4	8	12	0.2	-19.45

Abbreviations:
Al - Albania; Au - Austria; Az - Azores Archipelago; Be - Belgium with Luxembourg; BI - Balearic Islands; Br - Great Britain; Bu - Bulgaria; Ca - Canary Islands; Co - Corsica; Cr - Crete; Cy - Cypres; Cz - Czech Republic with Slovakia; Da - Denmark; Fa - Faero; Fe - Finland; Ga - France (mainland); Ge - Germany; Gr - Greece; Hb - Ireland; He - Switzerland; Ho - The Netherlands; Hs - Spain (mainland); Hu - Hungary; Is - Iceland; It - Italy (mainland); Ju - former Yugoslavia; Lu - Portugal (mainland); Ma - Madeira Archipelago; No - Norway; Po - Poland; Rm - Romania; Rs (B) - Russia Baltic division; Rs (C) - Russia central division; Rs (E) - Russia Southeastern division; Rs (K) - Russia Crimean division; Rs (N) - Russia Northern division; Rs (W) - Russia Western division; Sa - Sardinia; Sb - Svalbard; Si - Sicily; Su - Sweden; Tu - European Turkey

The clustering of regions with similar areas results in 16 clusters (see summarised data in table 5).

The data reveals that in order to determine which region is the most endemic rich it is often necessary to distinguish between the richest region in terms of a) local and b) European endemics:

Clusters 1-3, 6,11 show that different regions hold the crown. Clusters 5 and 6 show that the alpine regions Switzerland and Austria have medium local endemism but achieve the highest endemism rates in the case of European endemics. Generally, the southern and Mediterranean regions have higher endemism rates than the central or northern European regions (see clusters: 6-11, and clusters 14 and 15). Clusters 7, 12, 13, 16 show that this pattern is also valid for central European compared with most northern European regions – the central European regions Hungary, Poland, Germany and the central division of Russia are much richer in local and European endemics than Iceland, Norway, Finland and the Northern division of Russia.

Tab.5: Endemism of clusters of regions with comparable area sizes (max. deviation 10%) the total number of local and European endemics and Bykov´s index based on the data for local endemism per region. Highest values of local and European endemics per cluster are written in boldface.

No.	Region (km^2)	area (km)	species number	local endemics	European endemics	endemism ratio (%)	Bykov´s index
1	Crete	8,508	1,877	**152**	248	8.1	3.08
	Corsica	8,780	2,500	37	**271**	1.5	-1.76
	Cyprus	9,138	2,000	108	112	5.4	2.00
2	Turkey (European part)	23,877	2,500	4	85	0.2	-19.45
	Sardinia	24,099	2,100	28	200	1.3	-2.83
	Sicily	25,726	2,500	59	**233**	2.4	-1.67
	Crimean region	25,831	2,000	**64**	131	3.2	-1.23
3	Crimean region	25,831	2,000	**64**	131	3.2	-1.23
	Albania	28,657	3,031	22	**725**	0.7	-5.49
4	Belgium + Luxembourg	33,235	1,800	**1**	**198**	0.1	-39.61
	The Netherlands	35,549	1,221	0	148	0.0	-55.10
5	Switzerland	41,493	2,471	**8**	**741**	0.3	-13.13
	Denmark	42,714	1,450	1	145	0.1	-35.04
6	Ireland	83,924	1,000	0	141	0.0	-62.17
	Austria	84,128	2,950	25	**858**	0.8	-7.06
	Portugal (mainland)	88,573	3,000	**73**	489	2.4	-2.57
	Hungary	93,002	2,411	5	321	0.2	-25.96
7	Hungary	93,002	2,411	**5**	**321**	0.2	-25.96
	Iceland	10,2962	377	4	56	1.1	-5.06

No.	Region (km²)	area (km)	species number	local endemics	European endemics	endemism ratio (%)	Bykov´s index
8	Iceland	10,2962	377	4	56	1.1	-5.06
	Bulgaria	11,1024	3,580	**56**	**707**	1.6	-4.33
9	Bulgaria	11,1024	3,580	56	707	1.6	-4.33
	Greece	121,564	5,000	**419**	**1,096**	8.4	1.18
10	Greece	121,564	5,000	**419**	**1,096**	8.4	1.18
	Czech Republic + Slovakia	127,692	3,300	6	556	0.2	-34.28
11	Great Britain	230,709	1,400	25	291	1.8	-4.88
	Romania	237,396	3,400	45	700	1.3	-6.77
	Italy (mainland)	250,631	5,200	**170**	1,473	3.3	-2.84
	Former Yugoslavia	255,252	4,100	158	**1,479**	3.9	-2.43
12	Poland	311,695	2,374	**3**	**412**	0.1	-60.20
	Norway	320,915	1,700	2	181	0.1	-58.10
	Finland	335,313	1,100	0	114	0.0	-114.65
13	Finland	335,313	1,100	0	114	0.0	-114.65
	Germany	357,251	3,350	**8**	**645**	0.2	-39.72
14	Sweden	446,070	1,720	5	194	0.3	-33.24
	Spain (mainland)	494,053	5,000	**555**	**1,581**	11.1	-1.08
15	Spain (mainland)	494,053	5,000	**555**	**1,581**	11.1	-1.08
	France (mainland)	539,527	4,500	93	1,384	2.1	-5.96
16	Russia North	1,463,824	2,000	4	78	0.2	-72.24
	Russia Central	1,6257,65	3,000	**13**	**190**	0.4	-40.25

Ecological view

Only about three quarters of the listed plants are assigned to one or more of the predefined habitats, as much current data on distribution, ecology, altitude range, etc. are still insufficient in the literature.

The evaluation of distribution patterns of European endemics according to habitat types shows that the large majority of endemics inhabit rocky habitats (2,792), followed by grassland (1,336), shrub and heath habitats (1,150), and forests (733). Lower rates were found for coastal/saline habitats (449), man-made habitats (446), inland waterbodies (275), and finally mires, bogs and fens which are inhabited by only about 100 endemics.

A similar pattern is evident for local endemics, although the position of the two habitat categories grassland and shrub- and heathland is reversed: Rocky habitats (1,582), shrub and heath habitats (571), grasslands (336), forests (304), coastal and saline habitats (249), man-made habitats (204) inland waterbodies (92), mires, bogs and fens (21). Figures 23a-d visualise these data.

Tables 6 and 7 give an overview on the total number of local and European endemics per regions and habitat type.

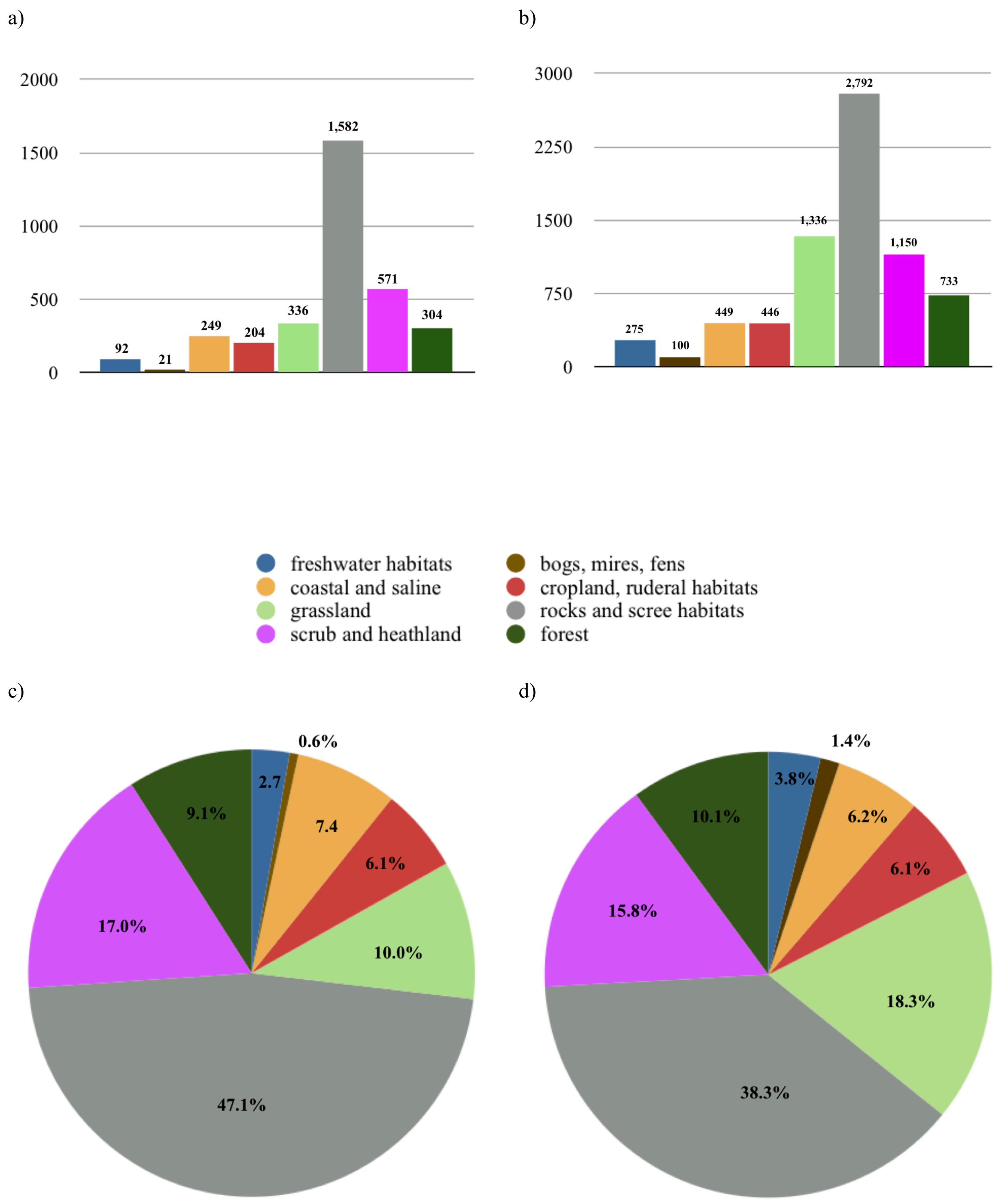


Fig. 23: Distribution of endemics per habitat category: a) local endemics (total numbers); b) European endemics total numbers; c) local endemics (percentage values); d) European endemics percentage values

Tab. 6: Local endemics per region and habitat type

Region	freshwater habitats	bogs, fens mires,	coastal and saline	ruderal cropland	grassland	rock and scree	shrub-/ heathland	forest
Al	0	0	0	0	3	11	0	0
Au	4	0	0	0	20	14	6	6
Az	4	2	12	3	7	23	15	18
Be	0	0	0	1	0	1	0	0
BI	0	1	13	2	3	35	8	5
Br	1	1	9	3	6	5	3	0
Bu	1	2	2	5	25	29	5	4
Ca	1	0	44	22	0	385	237	96
Co	5	1	2	1	10	21	5	1
Cr	8	2	11	5	5	114	45	19
Cy	12	0	6	28	7	59	43	26
Cz	0	0	0	0	1	2	0	0
Da	0	0	1	0	0	0	0	0
Fa	0	0	0	0	0	0	0	0
Fe	0	0	0	0	0	0	0	0
Ga	4	1	7	5	13	40	8	5
Ge	4	1	1	0	2	1	0	1
Gr	7	1	11	44	48	239	36	16
Hb	0	0	0	0	0	0	0	0
He	0	0	0	0	1	2	1	0
Ho	0	0	0	0	0	0	0	0
Hs	12	3	45	47	67	253	94	22
Hu	0	0	0	0	2	2	0	2
Is	1	1	0	0	1	0	0	1
It	3	2	6	4	32	83	12	9
Ju	0	0	9	7	23	69	3	5
Lu	3	0	13	9	9	15	19	6
Ma	12	1	33	10	4	83	21	41
No	0	0	0	0	1	0	0	0
Po	0	0	0	0	0	1	0	0
Rm	0	0	1	1	9	15	0	3
Rs (B)	1	0	0	0	1	1	0	0
Rs (C)	1	0	0	0	1	0	2	2
Rs (E)	1	0	0	0	4	2	0	0
Rs (K)	0	0	5	4	15	28	5	11
Rs (N)	0	0	0	0	1	2	0	0
Rs (W)	6	0	7	0	5	7	1	2
Sa	0	1	5	1	1	15	2	0
Sb	0	1	1	0	0	0	0	0
Si	1	0	12	3	6	20	0	3
Su	0	0	0	0	3	4	0	0
Tu	0	0	0	0	0	2	0	0

Abbreviations:
Al - Albania; Au - Austria; Az - Azores Archipelago; Be - Belgium with Luxembourg; BI - Balearic Islands; Br - Great Britain; Bu - Bulgaria; Ca - Canary Islands; Co - Corsica; Cr - Crete; Cy - Cypres; Cz - Czech Republic with Slovakia; Da - Denmark; Fa - Faero; Fe - Finland; Ga - France (mainland); Ge - Germany; Gr - Greece; Hb - Ireland; He - Switzerland; Ho - The Netherlands; Hs - Spain (mainland); Hu - Hungary; Is - Iceland; It - Italy (mainland); Ju - former Yugoslavia; Lu - Portugal (mainland); Ma - Madeira Archipelago; No - Norway; Po - Poland; Rm - Romania; Rs (B) - Russia Baltic division; Rs (C) - Russia central division; Rs (E) - Russia Southeastern division; Rs (K) - Russia Crimean division; Rs (N) - Russia Northern division; Rs (W) - Russia Western division; Sa - Sardinia; Sb - Svalbard; Si - Sicily; Su - Sweden; Tu - European Turkey

Tab. 7: European endemics per region and habitat type

Region	freshwater habitats	bogs, fens mires,	coastal and saline	ruderal cropland	grassland	rock and scree	shrub-/ heathland	forest
Al	15	6	8	51	212	302	128	100
Au	82	25	11	40	438	359	210	201
Az	6	5	22	9	16	41	29	39
Be	22	18	26	31	89	36	57	65
BI	3	1	32	18	15	56	26	12
Br	29	26	62	36	107	55	69	75
Bu	27	9	12	43	269	272	129	122
Ca	4	0	53	29	3	415	265	134
Co	24	7	29	23	65	110	57	46
Cr	9	2	21	35	15	170	73	27
Cy	12	0	7	29	8	61	43	26
Cz	51	20	16	45	294	167	151	171
Da	19	14	33	23	64	20	42	53
Fa	7	6	9	4	18	7	9	6
Fe	10	13	22	17	60	18	30	37
Ga	107	37	81	95	508	542	269	220
Ge	78	35	38	49	322	224	153	171
Gr	24	5	34	116	208	529	151	106
Hb	21	21	34	13	45	23	34	28
He	72	23	8	45	360	295	166	159
Ho	16	14	30	27	62	20	41	49
Hs	103	35	132	155	388	630	352	182
Hu	14	10	11	38	145	70	88	117
Is	8	4	9	6	22	12	11	9
It	82	30	42	94	543	636	253	233
Ju	58	24	35	87	519	573	246	232
Lu	48	17	67	75	96	120	148	74
Ma	16	2	45	18	9	118	52	85
No	23	20	27	24	77	38	49	51
Po	42	18	18	39	222	134	111	133
Rm	40	17	17	47	311	235	146	170
Rs (B)	12	11	20	21	59	18	32	43
Rs (C)	14	8	10	32	83	39	59	69
Rs (E)	9	1	3	18	39	24	21	22
Rs (K)	2	0	8	15	34	49	20	23
Rs (N)	5	7	11	12	38	17	19	22
Rs (W)	40	12	18	30	213	122	111	133
Sa	14	3	33	25	30	76	37	23
Sb	0	1	1	1	2	1	0	1
Si	11	2	34	26	33	71	24	33
Su	26	18	31	22	86	44	52	61
Tu	4	1	5	14	29	25	17	21

Abbreviations:
Al - Albania; Au - Austria; Az - Azores Archipelago; Be - Belgium with Luxembourg; BI - Balearic Islands; Br - Great Britain; Bu - Bulgaria; Ca - Canary Islands; Co - Corsica; Cr - Crete; Cy - Cypres; Cz - Czech Republic with Slovakia; Da - Denmark; Fa - Faero; Fe - Finland; Ga - France (mainland); Ge - Germany; Gr - Greece; Hb - Ireland; He - Switzerland; Ho - The Netherlands; Hs - Spain (mainland); Hu - Hungary; Is - Iceland; It - Italy (mainland); Ju - former Yugoslavia; Lu - Portugal (mainland); Ma - Madeira Archipelago; No - Norway; Po - Poland; Rm - Romania; Rs (B) - Russia Baltic division; Rs (C) - Russia central division; Rs (E) - Russia Southeastern division; Rs (K) - Russia Crimean division; Rs (N) - Russia Northern division; Rs (W) - Russia Western division; Sa - Sardinia; Sb - Svalbard; Si - Sicily; Su - Sweden; Tu - European Turkey

When habitat specificity is the focus of consideration, rock and scree habitats and the coastal and saline habitats have the highest proportions of habitat-specific (stenoecious) endemics, while habitats of shrub- and heathlands and bogs, mires, fens have the lowest proportions (table 8, figures 24 and 25).

In the case of local endemics (figure 24), rock and scree habitats host the highest proportions of habitat-specific endemics (60.9%; 964 taxa). Coastal and saline habitats host 146 stenoecious taxa (57.0%), followed by freshwater habitats (29 taxa, 31.5%), forest (95 taxa, 31.3%), man-made and ruderal habitats (63 taxa, 30.9%), grasslands (88 taxa, 26.2%), bogs, mires, fens (4 taxa, 19.0%) and shrub- and heathlands (101 taxa, 17.7%).

In the case of European endemics (figure 25), the coastal and saline habitats contain the highest proportions of stenoecious endemics (269 taxa, 58.6%), followed by rock and scree habitats that host 1,542 habitat-specific taxa (55.2%), man-made and ruderal habitats (132 taxa, 29.6%), forests (203 taxa, 27.7%), grasslands (351 taxa, 26.3%), freshwater habitats (72 taxa, 26.2%), shrub- and heathlands (180 taxa, 15.7%) and bogs, mires, fens (18 taxa, 18.0%).

The highest absolute numbers of habitat-specific endemics are generally found in the Mediterranean regions. As regards local endemics, the island regions play a particularly important role (Canary Islands, Madeira Archipelago, Greece, Crete, Cypres), as does mainland Spain (Hs), which is very rich in endemics confined to coastal and saline or to ruderal and urban habitats (see table 8).

In terms of European endemics, the continental regions France, Spain, Italy, the states of former Yugoslavia and Greece hold the leading positions (see tables 9 and 10 and distribution maps, figures 26 a-h). However, depending on the habitat type under focus, some temperate or even northern regions gain in importance: for coastal and saline habitats, for example, the Atlantic islands of Great Britain (62) and Ireland (34) reach high scores (figure 26a).

Many of the habitat-specific European endemics in the generally endemic-poor habitats bogs, mires and fens are reported for Germany (35), Austria (25) and Switzerland (23) as well as for Britain (26) and Ireland (21) and even for Norway (20; figure 26g).

All habitat-specific endemics of rocky habitats occur in Europe's mountainous regions (figure 26b): The Alps with Italy (636, including the Apennines), France (542), Austria (359), Switzerland (295), Spain (630) with the Pyrenean mountains, and the Balkan region with Yugoslavia (573), Albania (302); they also occur in Greece (529) and the volcanic-origin Canary Archipelago (415). High numbers of habitat-specific grassland endemics are found in Austria (438), Switzerland (360), Germany (322), Romania (311), Czech Republic and Slovakia (294), Bulgaria (269).

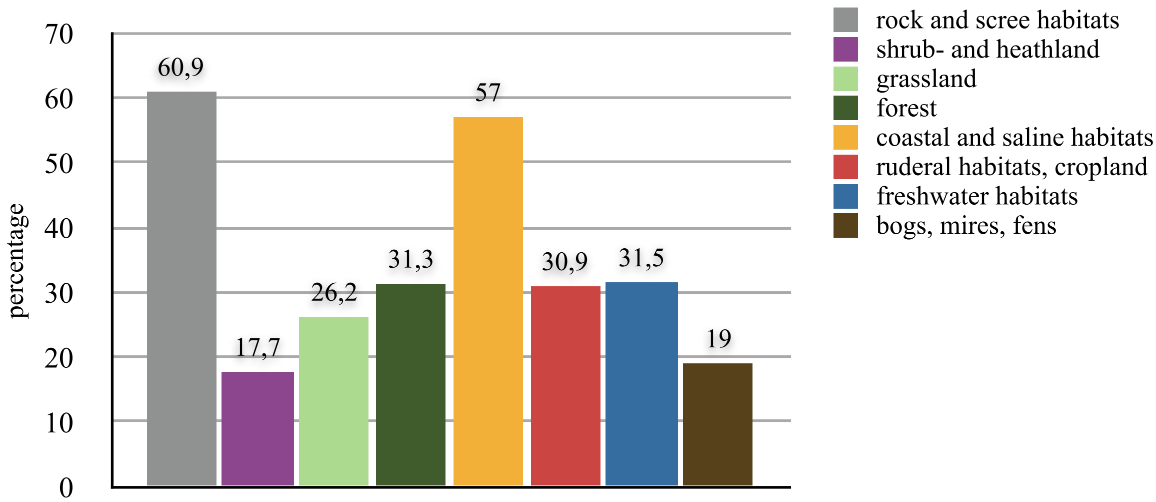


Fig. 24: Percentage values of stenoecious local endemic taxa per habitat type

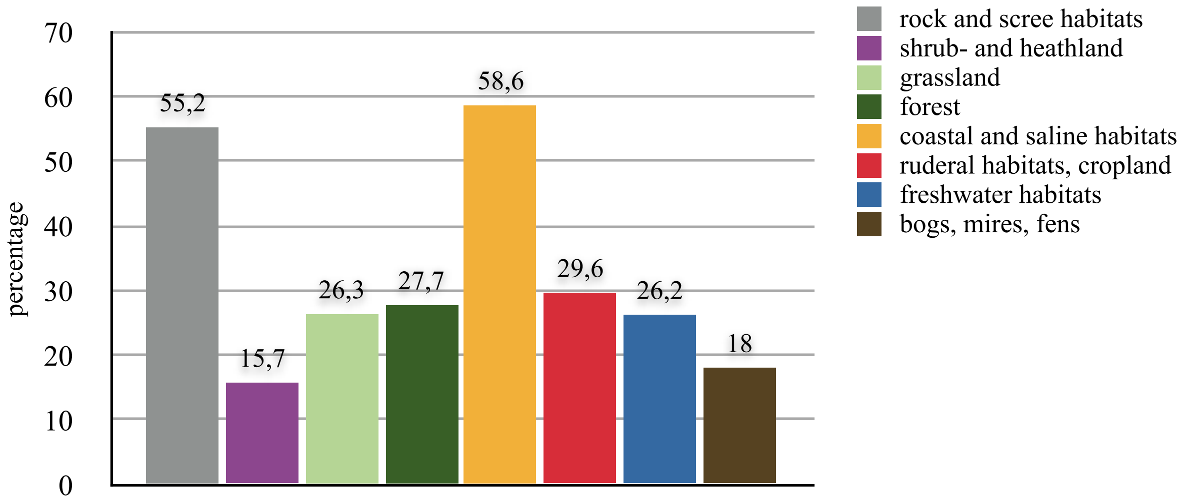


Fig. 25: Percentage values of stenoecious European endemic taxa per habitat type

Tab. 8: Absolute numbers of local and European endemics per habitat type and numbers of stenoecious taxa and percentage value of habitat specificity.

	local endemics	habitat specific	%	European endemics	habitat specific	%
rock and scree habitats	1,582	964	60.9	2,792	1,542	55.2
shrub- and heathland	571	101	17.7	1,150	180	15.7
grassland	336	88	26.2	1,336	351	26.3
forest	304	95	31.3	733	203	27.7
coastal/ saline habitats	256	146	57.0	459	269	58.6
ruderal habitats, cropland	204	63	30.9	446	132	29.6
freshwater habitats	92	29	31.5	275	72	26.2
bogs, mires, fens	21	4	19.0	100	18	18.0

Tab. 9: Regions hosting the largest numbers of local endemic and habitat-specific taxa. Number of taxa is given in parentheses.

	1	2	3	4	5
freshwater habitats	Cy (12)	Hs (12)	Ma (12)	Cr (8)	Gr (7)
bogs, mires, fens	Hs (3)	Cr (2)	Az (2)	It (2)	Bu (2)
coastal and saline habitats	Hs (45)	Ca (44)	Ma (33)	BI (13)	Lu (13)
ruderal habitats, cropland	Hs (47)	Gr (44)	Cy (28)	Ca (22)	Ma (10)
grasslands	Hs (67)	Gr (48)	It (32)	Bu (25)	Ju (23)
rock and scree habitats	Ca (385)	Hs (253)	Gr (239)	Cr (114)	It (83)
shrub- and heathland	Ca (237)	Hs (94)	Cr (45)	Cy (43)	Gr (36)
forest	Ca (96)	Ma (41)	Cy (26)	Hs (22)	Cr (19)

Tab. 10: Top ten regions in terms of European endemic and habitat-specific taxa. Number of taxa is given in parentheses

	1	2	3	4	5	6	7	8	9	10
freshwater habitats	Ga (107)	Hs (103)	Au (82)	It (82)	Ge (78)	He (72)	Ju (58)	Cz (51)	Lu (48)	Po (42)
bogs, mires, fens	Ga (37)	Hs (35)	Ge (35)	It (30)	Br (26)	Au (25)	Ju (24)	He (23)	Hb (21)	No (20)
coastal and saline habitats	Hs (132)	Ga (81)	Lu (67)	Br (62)	Ca (53)	Ma (45)	It (42)	Ge (38)	Ju (35)	Hb (34)
ruderal habitats, cropland	Hs (155)	Gr (116)	Ga (95)	It (94)	Ju (87)	Lu (75)	Al (51)	Ge (49)	Rm (47)	He (45)
grasslands	It (543)	Ju (519)	Ga (508)	Au (438)	Hs (388)	He (360)	Ge (322)	Rm (311)	Cz (294)	Bu (269)
rock and scree habitats	It (636)	Hs (630)	Ju (573)	Ga (542)	Gr (529)	Ca (415)	Au (359)	Al (302)	He (295)	Bu (272)
shrub- and heathland	Hs (352)	Ga (269)	Ca (265)	It (253)	Ju (246)	Au (210)	He (166)	Ge (153)	Gr (151)	Cz (151)
forest	It (233)	Ju (232)	Ga (220)	Au (201)	Hs (182)	Ge (171)	Cz (171)	Rm (170)	He (159)	Ca (134)

Abbreviations:
Al - Albania; Au - Austria; Az - Azores Archipelago; Be - Belgium with Luxembourg; BI - Balearic Islands; Br - Great Britain; Bu - Bulgaria; Ca - Canary Islands; Co - Corsica; Cr - Crete; Cy - Cypres; Cz - Czech Republic with Slovakia; Da - Denmark; Fa - Faero; Fe - Finland; Ga - France (mainland); Ge - Germany; Gr - Greece; Hb - Ireland; He - Switzerland; Ho - The Netherlands; Hs - Spain (mainland); Hu - Hungary; Is - Iceland; It - Italy (mainland); Ju - former Yugoslavia; Lu - Portugal (mainland); Ma - Madeira Archipelago; No - Norway; Po - Poland; Rm - Romania; Rs (B) - Russia Baltic division; Rs (C) - Russia central division; Rs (E) - Russia Southeastern division; Rs (K) - Russia Crimean division; Rs (N) - Russia Northern division; Rs (W) - Russia Western division; Sa - Sardinia; Sb - Svalbard; Si - Sicily; Su - Sweden; Tu - European Turkey

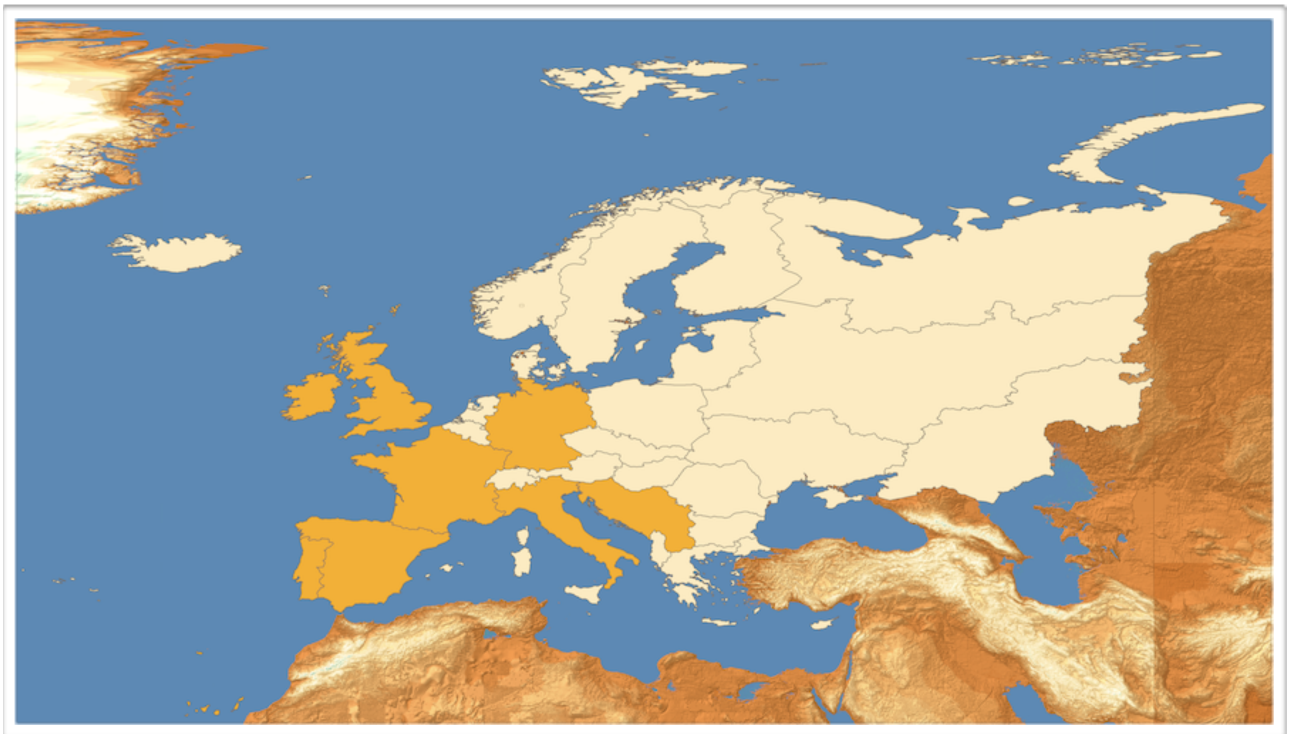


Fig. 26a: Top ten regions in terms of numbers of stenoecious European endemics ecologically bound to coastal and saline habitats. 58.6% of European endemics inhabiting coastal and saline habitats are stenoecious.

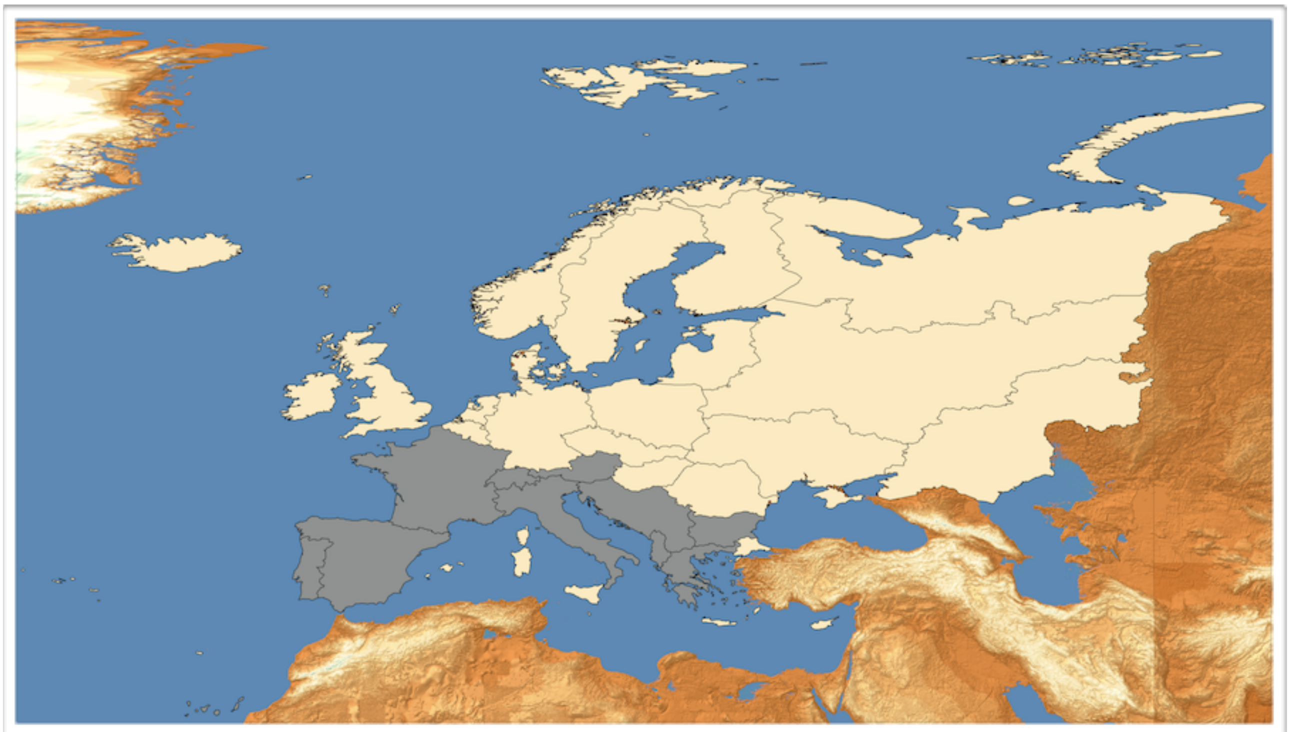


Fig. 26b: Top ten regions in terms of numbers of stenoecious European endemics ecologically bound to the rock and scree habitats. 55.2% of European endemics inhabiting rock and scree habitats are stenoecious.

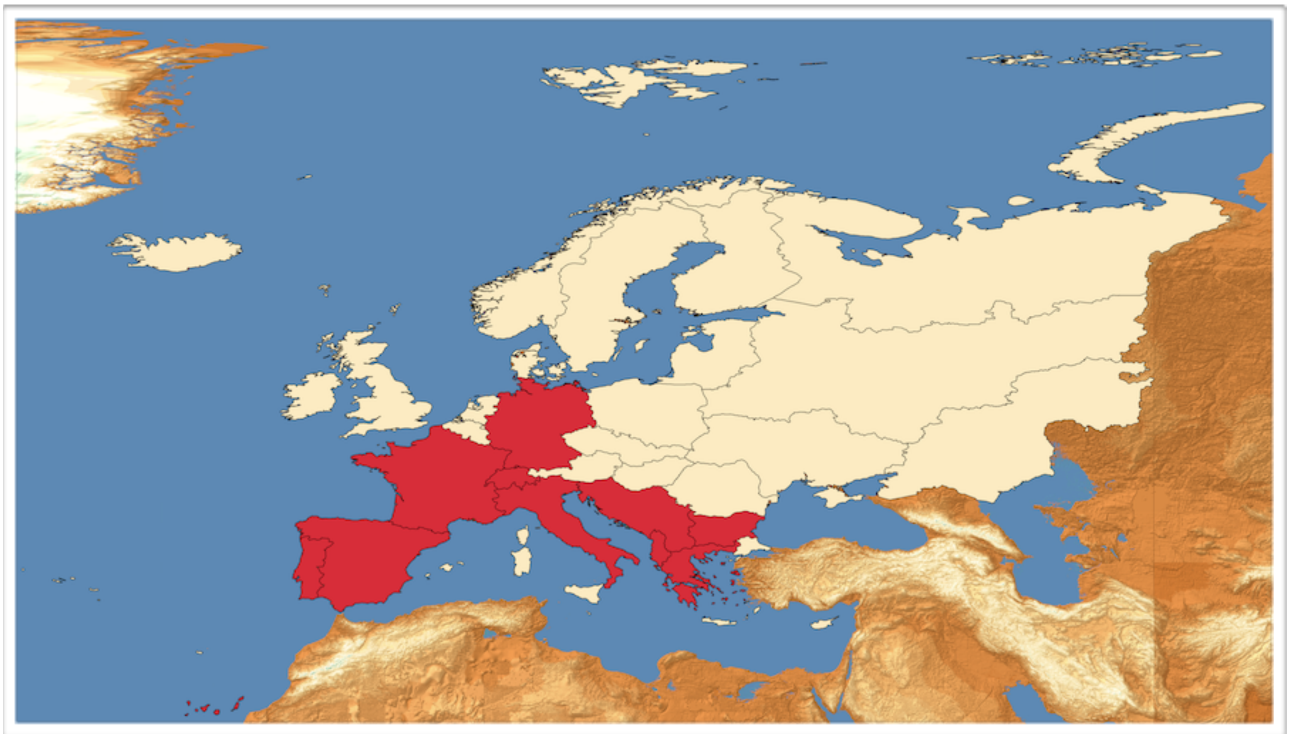


Fig. 26c: Top ten regions in terms of numbers of stenoecious European endemics ecologically bound to ruderal and man-made habitats. 29.6% of European endemics inhabiting ruderal and man-made habitats are stenoecious.

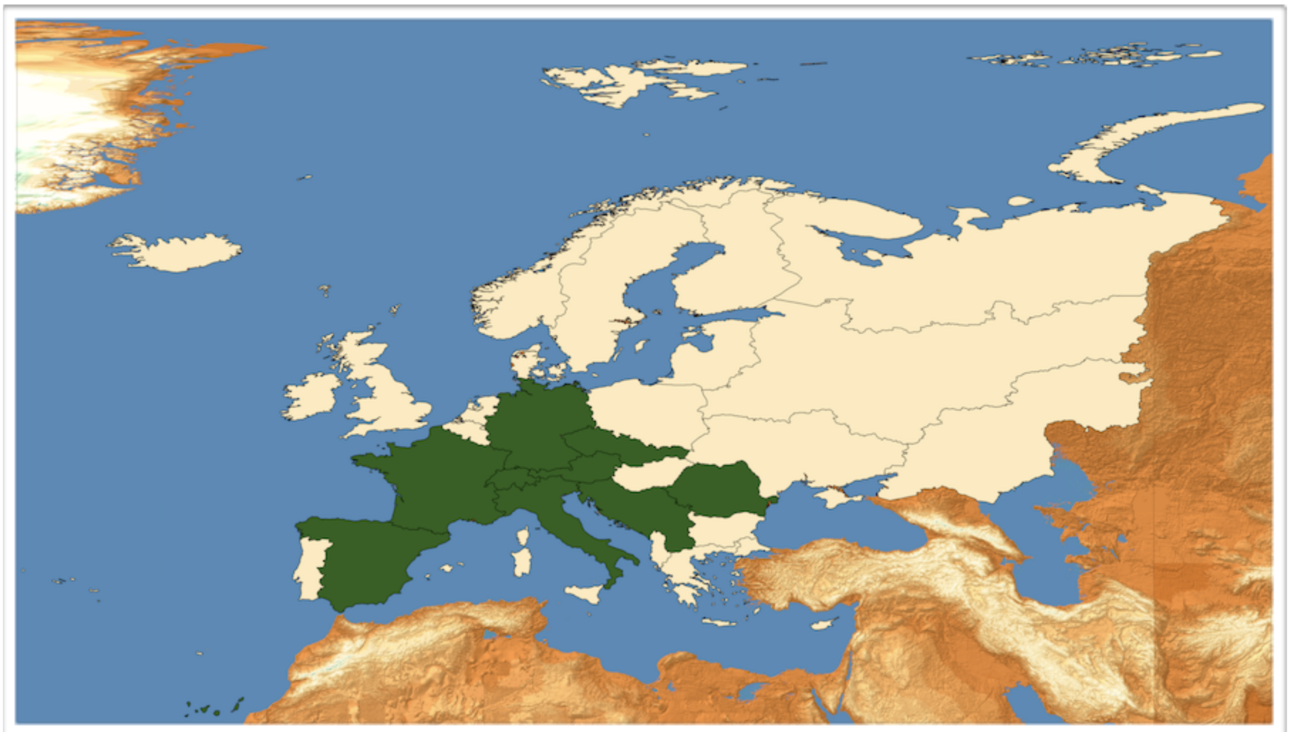


Fig. 26d: Top ten regions in terms of numbers of stenoecious European endemics ecologically bound to forest habitats. 27.7% of European endemics inhabiting forest habitats are stenoecious.

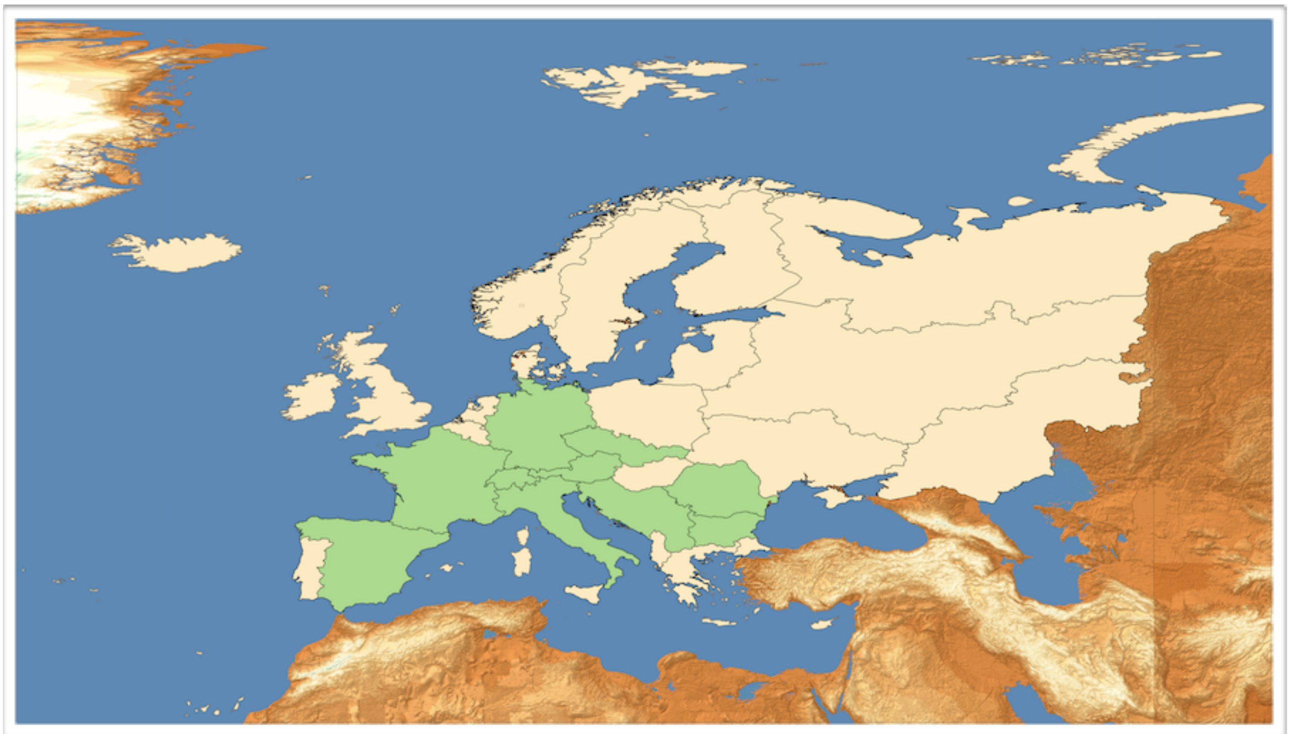


Fig. 26e: Top ten regions in terms of numbers of stenoecious European endemics ecologically bound to grassland habitats.26.3% of European endemics inhabiting grassland habitats are stenoecious.

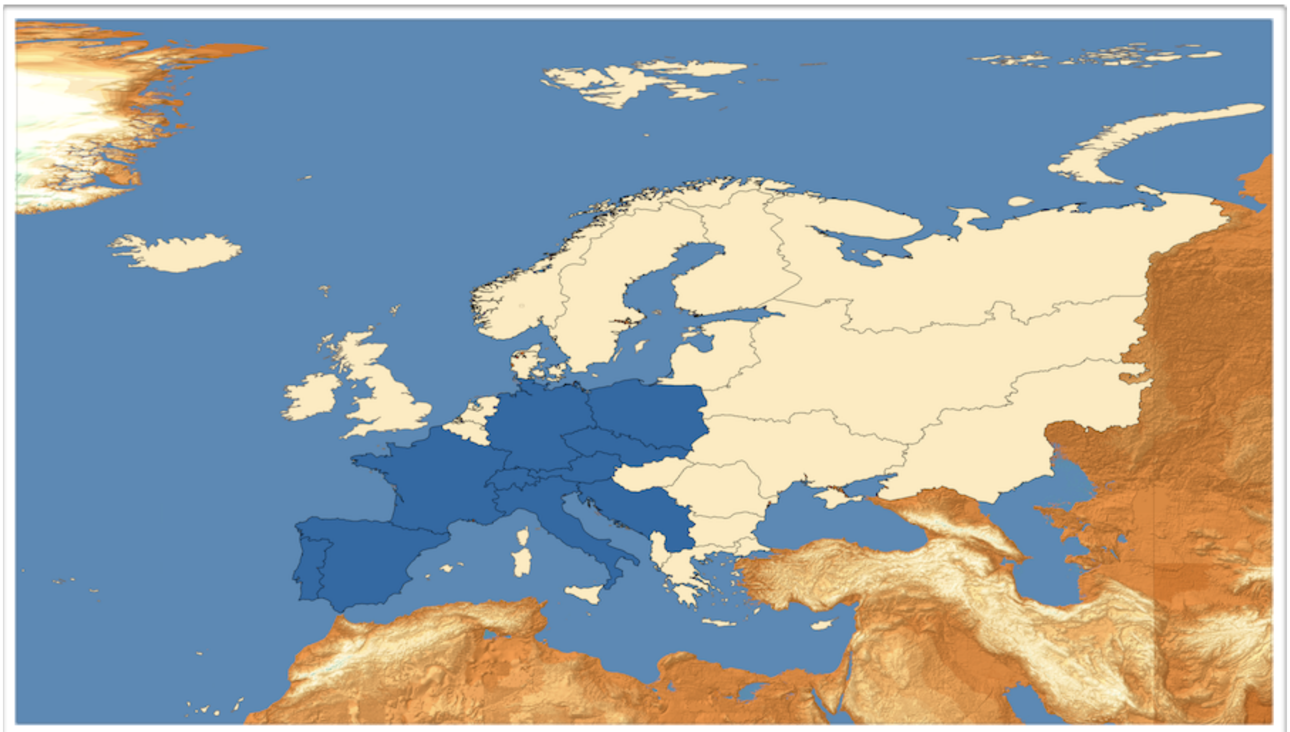


Fig. 26f: Top ten regions in terms of numbers of stenoecious European endemics ecologically bound to freshwater habitats. 26.2% of European endemics inhabiting freshwater habitats are stenoecious.

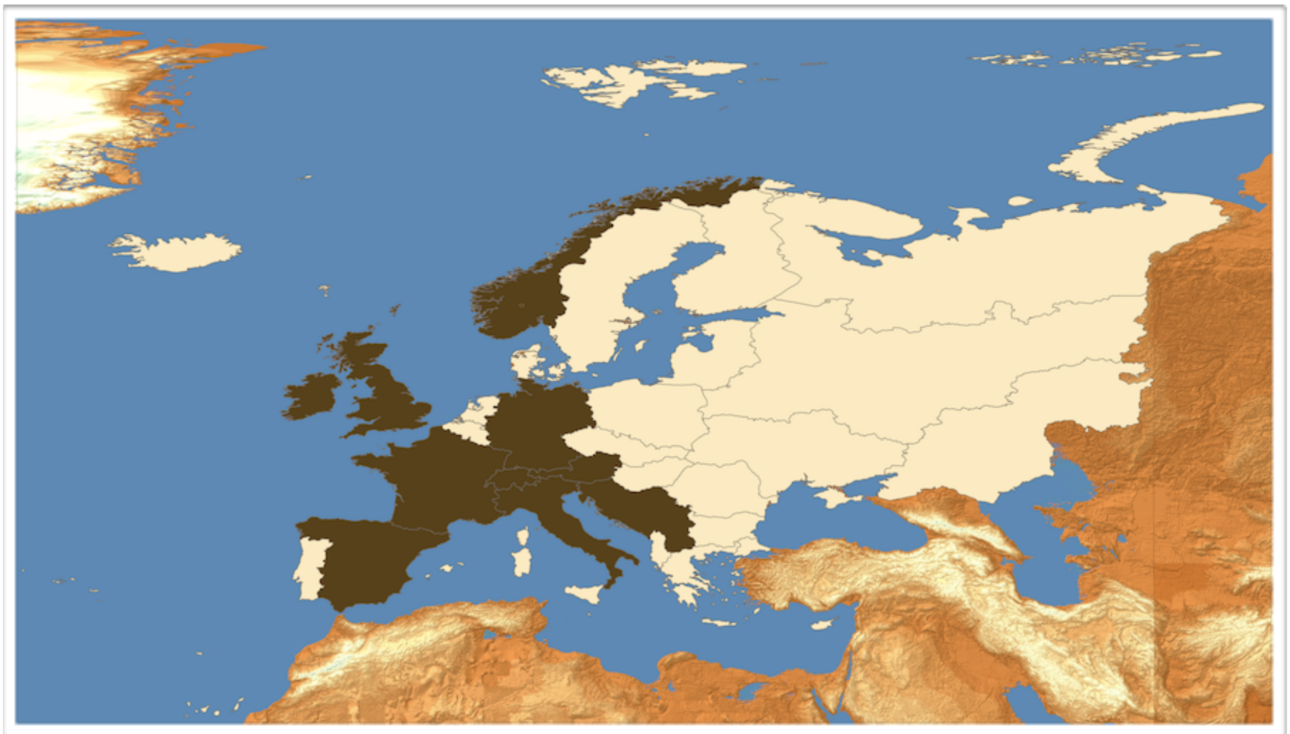


Fig. 26g: Top ten regions in terms of numbers of stenoecious European endemics ecologically bound to bogs, mires or fens. 18.0% of European endemics inhabiting bogs, mires or fens are stenoecious.

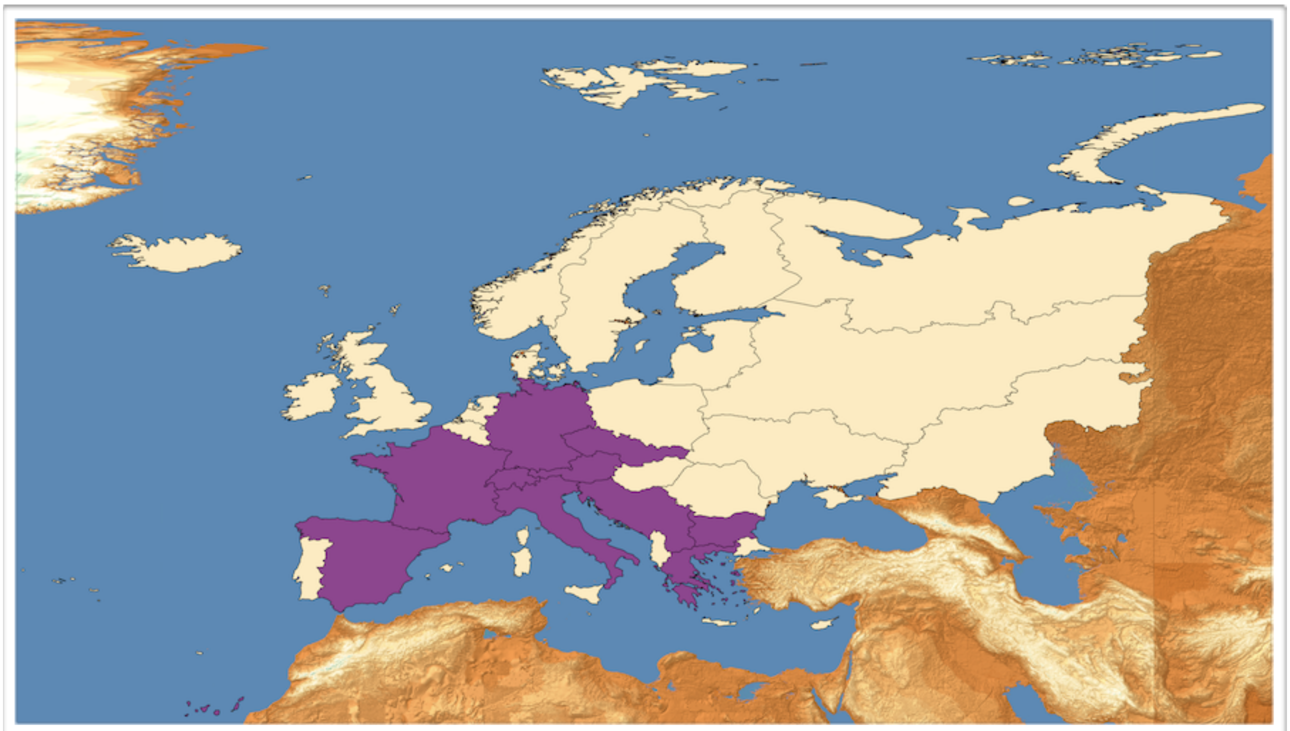


Fig. 26h: Top ten regions in terms of numbers of stenoecious European endemics ecologically bound to shrub- and heathlands. 15.7% of European endemics inhabiting shrub- and heathland habitats are stenoecious.

Sets of explanatory variables

Each explanatory variable for the calculation of the regression models was interpreted in at least two indices. The basic data for calculating the indices was compiled from different geographical datasets and spatially transformed to the scales and projection of the present spatial dataset.Table A5 (appendix) gives an overview of the names and respective calculations of all the indices generated and also of all dependent and independent (explanatory) variables in alphabetical order.

Many of the calculated indices that describe the same explanatory factor in different ways are highly correlated (see appendix, tables A8-A13). Some indices describing the explanatory variables 'isolation degree' and 'habitat diversity' show high correlation values. The same is true for the index 'non-endemics' with the indices describing the explanatory variables 'habitat continuity' indices 'LGM refugia', 'SGM refugia', 'TGM refugia'. The calculation of the tolerance value and the variance of inflation factor (VIF) showed no multicollinearity among the independent variables that were fed into the calculations (see appendix table A14).

Predictive regression models

The symmetric and standardised weights matrix used and the calculated Eigen-values are shown in the appendix (tables A6 and A15). The results of the calculation of the measures of spatial autocorrelation are given in Tab. 11 (see also STATA´s comprehensive calculations output table A16, appendix). Both measures of autocorrelation – Moran´s *I* and Geary´s *C* indicate spatial autocorrelation for both dependant variables – European and local endemics. Moran´s *I* resulted in high *z*-scores of 3.335 (local endemics) and 3.871 (European endemics) and Geary´s contiguity ratio resulted in values smaller than 1, which means positive autocorrelation.

Tab. 11: Results of the calculation of the measures of spatial autocorrelation, Moran´s *I* and Geary´s *C*

	Moran			**Geary**		
	I	*z*-score	*p* (two-tailed)	*C*	*z*-score	*p* (two-tailed)
European endemics	0.475	3.871	0.000	0.593	-2.886	0.004
local endemics	0.393	3.335	0.001	0.640	-2.269	0.004

Several regression models using different sets of indices were calculated to achieve best model fit. Some indices were omitted as they do not achieve any significant power within the model (e.g. 'vegetation index', 'distance index', 'shape index'). Other indices seem to be redundant or exchangeable and result in comparable model strength (e.g. 'SGM ice' and 'TGM ice'; 'relief index' and 'relief area index').

An overview of all calculated regression models for local endemics as well as European endemics as the dependent variable with different sets of indices for explanatory variables 'species pool', 'isolation degree', 'habitat diversity', 'habitat continuity', and the respective scored model strength are given in tables A17- A20 (appendix). All corresponding calculation outputs of STATA are listed in the appendix (tables A21- A24).

Linear regression (LR)

Patterns of local endemics

The results of the linear stepwise regressions (tables 12a and 12b) show that in the case of the local endemics the explanatory parameters 'isolation degree' and 'species pool' (using different sets of indices) seem to have the greatest influence on the given distribution pattern of local endemics. The parameters 'habitat diversity' and 'habitat continuity' also influence endemic diversity, the latter negatively. It should be noted that the negative sign is resulting from the fact that the best fitting indices for 'habitat continuity' are 'TGM ice' or 'LGM ice' thus indices indicating ecological discontinuity.
Interestingly, the order of parameters does not change if different indices are fed into the calculation. Adjusted R^2 as an indication value for the strength of relationship of the dependent variable and the predictor variables is quite low (about 0.54) and fluctuates between the values 0.543 and 0.514 depending on the indices fed into the calculation (see table A17: LR models 1-9 appendix).

If the 'vegetation index' or any index describing the explanatory variable 'isolation degree' other than 'coastline index' and `isolation index' are fed into the calculation, the model strength decreases rapidly to R^2-scores of 0.48 or lower (see table A17: LR models 10-24).

The rank of beta-coefficients indicating the strength of influence of explanatory variables shows in most cases the following order: (+) isolation degree > (+) species pool > (+) habitat diversity > (–) habitat continuity (LR models 2,4,6,7,8, appendix).

It is to note that this order varies if the 'shape index' is fed into calculation the habitat continuity parameter loses significance and the ranks of beta-coefficients are shifted to: (+) species pool > habitat diversity > (–) isolation degree (LR models 1,3,9, appendix).

Patterns of European endemics

For the European endemics the LR models show higher model strengths of between 0.778 and 0.739 (see table A18: LR models 1-12; appendix).

The regressions take in many cases three parameters into account: the 'species pool', 'habitat diversity' and 'habitat continuity'; the latter parameter influences the total endemic diversity negatively (as best fitting index 'TGM ice' indicates ecological discontinuity, see explanation above). If the indices 'SGM ice' or the 'LGM ice' are introduced into the calculation instead of the 'TGM ice' index then the influence of the 'habitat-continuity' parameter loses significance. However, the negative influence on European endemics still persists. The explanatory parameter 'isolation degree' is not significant in any of the regression models, but it should be noted that this parameter influences the total endemic diversity negatively. If the 'relief area', the 'vegetation index' or the 'distance index' are fed into the calculation the model strength decreases to an adjusted R^2-score of 0.64 or lower (see table A18: LR models 12-24; appendix).

The rank of beta-coefficients indicating the strength of influence of explanatory variables shows the following order: (+) species pool > (+) habitat diversity > (–) habitat continuity (LR models 3-6, 8-12, appendix). This order is stable for almost all calculated combinations of indices describing these variables. However, if the 'distance index' is fed into regression than the ranks of the 'habitat diversity' and 'species pool' switch: Thus (+) species pool > (+) habitat diversity > (–) habitat continuity (LR models 1,2,7; appendix).

Geographically Weighted Regression (GWR)

In most cases the GWR resulted in higher values in the squared correlation statistic (equal to the pseudo R^2 value for model strength)[21] than the standard multiple regression procedure.

Patterns of local endemics

The results of the GWR (table 13a, also table A19) show that for the local endemics the explanatory parameters 'species pool', 'isolation degree' and 'habitat diversity' explain about 61 percent of the variation in the best GWR model. The parameter 'habitat continuity', which was the fourth significant explanatory parameter in many of the standard LR models, is not significant in any of the GWR models. Interestingly, incorporating the 'SGM ice' index into the calculation results in slightly better pseudo R^2 than using the 'TGM ice' index.

[21] The squared correlation value is called R^2 in the following which is for the purpose of easier comparing in order to facilitate a comparison of the results of different regression model types.

The resulting pseudo-R^2-value using different sets of indices ranges between 0.585 and 0.618 (see table A19: GWR model 1-9; appendix). If the 'relief index' is replaced by any other index describing the 'habitat diversity' then the 'habitat diversity' parameter loses significance and the model strength decreases (see table A19: GWR models 10-24; appendix).

Comparing the relative strength of the significant explanatory variables (beta-coefficients) the following order is shown: (+) isolation degree > (+) species pool > (+) habitat diversity (see GWR models 1-3, 6-8, appendix). However, if the shape index was introduced into regression the ranks of the explanatory variables are changed and the influence of 'isolation degree' on the patterns of local endemics changes from positive to negative: (+) species pool > (+) habitat diversity > (–) isolation degree (see GWR models 4,5,9; appendix).

Patterns of European endemics

The GWR results in slightly higher model strengths than the LR models (best model R^2 = 0.807). Similar to the LR, the GWR models also take the two parameters, 'species pool' and 'habitat diversity' into account, with a stronger positive influence of the 'species pool' parameter:
(+) species pool > (+) habitat diversity (GWR models 3-10, 12). The third explanatory parameter 'habitat continuity' is not significant in any of the GWR models (see table A20: GWR models 1-24).

The order of beta-coefficients is changed if the 'distance index' is fed into calculation, i.e. the 'habitat diversity' variable ranks higher than the 'species pool' :(+) habitat diversity > (+) species pool (see table A20: GWR models 1,2,11)

Tab. 12: Best model results of the LR with the total number of a) local endemics and b) European endemics as dependent variables and the ecological parameters 'species pool', 'habitat continuity', 'habitat diversity' and 'isolation degree' as predictor variables.

a)

LR (local): adjusted $R^2 = 0.543$	beta-coefficient	*t*	*p*
Regional species pool** (non-endemics)	0.684	5.613	0.000
Habitat continuity (SGM glaciation)	-0.239	-1.92	0.063
Habitat diversity** (relief area index)	0.580	4.55	0.000
Isolation degree** (shape index)	-0.352	-2.86	0.007
constant	---	0.00	1.000

b)

LR (European): adjusted $R^2 = 0.778$	beta-coefficient	*t*	*p*
Regional species pool** (non-endemics)	0.398	3.26	0.002
Habitat continuity* (TGM glaciation)	-0.202	-2.52	0.016
Habitat diversity** (relief index)	0.484	5.17	0.000
Isolation degree (distance index)	-0.212	-1.96	0.058
constant	---	0.00	1.000

Abbreviations:
LR - Linear regression; SGM - Saalian glacial maximum; TGM - total glacial maximum

Tab. 13: Best model results of the GWR with the total number of a) local endemics and b) European endemics as dependent variable and the ecological parameters 'species pool', 'habitat continuity', 'habitat diversity' and 'isolation degree' as predictor variables.

a)

GWR (local): pseudo $R^2 = 0.618$	beta-coefficient	*z*	*p*
Regional species pool** (non-endemics)	0.4114	3.23	0.001
Habitat continuity (SGM ice)	-0.1947	-1.76	0.078
Habitat diversity** (relief index)	0.3384	2.95	0.003
Isolation degree** (coastline index)	0.4398	3.98	0.000
constant	---	-3.16	0.002

b)

GWR (Europe): pseudo $R^2 = 0.807$	beta-coefficient	*z*	*p*
Regional species pool** (non-endemics)	0.384	3.40	0.000
Habitat continuity (TGM glaciation)	-0.137	-1.48	0.140
Habitat diversity** (relief index)	0.461	5.21	0.000
Isolation degree (distance index)	-0.159	-1.45	0.146
constant	---	-0.56	0.243

Abbreviations:
GWR - Geographically Weighted regression; SGM - Saalian glacial maximum; TGM - total glacial maximum

Discussion

Biases in taxonomic interpretation: need for consistency in endemism data

Data on endemism within a distinct region is strongly dependent on the taxonomical interpretation of the present plant inventory. The Flora Europaea was used as the decisive Flora for the database EvaplantE to ensure a reasonably consistent database for the endemic plant inventory in Europe (with its 42 regions). However, all volumes of the Flora Europaea have the disadvantage that they are quite old and have not been updated to include the latest findings on Europe´s plant inventory (e.g. the comprehensive data for the southeast Mediterranean regions summarised in the Med checklist: Greuter et al. 1984, 1986, 1989, 2009 updated interactive web presentation, URL: ww2.bgbm.org/mcl/home.asp). Further, Flora Europaea does not provide comprehensive coverage of all of Europe's plant families[22], nor does it cover all the regions examined in the present thesis. The supplement to EvaplantE, which uses updated data taken from regional or local floras, was compiled with great caution in order to retain the consistency of taxonomic interpretation. As taxonomic knowledge and the standard of taxonomic interpretation changed over the years and also varied with regional affinities, the decision as to whether a taxon should be added to EvaplantE or not was never without ambiguities. The example of the Crimean region (see p. 20) clearly shows that a different taxonomic interpretation may lead to heavy biases in the database and hence in the statistics.

Fig. 27: *Alchemilla alpina*: a member of the agamosperm reproducing genus *Alchemilla.* (Hartinger 1882, source of public domain)

The latest volumes of the Atlas Florae Europaeae (Kurtto et al. 2004; Kurtto et al. 2007) that may count as an update or revision of the Flora Europaea give the idea that the trend in taxonomic interpretation of species is towards a more monotypic taxonomical standard (taxonomic splitting) in future. For example, if the complete data from the Atlas Florae Europaeae had been included in EvaplantE, the number of endemic taxa of the plant genus *Alchemilla*[23] would have risen from currently 94 endemic taxa to 136, amounting to an increase of about 30 percent.

[22] e.g. the genus *Rubus* is still missing in the floras

[23] *Alchemilla* reproduces agamosperm (=asexual reproduction through seeds) which is a form of apomixis. The taxonomic interpretation of *Alchemilla* taxa is still disputable (e.g. Fröhner, 2008).

If the taxonomic trend towards splitting continues, revisions of floras will surely also enlarge the number of endemics either because the taxonomic ranks of taxa are upgraded (e.g. varietates are upgraded to subspecies) or because individual taxonomically high-level taxa are divided into several lower-scale taxa (e.g. species groups are split into several species). As yet, it is more or less impossible to conceive the dimension of the changes that the new genetic methodologies will bring about in European Flora taxonomy.
It is becoming clear that the number of endemic species will fluctuate with every floristic or taxonomic revision and thus any future results will necessarily deviate more or less strongly from those of today. The comprehensive review of data on regional endemism worldwide (Bruchmann and Hobohm, unpublished) shows that the same is true for an inaccurate or insufficiently stringent application of the term endemic.

In conclusion, it can be said that as long as there are no definite guidelines in defining endemism and as long as the rank of taxa fluctuates with taxonomists' preferences ('splitters' or 'lumpers') all results should be interpreted and applied with the necessary caution. As matters stand, the present dataset EvaplantE is the most solid and consistent groundwork for assessing plant endemism in Europe. Thus, it gives valid indications of the present floristic, geographical and ecological patterns of endemic plant occurrence in Europe.

Floristic inventory and impact species traits

The floristic analysis of Europe's endemic taxa highlighted certain families, in particular the family of Asteraceae. The findings correspond largely with findings of studies on endemism at regional scales in Europe (e.g. Greece: Georghiou and Delipetrou 2010).

It is most likely that the dispersal trait has some influence on the incidence of taxa with restricted range sizes within the plant families. If there are very specialised mutual dependencies between plants and insects in dispersal of diaspores, as for example in the case of the very narrow endemic plant *Centaurea corymbosa* (Asteraceae; figure 28), then the range expansion of species occurs very slowly and the gene-flow between the plant populations is reduced. This dispersal mode may lead to isolation and narrow range size of the species. In fact, *C. corymbosa* is very isolated and the only existing six populations worldwide are confined to a tiny area of about 3km^2 in the Massif de la Clape in southern France (Colas et al. 1997; Imbert 2006).

On the other hand, efficient long-distance dispersal mechanisms, such as anemochory or endozoochory, should counteract the endemism, as these mechanisms ensure the occupation of large areas and thus facilitate the gene-flow between populations. However, long-distance dispersal could also be an important means of covering long distances over unsuitable habitat and arriving at new, unsettled regions such as isolated islands where the species may be able to spread and to adapt.

Plant species that disperse with the help of slow or small biotic agents such as ants would never reach an isolated island. This is why plant families with high colonisation abilities (long-distance dispersal) are very frequent in isolated island floras (e.g. see analyses of the richest plant family profiles for the 14 island regions, appendix).

Several studies discuss the role of species dispersal abilities in endemism. However, this relationship is not finally clarified yet: Helme and Trinder-Smith (2006) assessed endemic and threatened plants in the Cape Peninsula region and found significantly higher numbers of endemic taxa with ant-dispersal (myrmecochory), and far fewer endemics with wind dispersal. Giménez et al. (2004) who examined dispersal modes of endemic plants along an altitudinal gradient in the southern Iberian Peninsula found a more sophisticated relationship: Endemics of high altitudes tend to disperse via anemochory due to pappi, while dispersal of endemics from the lower regions is more frequently biotic-assisted (e.g. myrmecochory, zoochory).

Holmgren and Poorter (2007) found that the majority of endemic taxa were not dispersed by wind. However, the authors found that this pattern, visible on the macro-scale level of the large study region[24], shows regional variations depending on the local habitat situation. In fact, in the open landscape regions of the study area wind-dispersed endemics are in the majority.

Lavergne et al. (2004) raised concerns over the hypothesis that endemics are generally poor dispersers as there are strong dependencies on the different phylogenetic contexts of the examined floras. Hobohm (2008) summed up that the trait combination of specialised insect pollination and wind dispersal is frequently found in endemic plants.

Most of the endemic-rich plant families or genera discussed in the present study are insect pollinated (e.g. *Centaurea, Campanula*, *Silene, Galium, Saxifraga, Limonium*) and spread by wind dispersal (almost all members of Asteraceae, Poaceae and some members of the Scrophulariaceae and Fabacae). Some genera are, however, dispersed by animals or gravity (e.g. *Centaurea* spec., *Galium* spec., *Campanula* spec.)[25]. Species groups that reproduce asexually (apomictic species), as some *Hieracium* species do, hold an exceptional position. However, the 10 families with the highest numbers of endemic species are those families that are most species rich in general (Davis et al. 1994). At regional scales (see profiles of regions; appendix pp. 220 ff) these 10 endemic-rich families are also in evidence, and the family of Asteraceae is nearly always in top position. So far, there is only poor trait data in EvaplantE, which is the reason why it is not possible to discuss the role of dispersal traits in any detail. This issue remains an interesting field of study for the future.

[24] The examined study region comprises the whole Upper Guinean region from Senegal to Togo, West Africa.

[25] Information on taxa traits was evaluated from LEDA Traitbase (Kleyer et al. 2008, URL: www.leda-traitbase.org).

Photographer: Claude (free under GNU-License)

Fig. 28: *Centaurea corymbosa* spreads exclusively with the help of biotic agents: The range of the ants dispersing the seeds also confines *Centaurea corymbosa´s* range.

Geographical gradients in endemism across Europe

Europe has no endemic plant family but more than 100 endemic genera. The analyses of Kew Garden's Herbarium (Kew Garden's Herbarium, URL: www.kew.org/news/families-and-genera-map.htm) which focus on the distribution patterns of (endemic) plant families and genera show that Europe receives low and middle scores in the global ranking of floristic richness (genus level). However, an uneven distribution of (endemic) genera per region is visible throughout Europe (Box 4). This general trend is based on plants recorded at the genus level, but is largely confirmed when the focus is placed on the lower taxonomic ranks. The diversity maps (figures 21, 22) produced in the present study confirm this pattern and show a refined scale, accounting for 42 independent regions. Figures 17 and 18 show a tendency for fewer endemics (both European and local) to inhabit the northern than the southern regions and illustrate that the highest diversity of endemics is found in the southern and Mediterranean regions (absolute numbers; see also table 4).

Box 4: Kew Garden´s map on biological diversity - European section

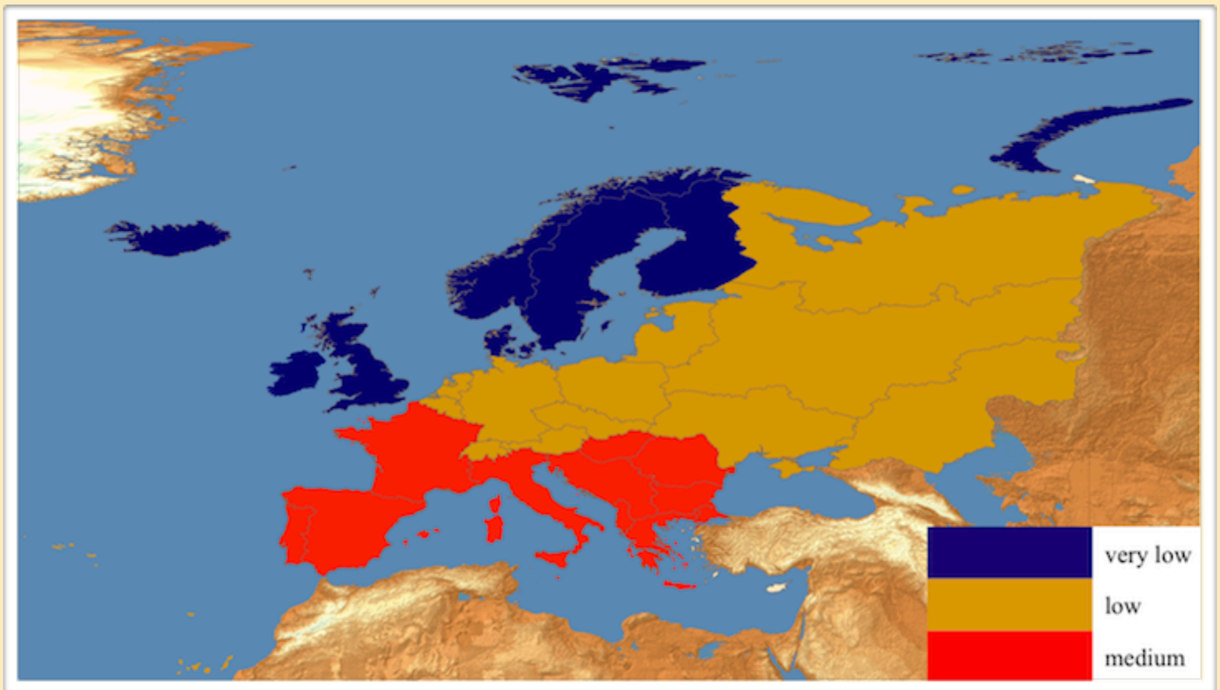


Fig. 29: Recoloured map of the study region based on the digital biodiversity map produced by KEW Gardens: The regions are categorised according to their total richness in genera and in endemic plant genera[18].

KEW Garden´s map shows that the large regions in the north (North and Middle Europe) do not host any endemic or only one endemic genus (Eastern Europe) and the southern continental regions host more than one thousand plant genera; of these, 24 genera are endemic to southeastern and 30 to southwestern Europe. The isolated archipelago of the smallest region, Macaronesia, has indeed the lowest numbers of genera overall, but with 36 endemic genera it is the most endemic-rich region of Europe (see table 14).

Tab. 14: Online search report of the interactive map of vascular plant families and genera for the European regions

region	area (100km^2)	number of families	number of genera	endemic genera
North Europe	16,202	111	596	0
Middle Europe	10,808	118	728	0
Eastern Europe	45,946	120	819	1
Macaronesia	140	112	511	36
Southwestern Europe	11,581	139	1,047	30
Southeastern Europe	10,575	142	1,109	24

[26] The division of areas is slightly different to the present study, as Macaronesia includes the Cape Verde Islands and the East Mediterranean Cyprus is related to the Western Asia region.
The division of regions:
Northern Europe: Denmark, Finland, Faero Islands, Great Britain, Iceland, Ireland, Norway, Svalbard and Sweden
Middle Europe: Austria, Belgium, Czech Republic, Germany, Hungary, Netherlands, Poland and Switzerland
Eastern Europe: Belarus, Baltic States, Crimean region, Central European Russia, East European Russia, North European Russia, South European Russia, Northwest European Russia and Ukraine
Southwestern Europe: Balearic Islands, Corsica, France, Portugal (mainland), Sardinia, Spain (mainland)
Macaronesia: Azores, Canary Islands, Cape Verde, Madeira and Selvages.

However, direct comparisons of diversity features are difficult, as there is considerable variation in the area sizes of the study regions[27]. Nevertheless, some examples of clustered regions with comparable area size confirm the assumed north-south gradient in endemic diversity (see table 5): The Czech Republic and Slovakia are species-poor as well as poor in local endemics (6) and European endemics (556) compared to the slightly smaller Greece with 419 local and 1,096 European endemics (cluster 10). Italy (170/1,473) and Yugoslavia (158/1,479) are much richer in endemics than the island of Great Britain (25/ 291; see cluster 11). The endemic diversity of Sweden is heavily contrasted by mainland Spain which hosts more than 100 times as many local endemics as Sweden (545 vs. 5, respectively) and about 8 times more European endemics (1,562 vs. 194, respectively). The diversity gradient from northern to southern Europe is also visible when smaller distances are compared: e.g. Denmark compared to Switzerland (1/145 vs. 8/741 respectively; cluster 5), Finland (0/114) compared to Germany (8/645; cluster13), Norway (2/181, cluster 12) compared to Poland (3/412; cluster 12), Bulgaria (56/707) compared to Greece (419/1.096) and France (93/1,384) compared to the extremely endemic-rich mainland Spain (545/1,562; cluster 15).

A comparison of regions with different area sizes makes the problems and biases of endemism ratios clear: The study regions Crete (endemism: 8.1%) and Greece (endemism: 8.4%) and the study regions Crimean peninsula (endemism: 3.2%) and Italy (endemism: 3.3%) have comparable endemism ratios. However, we gain little information from these numbers, as Greece and Italy both have more than 2.5-times higher numbers of local endemics than Crete and the Crimean. The endemism ratios of the compared regions are therefore only the same because the absolute numbers of species are different. While the small island Crete and the Crimean Archipelago are inhabited by about 2,000 species, Greece and Italy have a total floristic inventory of some 5,000 vascular plants each (see also table 5).

As long as there is no accurate method to compare endemism values across space it is reasonable to apply Bykov´s Index or alpha-values. Table 5 shows that the northern regions all have drastically low values of endemicity, while the southern, endemic-rich but large areas such as mainland Spain (-1.08), mainland Italy (-2.84) and Yugoslavia (-2.43) have negative residual scores close to the expected values. Only some extremely endemic-rich islands and archipelagos such as the Canaries (10.68), Cyprus (2.00) and Greece (1.18) reach positive scores above the expected level of endemicity.

[27] The uneven distribution of land masses along the latitudinal gradient creates the situation that the species-poor regions of the north of Europe have larger area sizes than the species-rich regions of the south. This special situation would result in a negative correlation in a species-area-curve.

This gradient in endemism may be explained by climatic and energetic factors. The latitudinal gradient of endemism found in the present study corresponds well to the findings at global scales: The global view shows that the alpha-diversity (and thus possibly also endemic diversity) of vascular plants generally increases towards the equatorial regions (Rosenzweig 1995; Rohde 1998; Kier et al. 2005; Barthlott et al. 2007). Certainly, the precondition of a sufficient supply of plant-available water must be fulfilled (theory of water-energy-dynamics, O'Brien 1998; Whittaker et al. 2001; O'Brien 2006). It is obvious that the present distribution pattern of endemics in Europe is influenced by current climatic conditions. Doubtless, this pattern will adapt and shift in the near future, depending on the local and regional effects of global warming (e.g. Pompe et al. 2008).

Impact of the 'habitat continuity' parameter

However, it is likely that the current pattern of endemism in Europe was shaped to a much greater extent by the destructive influence of the glacial cycles in the past than by current climatic features as e.g. Cain (1944: p. 216) noted:

‘*... the lands of the northern hemisphere which were covered by the Pleistocene ice sheets seem to be conspicuously low in endemics'.*

Several authors have emphasised that the last glacial events strongly influenced the floristic inventory and shaped the present patterns of diversity at regional and continental scales (e.g. Cowling and Lombard 2002; Pärtel 2002; Jansson 2003). Rohde (1996) argued with Rapoport´s rule[28] and hypothesised that species of the north with small ranges have become extinct because of glaciations (Rapoport 1982; Stevens 1992; Rohde 1996). However, most of the current published studies take only the extent of the last glacial maximum into account, i.e. the maximum extent of the ice sheets during the Weichselian period (LGM e.g. Essl et al. 2010). As apparent from map figure 15a (SGM) and map figure 15b (LGM) the extent of the ice sheet cover varied substantially depending on the glaciation period under consideration.

The present study shows that the influence of earlier glaciation periods must also be considered when explaining current biodiversity patterns, especially regarding the patterns of local endemics. This evaluation considers either the Saalian glacial maximum (SGM) or the total glacial maximum (TGM) layer with combined data of all glacial events of the Quaternary era. Figure 15c shows the study area and the extent of the total glacial maximum (TGM layer) and the richness of regions categorised in a 10- step colour scale (visible are the first 6 different coloured intervals showing regions with high endemism). This demonstrates impressively that the ten most endemic-rich

---

[28] Rapoport´s rule is the common name for Rapoport´s hypothesis which recognised the decrease of in alpha-diversity towards the poles accompanied by a rise in the mean range size of species (Stevens, 1992).

regions were largely uninfluenced by ice sheets or had large ice-free refugial areas, as is the case in France (90% ice-free refugium) or Italy (80% refugium).

An applicable showcase supporting a 'refugia-theory' in Europe is the comparison of the neighbouring alpine regions, Austria and Switzerland. The regions are situated in the same climatic region, are both mountainous, thus have high habitat diversity, and were affected by several glacial events. Austria today hosts 25 local and 858 European endemics, while the smaller but more habitat-rich Switzerland has only 8 local and 741 European endemic plants (see also profiles of regions, appendix). Switzerland’s relative endemic paucity may be explained by a strong glacial impact. Calculating the ice-free refugial areas for the last glacial maximum (LGM) and the Saalian maximum (SGM) it becomes evident that more than 50% of the region Austria was ice-free during both glacial events, while of the region covered by today’s Switzerland, 99% was covered by ice during the SGM and 80% during the LGM. This means that the potential endemic species in the region Switzerland have either become extinct or have been edged out by radical climatic pressure and had to immigrate again from southern regions during the warmer interglacial periods.

It is most likely that the periodic destruction of habitats steadily interrupts evolutionary processes (e.g. gene flow or speciation) and thus leads to a reduction in the taxa´s intra-specific variability and even to a generally reduced local species pool (Cain 1944; Kruckeberg and Rabinowitz 1985; Rohde 1992). On the other hand, in a few cases, catastrophic events may also promote founder effects, but only if the extremely reduced populations are able to spread again after the end of the catastrophe. However, as the likelihood of becoming extinct is much higher for small populations, it is most likely that the latter process happens infrequently.

All regression models (with local and European endemics as dependent variables) resulted in higher model strengths when using the TGM or SGM data than when using LGM data. In any case, the TGM or SGM ice-sheets show negative beta values, and thus negative influences on the number of endemic taxa. The influence of the explanatory parameter 'habitat continuity' is significant in many GWR models with local endemics as dependent variable but has no significant influence on the patterns of European endemics. This phenomenon might be explained by Rohde´s idea that species with small range sizes had lower chances of survival and were wiped out in the north but survived in large numbers in the non-glaciated south.

The contrast in absolute numbers of European endemics between northern and southern Europe is much smoother. This might be due to simple stochastic reasons, as it is very likely that European endemics are concentrated in the centre of the large land masses of Europe (see also Box 5). However, as Europe´s large landmasses are situated at high latitudes, these regions were strongly influenced by glacial cycles, which reduced the numbers of European endemics to moderate values.

Impact of parameter 'isolation degree'

Despite the apparent gradient in endemics from north to south, in the case of the local endemics it is conspicuous that the Atlantic islands Great Britain (25 local endemics), Iceland (4) and even the Faero Islands (1) and Svalbard (4) are inhabited by some local endemic taxa, which make these regions comparably rich or richer in local endemic plants than e.g. the Baltic region (1), the Scandinavian regions (Denmark (0), Sweden (5), Norway (2), Finland (0)), the Benelux region (Netherlands (0), Belgium and Luxembourg (1)). The continental region Hungary and the North Atlantic Iceland have comparable area sizes but there is a difference of only one in the number of local endemics differs (5 and for 4 endemics respectively). Moreover, Iceland has as many local endemics as the 14-times larger Northern division of Russia (Rs (N) (4)). Extreme richness in local endemics is also evident in the South Atlantic Archipelagos – the Canaries (540), Madeira (134) and the Azores (46) and the Mediterranean Islands – Crete (152), Sicily (59), Corsica (37), Sardinia (28).

The degree of geographical isolation as a promoting factor for local endemism was described and examined exhaustively by several scientists, starting with MacArthur´s and Wilson´s theory on Island Biogeography (MacArthur and Wilson 1967) and followed by several studies at global (Hobohm 2000; Kreft et al. 2007), regional or local scales (e.g. studies in the European area Cardona and Contandriopoulos 1979; Hannus and von Numers 2008; Nikolic et al. 2008; Reyes-Betancort et al. 2008; Panitsa et al. 2010).

It should be noted that the extraordinary status of islands in endemic species richness only applies when considering the number of small-range local endemics. If the focus is enlarged from small-range local endemics to broad-range European endemics, the islands lose their status of endemic richness to the large mainland regions of the south. This shifting might be due to a simple area-effect. This drastic degree to which the endemic diversity value of islands is decreased when a different definition of endemism is applied may be smoothed by using cross-scale values of endemicity. However, this obviously strong effect of rescaling also requires that researchers and conservationists keep the massive influence of their chosen scale of endemism in mind. When using data from endemism studies, the influence of scale (macroscale vs. regional scale vs. local scale) on the one hand, and the understanding of the term endemic, on the other must always be carefully evaluated.

Further, the rescaling effect also clarifies the problem of endemism at the edge of a study region (Hobohm and Bruchmann 2009). This 'edge-effect' is a stochastic phenomenon (see Box 5) that results from the position of the species´ population centre in a given geographic space: Endemic plant populations that occur at the edge of study areas – even if the geographic range of occurrence is small – have a smaller chance of acquiring endemic status than those endemic species that occur in the centre of a study region. The logical consequence of this is that small regions at the edge of a study area tend to host higher proportions of endemics with very narrow geographical ranges of occurrence than large-range endemics. The low endemic species number for e.g. the European part of Turkey (4 local/ 85 European endemics) that would not be expected on the basis of its geographical position in the otherwise generally endemic-rich Mediterranean region can also be traced back to this edge phenomenon. If this region was, theoretically, moved to a central position within the study area it would presumably host more European endemics than in its actual edge position (Hobohm 2008). However, it is not as yet possible to quantify this 'edge effect' in endemism, but the trends or contingent biases in data should be kept in mind.

The parameter 'isolation degree' was much more loaded in the LR and GWR models explaining the patterns of richness in local endemics (1st rank in most LR and GWR models). In contrast, the parameter 'isolation degree' was not significant in any regression for explaining European endemics, no matter which index describing the isolation factor was chosen. This result is not particularly surprising, as the characteristic of having a small range and thus being isolated is more or less inherent to the definition of a local endemic plant.

The predicting parameter 'isolation degree' is well described with the proportions of shore and perimeter per region and is also adequately described with the 'isolation index' that includes distance measures. The suitability of simple distance measures ('distance index') and the 'shape index', however, is debatable: The use of the 'distance index' describing the explanatory variable 'isolation degree' decreases model strength in LR and GWR models explaining patterns of local endemism but resulted in good model fit regarding patterns of European endemics. Using the 'shape index' results in moderate to good R^2 values but with the opposite algebraic sign.

Besides, it should be noted that the present isolation indices include only geographical separation either in the form of distance or of water barriers. Barriers, such as alpine mountain ranges that doubtlessly also have isolating or separating effects on floras are not considered as an isolating factor, yet. Future studies should test how a probable influence of these barriers can be incorporated into calculations.

Impact of the 'regional species pools' parameter

It is important to note that the parameter 'isolation degree' on its own is never the decisive factor for high endemism. Isolation is not a single acting promoter but, due to the reduced gene flow, isolation is an important precondition for speciation (Kruckeberg and Rabinowitz 1985). Another major precondition of high endemism is the existence of a species pool in the neighbourhoods of the isolated region. This adjacent species pool ensures a certain probability for the invasion of species into the isolated region; these then represent the initiating biotic inventory for the newly developing flora. Thus, the environmental parameters regional 'species pool' and 'isolation degree' work closely together promoting speciation (Stebbins and Major 1965; Hobohm and Bruchmann 2009).

Box 5: Living on the edge

Figures 30a and 30b illustrate the position of the population centre of endemic plants within the study area and their geographical range size. Two different grid layers with hypothetical range sizes, Fig. a small range sizes or Fig. b large range sizes, were positioned over a map of parts of the study area. It becomes clear that plants with large range sizes positioned towards the edges of the study area have a smaller probability of being classified as endemic than those plants positioned in Central Europe. In contrast, plants with small range sizes have high chances of acquiring the status 'endemic' even if their population centre is positioned at the edge of the study area. This stochastic effect is relevant in discussions of differences in the distribution patterns of local and European endemics. Central European endemics may have larger range sizes than those endemics found towards the edges of the study area.

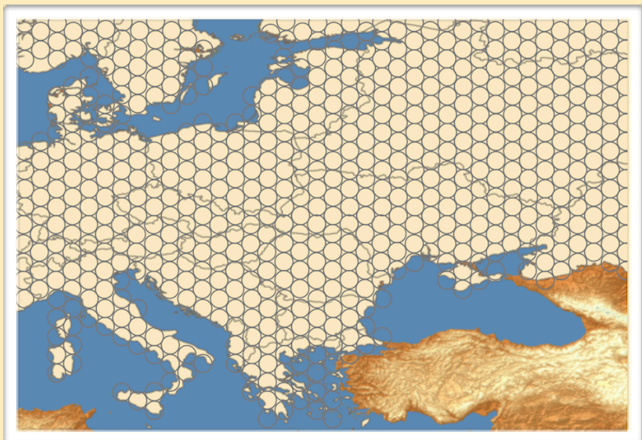


Fig. 30a:
Small hypothetical range sizes of endemic plants.

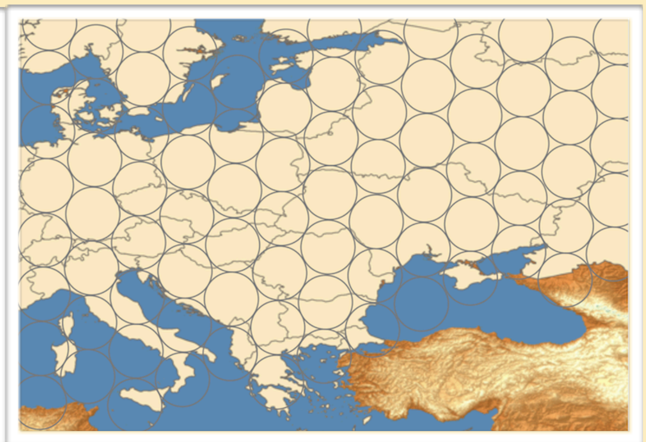


Fig. 30b:
Large hypothetical range sizes of endemic plants.

The described dependence between the parameters 'isolation degree' and 'regional species pool' parameter is shown in the bivariate correlation analyses (see tables A8-A13, appendix) and is also clearly displayed in the regression results. In the case of local endemics, the regional 'species pool' always accompanies the 'isolation degree' variable and has a similarly strong impact in regression models (2nd rank in most LR and GWR).

In the case of the European endemics as dependent variable, the calculations of LR and of GWR account for very high beta-values of the 'species pool' parameter. In most cases, the 'species pool' variable is most important (1st rank) and has a strong positive influence on the current pattern of European endemics.

The higher importance of the 'regional species pool' parameter in explaining variations in the patterns of either local or European endemics becomes clear: The process of speciation on a continuous mainland area generally begins with a large species pool in the neighbourhood, which means that numerous genetic resources are available from which new species may evolve. Furthermore, migration and gene flow should occur frequently on continuous terrestrial areas. However, in isolated areas, e.g. an oceanic island far away from the continents, speciation has to be established from a small or moderate genetic inventory.

The high importance of the regional species pools in explaining the patterns of European endemics is also of interest regarding the negative effect of the 'habitat continuity' parameter. After the comprehensive habitat destruction by the ice-sheets, the re-invasion of species came from the southern, non-glaciated regions. Today the northern regions still have lower total species numbers (see region profiles, p. 220 ff appendix) and thus smaller regional species pools from which new species – potential endemics – may have evolved.

Impact of the 'habitat diversity' parameter

Beside the explanatory parameters 'habitat continuity' and 'species pool' the 'habitat diversity' parameter was weighted very high in regression models. In the case of the local endemics, 'habitat diversity' was placed third, and in the case of the European endemics 2nd among significant explanatory parameters and impacts. As stated by Cain in the following quotation, habitat diversity is important for a high degree of endemism (Cain 1944): p. 212):

> *'A high degree of endemism is usually correlated with age and isolation of an area, and with the diversification of its habitats, as these factors influence both evolution (the formation of new endemics) and survival (the production of relic endemics).'*
>
> *(Cain 1944)*

Species diversity and endemic diversity are generally highly correlated with the area size of the examined region. Several authors argue that the factor 'area' per se has only little value in explaining richness patterns because, at least at large scales, it is not the quantity but the quality of an area that affects species richness (Cain 1944; Kruckeberg and Rabinowitz 1985; Ricklefs and Irby 1999; Morand 2000). In many cases, the measured positive correlation between area and species richness is due to a sampling effect over large scales, as the effects of climate variability, landscape heterogeneity (relief, vegetation) or the number of soil types increase with increasing area size (Whittaker et al. 2001).

In the present study, it is conspicuous that the poorly structured lowland regions such as the Netherlands (148), Belgium and Luxembourg (198), Denmark (145) or the Baltic region (118) have low numbers of endemics, while the high-mountain regions e.g. Spain (1,581), France (1,477)), Italy (1,473), Austria (858), Switzerland (741), Greece (1,096), Yugoslavia (1,479) and the Canary Islands are mostly extraordinarily rich in endemics (figure 17).

In fact, the 'relief index', which simply accounts for the elevation gradient within the regions, results in the best model fit in most calculated regression. Other indices describing the habitat diversity such as the 'vegetation index' did not produce significant results. The use of the 'relief area index' decreased the model strength rapidly when explaining local patterns of endemism. The index failure of the 'vegetation index' may be due to the fact that this index was measured at very large scales (1:2,500,000) and condensed to a simple count of broad-scale vegetation types. The impact of small-scale variability in vegetation e.g. very local or microhabitats, different microclimatic conditions at southern- or northern-facing slopes, is not reflected well in these broad-scale index.

The 'relief index' seems to be a very appropriate measure for habitat diversity, and several authors found good model strength using this measure (Ricklefs and Irby 1999; Morand 2000; Strauss 2009). Moreover, this index is very easy to assess as valid altitude data is also available online for almost all regions (e.g. www.maps-google.com and others).

Handling spatial autocorrelation power of predictive regression models

The visualisation of combined data via maps certainly gives an impressive overview of endemism at a continental scale and also gives some idea of the interrelationships between the current patterns of endemism and the explanatory parameters. Some of the previously discussed aspects were partly revealed by the combination of ecological features with spatial data (calculation of explanatory indices) and by bivariate correlation statistics (see tables A8 - A13, appendix). However, every evaluation that is based exclusively on the visual impressions from map studies must remain on a qualitative level and does not allow any quantitative statements to be made. With the help of bivariate correlations, however, it is possible to some degree to quantify the impact of every single explanatory parameter. It is neither possible to quantify the combined impact of parameters in total nor to assess the differences in the strengths of impacts of the single explanatory parameter on the given patterns of endemism. This correct quantifying of relationships, which could upgrade the scientific discussion, was enabled primarily by multivariate regression.

Contrasting the quiet different results of the non-spatial LR with those of the GWR highlights the strong influence of spatial autocorrelation in regression statistics. It can be concluded that the standard LR is sensitive towards non-uniformly distributed data and is not applicable if spatial autocorrelation was detected (Kühn 2007). As spatial autocorrelation is frequently found in ecological data the standard LR falls behind the spatial accounting GWR.

However, as the pseudo-R^2 of the GWR and the adjusted-R^2-value of the LR are not directly congruent it is neither possible to compare the model strengths directly nor to quantify the errors in LR statistics caused by the spatial dependencies.

As spatial autocorrelation was indicated in the present data, the GWR had to be applied instead of the LR. The GWR method is robust against errors resulting from spatial patterns underlying the data fed into the calculation. Because of the addition of the weights matrix this regression type is able to account for the spatial autocorrelation. However, this advantage might also be the greatest shortcoming of GWR:
The major criticism of the spatial regression method GWR is that the specification of spatial weights in the weights matrix is defined *a priori*. This means that in defining the weights matrix a presumption of the spatial interrelationships is already made (Selb 2006). As this presumption is not tested with the data's reality before running the calculations, the results may be biased. Accordingly, the resulting models of GWR only give the answer that the coherence between the dependent and the explanatory variables is exclusively true under consideration of the *a priori* defined spatial dependencies. The GWR is likely to result in different loadings of explanatory variables if the specification of spatial weights matrix were defined differently. When discussing the results of GWR, this should be kept in mind.

The second criticism is that in the concept of the GWR the spatial weights, or the given conception of neighbourhood effects, are assumed to be the same for each of the explanatory variables that are fed into the calculation. Looking at the maps in figure 14 and figure 15, however, it is evident that e.g. the spatial pattern that underlies the indices for habitat continuity is structured differently than e.g. the spatial patterns underlying the isolation indices.

In the present study, the specification of spatial weights in the weights matrix was established with respect to all named preconditions: The standard weights matrix calculated by distance measures of centroids was dismissed and replaced by another weights matrix which accounted for the ecologically relevant differences of neighbourship across terrestrial (e.g. mainland regions) and across marine areas (e.g. islands and peninsulas). This classification of spatial dependencies proved to be successful. However, to ultimately prove the reliability of GWR models it is recommended to calculate the same GWR with different classifications of neighbourhoods and to test the otherwise identical GWR models against each other (Selb 2006). A test using fictive dummy-data is also useful.

The GWR is not the only statistical method of accounting for the effects of autocorrelation. Today several different techniques of spatial modeling are known that account for the spatial impact in ecological datasets (Dormann 2007; Carl et al. 2008). As stated by Dormann (2007) almost all methods result in reliable spatial models. However, it was also found that the different methods of accounting for spatial effects differ significantly in results and conclusions if the calculations are based on binary spatial data (e.g. presence/ absence data). This effect was ascribed to the generally low content of information in binary maps compared to spatial datasets with continuous values. Thus, all spatial calculations on the EvaplantE data are subject to another uncertainty, as EvaplantE is based on this critical type of binary presence-absence data, which means that EvaplantE has, to date, low geographical information content. An upgrade of EvaplantE´s data with respect to spatial information content, e.g. including coarse categories of range sizes, can be advised.

Ecologists will always face the challenge resulting from uncertainties and have – under the condition of uncertainty – to decide which method to use. The problem that every model calculation has a certain degree of uncertainty will never be solved and is inherent to the fact that a model can never be the same as 'reality'. Of course this does not mean that ecologists or conservationists should be comfortable with bad models. After evaluating EvaplantE´s data it seems advisable not to rely on the application of one particular statistical method but first to consolidate expertise in the reality of the field and to improve the data quality (see beginning of discussion page).

A first step might be a general change in the paradigm of delineating and mapping endemism according to artificial political boundaries.

Delineating and valuing endemism – need for paradigm change

Relating endemic taxa to habitat categories, and thus to ecological features, in order to find habitat dependencies of endemic plants is a relatively new approach which was recently advanced by Ricketts et al. (1999) for North America, by Burgess et al. (2004) for Africa and Madagascar; also by Mucina and Rutherford 2006 at the smaller scale of South Africa, Lesotho and Swaziland), by Wikramanayake et al. (2002) for the terrestrial ecoregions of the Indo-Pacific[29] and by Hobohm and Bruchmann (2009; Hobohm 2008) for the European continent[30].

It can be noticed that the non-European works begin with the delineation of ecozones, ecoregions or distinct landscape formations and list bare figures of species and endemics for describing the biotic inventory within the delineated landscapes. In most cases it is also the aim of the assessments to find extraordinarily biotic rich priority areas for the establishment of maximum efficiency concepts of biodiversity conservation (*in situ*). The latter focus of searching for the most biotic rich areas is unfortunately based on strongly condensed data i.e. the endemism data consist purely of numbers of endemics without naming or assessing taxonomic ranks or geographical ranges of taxa.[31]

In contrast, the European assessment is a species-centred approach and is stringently focused on the endemic inventory of vascular plants and their related habitats and is, as far as possible, taxonomically valid. From the taxonomical and ecological point of view this approach leads to a much finer scale of cognition in plant endemism as it includes considerations on the local and regional scales (depending on the geographical range of the endemics) and relates this to a continental-scale overview. However, evaluation of EvaplantE is vulnerable to any gap in ecological knowledge and suffers all the problems and biases which result from different habitat terminology in the various European languages or by different international standards of classifications Hobohm and Bruchmann 2009; see also impressions of picture plates showing examples of habitats). Nevertheless, this approach may be able to detect missing data (floristic, geographic and ecologic) and reveals unsolved questions in conservation sciences, e.g. the problems resulting from delineating endemism according to political divisions.

In fact, the evaluation of EvaplantE endemism in Europe is mostly defined according to artificial boundaries (borders of the national states) and only few data on endemism are related to natural (e.g. mountain ranges or islands) or to ecological (e.g.biomes or habitats) features. To date there are still large data gaps in the ecological knowledge of endemic plants' habitat affinities. About 24 % of

[29] However, a criticism of the works of Wikramanayake et al. and Burgess et al. is that they are based upon bad quality data, as most endemism data was roughly measured in only four endemic-richness categories (coarse interval scale!).

[30] In some respects, the approach of the world's distinctive ecoregions (Olson *et al.*, 2000; Olson & Dinerstein, 2002) may also be part of this list, although endemism was not the leading idea of this approach.

[31] Furthermore it can be mentioned that sometimes endemism data for different species groups were focused on and were at times even mixed up (e.g. bird endemism vs. plant endemism vs. endemism in amphibia or the endemism in other species groups).

endemic taxa are not yet assigned to habitats. Generally, the data availability at population level is even worse. Some endangered species with already critical population sizes receive attention, e.g. plants listed in the national red lists or in Annex 1 of the European Habitats Directive (good or bad conservation status; see e.g. www.floraweb.de, Rat der Europäischen Gemeinschaften 1992; Commission of the European Communities 2009). It is to be feared that the population sizes of other more abundant endemic plants are decreasing unobserved due to habitat changes and ongoing trends in intensification of land-use but without attracting conservationists' attention.

In the course of *in situ* conservation the habitat affinities of endemic plants should be of much greater interest than the confinement of plants to political borders.

The evaluation of numbers of endemic plants inhabiting the different habitat categories generally confirms the findings of (Hobohm 2008; Hobohm and Bruchmann; figure 23 a-d). However, the present study sets a strong focus on the evaluation of Europe´s stenoecious endemic plants, as this knowledge might be of special interest in the course of *in situ* conservation and may give important indications as to how best to classify the rarity and the vulnerability of Europe´s endemic plants.

The evaluation of habitat affinities shows that some 40% of endemics (that were assigned to habitats) do not have a narrow ecological amplitude and can be found in more than one habitat type. The fact that an endemic taxon need not necessarily be exclusively bound to one set of ecological conditions was already indicated by van der Maarel and van der Maarel-Versluys (1996). for vascular plant endemics along the European coasts. In fact, 58.5% of the assigned endemics are habitat specific and strictly bound to one of the eight habitat categories. About 29.6% of endemic plants occur in two habitat types and only a small proportion of endemics have wider ecological restrictions and occur in 3 (10.4%) and 4 (1,5%) habitats. Of special interest is the fact that coastal and saline habitats and also rock and scree habitats are host to large proportions of habitat-specific endemic plants (57% and 60.9% respectively for the local endemics, and 58.6% and 55.2% respectively for European endemics). Other habitat types such as shrub- and heathlands as well as bogs, mires and fens contain significantly smaller proportions of stenoecious endemic plants. Interestingly, the ruderal and human-influenced habitats as well as grassland habitats have equally high or even higher proportions of stenoecious endemics than Europe's forest habitats (tables 9 and 10). The latter results underline the value of Europe's open cultural landscapes as important habitats and also warn against today's trend of land abandonment and intensification of land use Pignatti 1978, 1983; European Communities 2008; Commission of the European Communities 2009; Bruchmann and Hobohm 2010; Bruchmann and Hobohm, unpublished; EDGG 2010). From the overview given in figures 26a-h it is evident that not only the endemic-rich Mediterranean and island regions are responsible for the protection of the habitats in which stenoecious endemics live but also the temperate or even northern regions, such as Britain for coastal endemics, or Germany or Norway for the habitats of bogs mires and fens.

It is most likely that the different richness levels of habitats in stenoecious endemic plants are not due to a simple effect of area, as, for instance, both rock and scree habitats and coastal and saline or grassland habitats cover less of Europe´s area than, for example, forest or agricultural habitats. However, as we do not have concrete data on the area extent of the habitats in Europe it is not possible to finally conclude questions concerning the conservation status of habitats and endemics (see also Hobohm 2008).

It is stated in the CBD (article 7 in conjunction with Annex 1) and also concretised in the European Plant Conservation Strategy (EPCS; Planta Europa 2002) that those plants and habitats that are most endangered should receive priority conservation. This statement becomes more concrete in the EPCS objective 1.02 that calls for the inclusion of all national endemic plants in the European Red List. The blind spot of this national boundary orientated conservation strategy is well illustrated by the case of *Androsace alpina* (see Box 1). This example shows that the endemism status of endemics which occur across political borders is often misconceived even though they may have smaller geographical distribution ranges than some local endemics or may be bound to one habitat type. In fact, many of Europe´s endemic plants fall through the conservation net simply because their range extends across the border of individual countries and their respective administrative responsibilities. In the present study, more than half the endemic plant taxa (52%) are identified as cross-border endemics. Of these, 20% are endemic for two study regions and a further 15% of endemic taxa are confined to three (9%) and four (6%) study regions (see table 4) Because the database still comprises only binary data on the presence or absence of endemics in geographical regions and habitats it is not possible to determine how many of the cross-border endemics may be vulnerable to extinction.

The classification of the factual rarity or vulnerability status of the endemic plants with respect to their geographical range, habitat specificity and abundance must be tackled. Conservation policy must face up to this challenge very soon if the loss of biodiversity in Europe is to be seriously taken in hand.

Coastal and saline habitats

Fig. 31a: Cliff coast, Atlantic Ocean, Tenerife, Canary Islands (Photographer: Bruchmann)

Fig. 31b: Coastal dune, North Sea, Rømø island, Denmark (Photographer: Bruchmann)

Rock and scree habitats

Fig. 32a: Alpine habitat on limestone, Hochkönig region, Austria (Photographer: Bruchmann)

Fig. 32b: Scree habitat, Tenerife, Canary Islands (Photographer: Bruchmann)

Grassland habitats

Fig. 33a: Alpine meadow, Tiarno de Sotto, Italy (Photographer: Bruchmann)

Fig. 33b: Mowed semi-natural grassland, Hiddensee island, Germany (Photographer: Bruchmann)

Standing and running waters

Fig. 34a: Habitats along running waters, River Oder, Poland (Photographer: Bruchmann)

Fig. 34b: Standing water: Bolmen Lake, southern Sweden (Photographer: Bruchmann)

Habitats of bogs mires fens

Fig. 35a: Spruce swamp, near Fröslev Mosse, Denmark (Photographer: Bruchmann)

Fig. 35b: Raised bog, Nationalpark Storre Mosse, Sweden (Photographer: Bruchmann)

Woodland habitats

Fig. 36a: Woodland of European beech *Fagus sylvatica*), Denmark (Photographer: Thyssen; free under GNU-licence)

Fig. 36b: Laurisilva, Garajonay La Gomera, Canary Islands (Photographer: unknown)

Ruderal and man-made habitats

Fig. 37a: Man-made habitat with *Aeonium urbicum,* Gomera, Canary Islands (Photographer: Bruchmann)

Fig. 37b: Harvested cropland, Stranderod, Denmark (Photographer: Pioch)

Shrub- and heathland

Fig. 38a: Heathland, Wilsede, Germany (Photographer: Bruchmann)

Fig. 38b: Maquis shrubland with Cistus, Corsica (Photographer: unknown; free under GNU-licence)

Conclusion

Creating a spatial dataset applicable to the EvaplantE database and the visual presentation of Europe´s endemism in maps enables a first visual impression of the regions of Europe which are the most, or rather the least, diverse in terms of endemic plant taxa. Further, the spatial referencing of other biotic or abiotic datasets (e.g. Quaternary glaciations) and the blending of maps gives new course of actions handling with ecologically relevant data. Spatial relationships, such as the north-south gradient in local and European endemism, the outstanding richness of some Mediterranean regions, the distinctiveness of isolated islands and mountainous areas were revealed. These trends indicated by the visual exploration method described above were confirmed by assessing EvaplantE data with the help of descriptive and bivariate statistics as well as with the help of regression methods based on several sets of explanatory variables derived from the maps created.

As regards the hypothesis presented at the beginning of this study, the influence of predictor variables explaining the current spatial patterns of endemics was clearly shown. Much of the variability of the data in Europe´s botanical endemism can be explained by the defined explanatory variables. In the case of local endemics, the explanatory variables 'isolation degree', 'species pool', and 'habitat diversity' predict the endemic pattern best (GWR model, pseudo-R^2 value = 0.618). In the case of European endemics, the pattern of endemics is predictable with the help of the variables regional 'species pool' and 'habitat diversity' (best GWR model, pseudo-R^2 value = 0.807).

Contrasting the results of non-spatial LR with those from the spatial accounting GWR shows the fragility of standard regressions when dealing with spatially autocorrelated data. Spatial accounting regression methods such as the GWR are well able to incorporate spatial dependencies within the dataset. In most cases, the GWR results in high model strengths and leaves the standard LR behind[32]. However, depending on the incorporated weights matrix, which is an *a priory* assumption of how the spatial dependencies in the data are assumed to be structured, the results of GWR calculations differ to a greater or lesser extent. As the available dataset, EvaplantE, is binary structured (presence-absence-data), the given spatial content of endemism data is quite low, a factor which may even compound the uncertainty of the GWR statistics.

Floristic aspects of endemism showed that the generally most species-rich plant families are also richest in endemics. The influence of specific species traits (insect pollination, wind-spreading) is evident but could not qualified in valid trends or quantified in numbers.

The evaluation of ecological patterns, and thus the habitat-dependencies of endemic plants, showed the importance of Europe´s open cultural landscapes, for example with respect to *in situ* species conservation. Many endemics are bound to natural habitats e.g. coastal habitat, rock and scree habitats, forests but many endemic plants are also bound to cultural landscapes such as grasslands (natural and semi-natural) and even to man-made and ruderal habitats (see figures 24, 25, 26 a-h).

---

[32] Please note unsolved problem of comparison of GWR pseudo-R^2 versus LR adjusted-R^2.

Some major problems and blind spots became obvious while reviewing and interpreting the data on Europe's endemism:

Firstly, data inconsistency is a major challenge when investigating the endemism inventory of the European continent: The present thesis clearly shows the problems which arise from a variously stringent use of the term endemism or the problems resulting from taxonomical 'splitting' or 'lumping'. Also, the assignment of endemic plants to habitat categories is not without ambiguities, either because of the divergent meaning of some habitat denominations in different European languages or because of different ecological attributes of habitats of different climatic zones (e.g. Mediterranean vs. temperate grasslands).

Secondly, the term endemic is a very scale-dependent one, and the precise location in the given area under consideration also plays a role (Box 5).

Thirdly, recognizing the value of endemism i.e. using endemism as an indicator for biotic-richness or uniqueness is a critical aspect which strongly depends on the strategy- or target level and the given scientific background. Relating endemism to artificial boundaries, as has been done in the Flora Europaea, may be applicable in terms of politics and administrative or executive responsibility, but it does not make sense if the focus is on ecological questions of endemism or if seeking to initiate effective species conservation (*in situ*). As yet, there is no other comparable comprehensive data on endemism in Europe available other than the presently evaluated, mostly artificial boundary related, data of EvaplantE. Thus, the introductory questions which regions, habitats, or species should be prioritised in the course of biodiversity conservation can not be answered adequately.

In recognizing the value and significance of endemism one should avoid comparing apples with oranges. Not every endemic is rare and not every rare plant is necessarily also endangered (Ozinga et al. 2005). Using the state of endemic inventories as an indicator for biodiversity conservation is based on a meaningful categorisation of all European endemic plants according to their rarity status. In order to achieve this, it will be necessary to categorise endemic plants according to their geographical and ecological range (i.e. range size, habitat specificity) and, whenever possible, according to trends in population sizes

In order to face up to the biodiversity challenge and thus to span a systematic and tight conservation net which will help prevent species loss, it is strongly recommended that a suitable and consistent system be established in the very near future to identify the rarity and vulnerability of those species that are confined to the European continent.

References

Aeschimann, D., Lauber, K., Moser, D.M. & Theurillat, J.-P. 2004a. Flora alpina Vol. 1. Haupt-Verlag, Bern.

Aeschimann, D., Lauber, K., Moser, D.M. & Theurillat, J.-P. 2004b. Flora alpina Vol. 2. Haupt-Verlag, Bern.

Aeschimann, D., Lauber, K., Moser, D.M. & Theurillat, J.-P. 2004c. Flora alpina Vol. 3. Haupt-Verlag, Bern.

Agardy, T., Ash, N.J., Cooper, H.D., Díaz, S., Faith, D.P., Mace, G., McNeely, J.A., Mooney, H.A., Oteng-Yeboah, A.A., Pereira, H.M., Polasky, S., Prip, C., Reid, W.V., Samper, C.N., Schei, P.J., Scholes, R., Schutyser, F. & Jaarsveld, A.V. 2005. Millennium Ecosystem Assessment,- Ecosystems and Human Well-being: Biodiversity Synthesis. World Resources Institute, Washington DC.

Anchisi, E. 1991. Seltene Blumen des Wallis. Illustrierter Katalog der nur im Wallis vorkommenden Pflanzenarten der Schweiz. Rotten Verlags AG, Visp.

Applequist, W.L. & Wallace, R.S. 2000. Phylogeny of the Madagascan endemic family Didiereaceae. Plant Systematics and Evolution 221: 157-166.

Barthlott, W., Hostert, A., Kier, G., Koper, W., Kreft, H., Mutke, J., Rafiqpoor, M.D. & Sommer, J.H. 2007. Geographic patterns of vascular plant diversity at continental to global scales. Erdkunde 61: 305-315.

Bergmeier, E. & Abrahamczyk, S. 2007. Ecology and distribution of the Aegean wetland endemics Carex cretica and Lathyrus neurolobus. Beiheft zur Nova-Hedwigia 31: 207-219.

Bohn, U. & Neuhäusl, R. 2004. Map of the natural vegetation of Europe (Scale 1 : 2,500,000). Federal Agency for Nature Conservation, Bonn.

Bonafè Barceló, F. 1977. Flora de Mallorca. Editorial Moll, Mallorca.

Borges, P.A.V., Abreu, C., Angular, A.M.F., Carvalho, P., Jardim, R., Melo, I., Oliveira, P., Sergio, C., Serrano, A.R.M. & Viera, P. 2008. A list of the terrestrial fungi, flora and fauna of Madeira and Selvagens archipelagos. Direccao regional do Ambiente da Madeira and universidade dos Acores, Funchal and Angro do Heroismo, Funchal.

Bouchard, J. 1978 Flore practique de la Corse. Société des Sciences Historiques et Naturelles de la Corse, Bastia.

Bramwell, Z.I. & Bramwell, D. 2001. Flores silvestres de las Islas Canarias. Rueda, Madrid.

Bruchmann, I. & Hobohm, C. 2010a. Halting the loss of biodiversity: Endemic vascular plants in grasslands of Europe. Grassland Science in Europe 15: 776-778.

Bruchmann, I. & Hobohm, C. 2010b. Über Grenzen hinweg: Schutz endemischer Gefäßpflanzen in Europa? Treffpunkt Biologische Vielfalt, 10, 119-125.

Burgess, N., D'Amico Hales, J., Underwood, E., Dinerstein, E., Olson, D., Itoua, I., Schipper, J., Ricketts, T. & Newmann, K. 2004. Terrestrial Ecoregions of Africa and Madagascar. Island Press, Washington, DC.

Bykov, B.A. 1979. On a quantitative estimate of endemism. Botaniceskie materialy Gerbarija Instituta botaniki Akademii nauk Kazahskoj SSR 11: 3-8.

Cain, S.A. 1944. Foundations of plant geography. Harper and Brothers, New York, London.

Cardona, M.A. & Contandriopoulos, J. 1979. Endemism and evolution in the islands of the Western Mediterranean. In: Bramwell, D. (ed). Plants and islands. Academic Press, London, pp. 133-170.

Carl, G., Dormann, C.F. & Kühn, I. 2008. A wavelet-based method to remove spatial autocorrelation in the analysis of species distributional data. Web Ecology 8: 22–29.

Castroviejo, S. 2001. Flora Iberica Vol. 14: Myoporaceae - Campanulaceae. C.S.I.C., Madrid.

Castroviejo, S. 2003. Flora Iberica Vol. 10: Araliaceae - Umbelliferae. C.S.I.C., Madrid.

Castroviejo, S. 2005. Flora Iberica Vol. 21: Smilacaceae - Orchidaceae. C.S.I.C., Madrid.

Castroviejo, S., Aedo, C., Benedi, C., Lainz, M., Munoz Garmendia, P., Nieto Feliner, G. & Paiva, J. 1997a. Flora Iberica Vol. 8: Haloragaceae - Euphorbiaceae. C.S.I.C., Madrid.

Castroviejo, S., Aedo, C., Cirujano, S., Lainz, M., Montserra, P., Morales, R., Munoz Garmendia, F., Navarro, C., Paiva, J. & Soriano, C. 1993a. Flora Iberica Vol. 3: Plumbaginaceae (partim) - Capparaceae. C.S.I.C., Madrid.

Castroviejo, S., Aedo, C., Gomez Campo, C., Lainz, M., Montserra, P., Morales, R., Munoz Garmendia, F., Nieto Feliner, G., Rico, E., Talavera, S. & Villar, L. 1993b. Flora Iberica Vol. 4: Cruciferae - Monotropaceae. C.S.I.C., Madrid.

Castroviejo, S., Aedo, C., Lainz, M., Morales, R., Munoz Garmendia, F., Nieto Feliner, G. & Paiva, J. 1997b. Flora Iberica Vol. 5: Ebenaceae - Saxifragaceae. C.S.I.C., Madrid.

Castroviejo, S. & al., e. 1998. Flora Iberica Vol. 6: Rosaceae. C.S.I.C., Madrid.

Castroviejo, S., Benedi, C., Rico, E., Güemes, J. & Herrero, A. 2009. Flora Iberica Vol. 13: Plantaginaceae-Scrophulariaceae. C.S.I.C., Madrid.
Castroviejo, S., Lainz, M., Lopez Gonzalez, G., Montserra, P., Munoz Garmendia, F., Paiva, J. & Villar, L. 1986. Flora Iberica Vol. 1: Lycopodiaceae - Papaveraceae. C.S.I.C., Madrid.
Castroviejo, S., Lainz, M., Lopez Gonzalez, G., Montserra, P., Munoz Garmendia, F., Paiva, J. & Villar, L. 1990. Flora Iberica Vol. 2: Plantanaceae - Plumbaginaceae (partim). C.S.I.C., Madrid.
Castroviejo, S., Luceno, M., Galän, A., Jimenez Mejfas, P., Cabezas, F. & Medina, L. 2007. Flora Iberica Vol. 18: Cyperaceae-Pontederiaceae. C.S.I.C., Madrid.
Castroviejo, S. & Talavera, S. 2006. Flora Iberica Vol. 7(2): Leguminosae. C.S.I.C., Madrid.
Caujapé-Castells, J., Naranjo-Suarez, J., Santana, I., Baccarani-Rosas, M., Cabrera-Garcia, N., Marrero, M., Carqué, E. & Mesa, R. 2008. Population genetic suggestions to offset the extinction ratchet in the endangered Canarian endemic Atractylis preauxiana (Asteraceae). Plant Systematic and Evolution (2008) 273: 191–199.
Colas, B., Olivieri, I. & Riba, M. 1997. Centaurea corymbosa, a cliff-dwelling species tottering on the brink of extinction: A demographic and genetic study. Proceedings of the National Academy of Sciences of the United States of America 94: 3471-3476.
Commission of the European Communities 2009. Report from the Commission of the Council and the European Parliament: Composite report on the conservation status of habitat types and species as required under Article 17 of the Habitats Directive. Commission of the European Communities, not specified.
Cordes, H., Feder, J., Hellberg, F., Metzing, D. & Wittig, B. 2006. Atlas der Farn- und Blütenpflanzen des Weser-Elbe-Gebietes. Hauschildt, Bremen.
Cowling, R.M. & Lombard, A.T. 2002. Heterogeneity, speciation/extinction history and climate: explaining regional plant diversity patterns in the Cape Floristic Region. Diversity and Distributions 8: 163-179.
Crisp, M.D., Laffan, S., Linder, H.P. & Monro, A. 2001. Endemism in the Australian flora. Journal of Biogeography 28: 183-198.
Danton, P., Baffray, M. & Reduron, J.-P. 2005. Inventaire des plantes protégées en France.
Davis, S.D., Heywood, V.H. & Hamilton, A.C. 1994. Centres of plant diversity Vol. 1: Europe, Africa, South West Asia and the Middle East. IUCN Publications, Cambridge.
de Bolos, O. & Vigo, J. 1984. Flora dels Paisos Catalans. Volume 1: Licopodiàcies - Capparàcies Editorial Barcino,
de Bolos, O. & Vigo, J. 1990. Flora dels Paisos Catalans. Volume 2: Crucíferes - Amarantàcies. Editorial Barcino,
de Bolos, O. & Vigo, J. 1996. Flora dels Paisos Catalans. Volume 3: Pirolacies - Compostes. Editorial Barcino,
de Bolos, O. & Vigo, J. 2001. Flora dels Paisos Catalans. Volume 4: Monocotiledonies Editorial Barcino,
Dengler, J. 2009. A flexible multi-scale approach for standardised recording of plant species richness patterns Ecological Indicators 9: 1169–1178.
Domac, R. 2002. Flora Hrvatske. Skolska knjiga, Zagreb.
Dormann, C.F., McPherson, J. M., Araújo, M. B., Bivand, R., Bolliger, J., Carl, G., Davies, R. G., Hirzel, A., Jetz, W., Kissling, W. D., Kühn, I., Ohlemüller, R., Peres-Neto, P. R., Reineking, B., Schröder, B., Schurr, F. M., Wilson, R. 2007. Methods to account for spatial autocorrelation in the analysis of species distributional data: a review. Ecography 30: 609-628.
EDGG 2010. Smolenice grassland declaration. Bulletin of the European Dry Grassland Group (EDGG) 7: 7.
Ehlers, J. & Gibbard, P.L. 2003. Extent and chronology of glaciations. Quaternary Science Reviews 22: 1561-1568.
Ehlers, J. & Gibbard, P.L. 2004. Quarternary glaciations: extent and chronology: Part 1 Europe. Elsevier, Amsterdam.
Encyclopedia of life, 2010: *Centaurea transalpina* Schleich. ex DC.". Encyclopedia of Life, URL: www.eol.org/pages/467680". Accessed 03 Nov 2010).
Engler, A. 1879-1882. Versuch einer Entwicklungsgeschichte der extratropischen Florengebiete der nördlichen Hemisphäre. Wilhelm Engelmann, Leipzig.
Essl, F., Dullinger, S., Plutzar, C., Willner, W. & Rabitsch, W. 2010. Imprints of glacial history and current environment on correlations between endemic plant and invertebrate species richness. Journal of Biogeography, pre-press-online-version.
European Commission DG Environment 2007. Interpretation manual of European Union habitats - EUR 27.
European Communities 2008. LIFE and endangered plants: Conserving Europe's threatened flora. Office for Official Publications of the European Communities, Luxembourg.

European Council 2001. European Council: Presidency Conclusions. Council of the European Union Press Office, Goteborg.
Federal Agency for nature conservation, Bonn, Germany: URL: www.floraweb.de. Accessed 06 Jul 2010.
Favarger, C. & Contandriopoulos, J. 1961. Essai sur l'endémisme Bulletin de la Société Botanique Suisse 71: 384-408.
Fedorov, A. 1999a. Flora of Russia, Volume 2: The European Part and Bordering Regions A A Balkema, Leiden.
Fedorov, A. 1999b. Flora of Russia, Volume 3: The European Part and Bordering Regions A A Balkema, Leiden.
Fedorov, A. 2001a. Flora of Russia, Volume 4: The European Part and Bordering Regions A A Balkema, Leiden.
Fedorov, A. 2001b. Flora of Russia, Volume 5: The European Part and Bordering Regions A A Balkema, Leiden.
Fedorov, A. 2002. Flora of Russia, Volume 6: The European Part and Bordering Regions A A Balkema, Leiden.
Fedorov, A. not specified. Flora of Russia, Volume 1: The European Part and Bordering Regions A A Balkema, Leiden.
Fischer, M.A. & Fally, J. 2000. Pflanzenführer Burgenland. Eigenverlag, Deutschkreutz.
Fontaine, B.e., Bouchet, P., Van Achterberg, K., Alonso-Zarazaga, M.A., Araujo, R., Asche, M., Aspock, U., Audisio, P., Aukema, B., Bailly, N., Balsamo, M., Bank, R.A., Barnard, P., Belfiore, C., Bogdanowicz, W., Bongers, T., Boxshall, G., Burckhardt, D., Camicas, J.L., Chylarecki, P., Crucitti, P., Davarveng, L., Dubois, A., Enghoff, H., Faubel, A., Fochetti, R., Gargominy, O., Gibson, D., Gibson, R., Gomez Lopez, M.S., Goujet, D., Harvey, M.S., Heller, K.-G., Van Helsdingen, P., Hoch, H., De Jong, H., De Jong, Y., Karsholt, O., Los, W., Lundqvist, L., Magowski, W., Manconi, R., Martens, J., Massard, J.A., Massard-Geimer, G., Mcinnes, S.J., Mendes, L.F., Mey, E., Michelsen, V., Minelli, A., Nielsen, C., Nieto Nafria, J.M., Van Nieukerken, E.J., Noyes, J., Papa, T., Ohl, H., De Prins, W., Ramos, M., Ricci, C., Roselaar, C., Rota, E., Schmidt-Rhaesa, A., Segers, H., Zur Strassen, R., Szeptycki, A., Thibaud, J.-M., Thomas, A., Timm, T., Van Tol, J., Vervoort, W. & Willmann, R. 2007. The European union`s 2010 target: Putting rare species in focus. Biological Conservation 139: 167-185.
Fotheringham, A.S., Brunsdon, C. & Charlton, M. 2002. Geographically Weighted Regression: The analysis of spatially varying relationships. Wiley, Sussex.
Franquinho, L.O. & Da Costa, A. 1999. Madeira: Plantas e Flores. Francisco Ribeiro, Funchal.
Gamisans, J. & Marzocchi, J.-F. 1996. La flore endémique de la Corse. Edisud, Aix-en-Provence.
Garbari, F. & Bedini, G. 2006. The flora of the Apuan Alps (Tuscany, Italy): survey of biosystematic investigations Willdenowia 36: 149-155.
Geary, R.C. 1954. The contiguity ratio and statistical mapping The Incorporated Statistician 5: 115-127+129-146.
Georghiou, K. & Delipetrou, P. 2010. Patterns and traits of the endemic plants of Greece. Botanical Journal of the Linnean Society 162: 130–422.
Giménez, E., Melendo, M., F., V., Gómez-Mercado, F. & Cano, E. 2004. Endemic flora biodiversity in the south of the Iberian Peninsula: altitudinal distribution, life forms and dispersal modes. Biodiversity and Conservation 13: 2641–2660.
Greuter, W., Burdet, H.M. & Long, G. 1984. Med-Checklist, Volume 1: Pteridophyta, Gymnospermae, Dicotyledones (Acanthaceae-Cneoraceae). Conservatoire Botanique de Genève, Genève.
Greuter, W., Burdet, H.M. & Long, G. 1986. Med-Checklist, Volume 3: Dicotyledones (Convolvulaceae-Labiatae). Conservatoire Botanique de Genève, Genève.
Greuter, W., Burdet, H.M. & Long, G. 1989. Med-Checklist, Volume 4: Dicotyledones (Lauraceae-Rhamnaceae). Conservatoire Botanique de Genève, Genève.
Greuter, W., Burdet, H.M. & Long, G. 2009. Med-Checklist - A critical inventory of vascular plants of the circum-mediterranean countries. Genève.
Haeupler, H. 1983. Die Mikroarealophyten der Balearen. Ein Beitrag zum Endemismus-Begriff und zur Inselbiogeographie. Tuexenia 3: 271-288.
Haeupler, H. & Muer, T. 2000. Bildatlas der Farn- und Blütenpflanzen. Ulmer, Stuttgart.
Hair, J.F., Babin, B. & Anderson, R. 2010. Multivariate data analysis. Prentice Hall, not specified.
Hannus, J.-J. & von Numers, M. 2008. Vascular plant species richness in relation to habitat diversity and island area in the Finnish Archipelago. Journal of Biogeography 35: 1077-1086.
Hansen, A. & Sunding, P. 1993. Flora of Macaronesia. Checklist of vascular Plants. Sommerfeltia 17: 1-295.
Haubrich, W.S. 2003. Medical Meanings - a glossary of word origins. American College of Physicians, US.
Hawksworth, D.L. & Kalin-Arroyo, M.T. 1995. Magnitude and distribution of biodiversity. In: Heywood, V.H. (ed). Global Biodiversity Assessment. UNEP - United Nations Environment Programm, Cambridge, pp. 107-191.
Hegi, G., Merxmüller, H. & Reisigl, H. 1977. Alpenflora. Berlin, Hamburg.

Helme, N.A. & Trinder-Smith, T.H. 2006. The endemic flora of the Cape Peninsula, South Africa. South African Journal of Botany 72: 205-210.

Hendrych, R. 1981. Bemerkungen zum Endemismus in der Flora der Tschechoslowakei. Preslia 53: 97-120.

Hess, H.E., Landolt, E., Müller-Hirzel, R. & Baltisberger, M. 1984. Bestimmungsschlüssel zur Flora der Schweiz und angrenzender Gebiete. Birkhäuser Verlag, Basel, pp. 657.

Heywood, V.H. 1996. Global Biodiversity Assessment. UNEP - United Nations Environment Programm, Cambridge.

Hobohm, C. 1999. Euphorbia margalidiana und Bykov`s Index of Endemicity - ein Beitrag zur Biogeographie ausgewählter Inseln und Archipele. Abhandlungen Naturwissenschaftlicher Verein zu Bremen 44: 367-375.

Hobohm, C. 2000. Plant species diversity and endemism on islands and archipelagos, with special reference to the Macaronesian Islands. Flora 195: 9-24.

Hobohm, C. 2003. Characterization and ranking of biodiversity hotspots: centres of species richness and endemism. Biodiversity and Conservation 12: 279-287.

Hobohm, C. 2004. Ökologische Aspekte der Vielfalt endemischer Pflanzenarten in Europa unter besonderer Berücksichtigung großflächiger Beweidungsmaßnahmen als Instrumentarium für den Arten- und Biotopschutz. Schriftenreihe für Landschaftspflege und Naturschutz 78: 281-292.

Hobohm, C. 2008. Endemische Gefäßpflanzen in Europa. Tuexenia 28: 10-22.

Hobohm, C. & Bruchmann, I. 2009. Endemische Gefäßpflanzen und ihre Habitate in Europa: Plädoyer für den Schutz der Grasland-Ökosysteme. Berichte der Reinhold-Tüxen-Gesellschaft 21: 142-161.

Hohenester, A. & Welß, W. 1993. Exkursionsflora für die Kanarischen Inseln mit Ausblicken auf ganz Makaronesien. Ulmer, Stuttgart.

Holmgren, M. & Poorter, L. 2007. Does a ruderal strategy dominate the endemic flora of the West African forests? Journal of Biogeography 34: 1100-1111.

Imbert, E. 2006. Dispersal by ants in Centaurea corymbosa (Asteraceae): What is the elaiosome for Plant Species Biology 21: 109-117.

Jäger, E. & Werner, K. 2002. Rothmaler Exkursionsflora von Deutschland: Gefäßpflanzen -Kritischer Band. Heidelberg, Berlin.

Jahn, R. & Schönfelder, P. 1995. Exkursionsflora für Kreta. Ulmer, Stuttgart.

Jansen, J. 2002. Geobotanical guide of the Serra da Estrela. Instituto da Conservação da Natureza, Ministério das Cidades, Ordenamento do Território e Ambiente, Lisboa.

Jansson, R. 2003. Global patterns in endemism explained by past climatic change. Proceedings of the Royal Society of London 270: 583-590.

Jardim, R. & Francisco, D. 2000. Flora Endémica da Madeira. Muchia Publicacoes, Setubal.

Jurasinski, G. & Beierkuhnlein, C. 2006. Spatial patterns of biodiversity-assessing vegetation using hexagonal grids. Biology and Environment: Proceedings of the Royal Irish Academy 106: 401-411.

Kajan, E. 2003. Pflanzen Griechenlands : Festland und Peloponnes. IHW-Verlag, Eching.

Kallimanis, A., Bergmeier, E., Panitsa, M., Georghiou, K., Delipetrou, P. & Dimopoulos, P. Biogeographical determinants for total and endemic species richness in a continental archipelago. Biodiversity and Conservation 19: 1225-1235.

Khoshoo, N. & Ahuja, M.R. 1963. The chromosomes and relationships of Welwitschia mirabilis. Chromosoma 14: 522-533.

Kier, G., Mutke, J., Dinerstein, E., Ricketts, T.H., Küper, W., Kreft, H. & Barthlott, W. 2005. Global patterns of plant diversity and floristic knowledge. Journal of Biogeography 32: 1107-1116.

Kleyer, M., Bekker, R.M., Knevel, I.C., Bakker, J.P, Thompson, K., Sonnenschein, M., Poschlod, P., van Groenendael, J.M., Klimes, L., Klimesova, J., Klotz, S., Rusch, G.M., Hermy, M., Adriaens, D., Boedeltje, E,G., Bossuyt, T.B., Dannemann, A., Endels, P., Götzenberger, L.; Hodgson, J.G., Jackel, A-K., Kühn, I., Kunzmann, D., Ozinga, W.A., Römermann, C., Stadler, M., Schlegelmilch, J., Steendam, H.J., Tackenberg O., Willmann, B., Cornelissen, J.H.C., Erikkson, O., Garnier, E., Peco, B. (2008): The LEDA Traitbase: A database of life-history traits of Northwest European flora. Journal of Ecology 96: 1266-1274.

Knapp, S. 2002. Assessing patterns of plant endemism in neotropical uplands. The Botanical Review 68: 22-37.

Kovar- Eder, J., Vitek, E. & Ströbitzer-Hermann, M. 2000. Kutikularanalytische Untersuchungen an *Acer heldreichii* Orph. ex Boiss. ssp. *heldreichii* und ssp. *trautvetteri* (MEDW.) Murray sowie *Acer pseudoplatanus* L. Annalen des Naturhistorischen Museums in Wien 102: 409- 416.

Kreft, H., Jetz, W., Mutke, J., Kier, G. & Barthlott, W. 2007. Global diversity of island floras from a macroecological perspective. Ecology Letters 11: 116-27.

Kruckeberg, A.R. & Rabinowitz, D. 1985. Biological aspects of endemism in higher plants. Annual Review of Ecology and Systematics 16: 447-479

Kühn, I. 2007. Incorporating spatial autocorrelation may invert observed patterns. Diversity and Distributions 13: 66-69.

Kurtto, A., Fröhner, S.E. & Lampinen, R. 2007. Atlas Florae Europaeae. Rosaceae (Alchemilla and Aphanes). The Committee for Mapping the Flora of Europe & Societas Biologica Fennica Vanamo, Helsinki.

Kurtto, A., Lampinen, R. & Junikka, L. 2004. Atlas Florae Europaeae. Rosaceae (Spiraea to Fragaria, excl. Rubus) distribution of vascular plants in europe. The Committee for Mapping the Flora of Europe & Societas Biologica Fennica Vanamo, Helsinki.

Langer, W. & Sauerbier, H. 1997. Endemische Pflanzen Der Alpen und angrenzender Gebiete. IHW-Verlag, Biberach a.d. Riss.

Lavergne, S., Thompson, J.D., Garnier, E. & Debussche, M. 2004. The biology and ecology of narrow endemic and widespread plants: a comparative study of trait variation in 20 congeneric pairs. Oikos 107: 505-518.

Legendre, P. 1993. Spatial autocorrelation: trouble or new paradigm? Ecology 74: 1659-1673.

Lid, J. 1985. Norsk, svensk, finsk Flora. Oslo.

Lu, H.-P., Wagner, H.H. & Chena, X. 2007. A contribution diversity approach to evaluate species diversity. Basic and Applied Ecology 8: 1-12.

MacArthur, R.H. & Wilson, E.O. 1967. The theory of island biogeography. Princetown University Press, Princetown, New York.

Major, J. 1988. Endemism: a botanical perspective. In: Myers, A.A. & Giller, P.S. (eds). Analytical biogeography. Chapman & Hall, London, pp. 117-146.

McDonald, D.J. & Cowling, R.M. 1995. Towards a profile of an endemic mountain fynbos flora: Implications for conservation. Biological Conservation 72: 1-12.

Médail, F. & Verlaque, R. 1997. Ecological characteristics and rarity of endemic vascular plants from southeastern France and Corsica: implications for biodiversity conservation. Biological Conservation 80: 269-281.

Meikle, R.D. 1977. Flora of Cyprus Vol 1. Bentham-Moxon Trust, Kew.

Meikle, R.D. 1985. Flora of Cyprus. Bentham-Moxon Trust, Kew.

Mittermeier, R.A., Gil, P.R., Hoffman, M., Pilgrim, J., Brooks, T., Mittermeier, C.G., Lamoreux, J. & da Fonseconda, G.A.B. 2005. Hotspots revisited: Earth`s biologically richest and most endangered terrestrial ecoregions. Cemex, Mexico City.

Moran, P.A.P. 1948. Some theorems on time series: II The significance of the serial correlation coefficient. Biometrika, 35: 255-260.

Moran, P.A.P. 1950. Notes on continuous stochastic phenomena. Biometrika 37: 17-23.

Morand, S. 2000. Geographic distance and the role of island area and habitat diversity in the species–area relationships of four Lesser Antillean faunal groups: a complementary note to Ricklefs & Lovette. Journal of Animal Ecology 69: 1117-1119.

Moreno Saiz, J.C. & Sainz Ollero, H. 1992. Atlas corologico de las Monocotyledoneas endemicas de la Peninsula Iberica y Baleares. Icona, Madrid.

Mossberg, B., Stenberg, L. & Ericsson, S. 1997. Den nya Nordiska Floran. W&W, Stockholm.

Mucina, L. & Rutherford, M.C. 2006. The Vegetation of South Africa, Lesotho and Swaziland. South African National Biodiversity Institute, Pretoria.

Natural history museum. Biodiversity and WorldMap project. URL: http://www.nhm.ac.uk/research-curation/research/projects/worldmap. Accessed: 11.Oct.2010.

Nachtergaele, F., van Velthuizen, H. & Verelst, L. 2009. Harmonized world soil database (Version 1.1).

Nikolic, T., Antonic, O., Alegro, A.L., Dobrovic, I., Bogdanovic, S., Libera, Z. & Reetnika, I. 2008. Plant species diversity of Adriatic islands: An introductory survey plant biosystems 142: 435 - 445.

O'Brien, E. 1998. Water-energy dynamics, climate, and prediction of woody plant species richness: an interim general model. Journal of Biogeography 25: 379-398.

O'Brien, E.M. 2006. Biological relativity to water–energy dynamics. Journal of Biogeography 33: 1868-1888.

O'Brien, R.M. 2007. A caution regarding rules of thumb for variance inflation factors. Quality and quantity 41: 673-690.

Oberdorfer, E. 2001. Pflanzensoziologische Exkursionsflora für Deutschland und angrenzende Gebiete. Ulmer, Stuttgart.

Olson, D.M. & Dinerstein, E. 2002. The global 200: Priority ecoregions for global conservation. Annals of the Missouri Botanical Garden 89: 199-224.

Olson, D.M., Dinerstein, E., Abell, R., Allnutt, T., Carpenter, C., McClenachan, L., D'Amico, J., Hurley, P., Kassem, K., Strand, H., Taye, M. & Thieme, M. 2000. The global 200: A representation approach to conserving the Earth´s distinctive ecoregions. Conservation Science Program, World Wildlife Fund-US, Washington.

Orme, C.D.L., Davies, R.G., Burgess, M., Eigenbrod, F., Pickup, N., Olson, V.A., Webster, A.J., Ding, T.-S., Rasmussen, P.C., Ridgely, R.S., Stattersfield, A.J., Bennett, P.M., Blackburn, T.M., Gaston, K.J. & Owens, I.P.F. 2005. Global hotspots of species richness are not congruent with endemism or threat. Nature 436: 1016-1019.

Ozinga, W., Schaminée, J., Heer, M., De, Hennekens, S.M., Van Opstal, A. Sierdsma, H. ; Smits, N., Stumpel, A., Van Swaay, C. 2005. Target species - species of European concern : A database driven selection of plant and animal species for the implementation of the pan European ecological network. Alterra, Wageningen.

Panitsa, M., Trigas, P., Iatrou, G. & Sfenthourakis, S. 2010. Factors affecting plant species richness and endemism on land-bridge islands - An example from the East Aegean archipelago. Acta Oecologica 36: 431-437.

Pärtel, M. 2002. Local plant diversity patterns and evolutionary history at the regional scale. Ecology 83: 2361-2366.

Paulini, I., Deil, U., Camarda, I. & Schumacher, W. 2008. Small-scale species richness of Mediterranean vegetation on the highland of Bitti-Buddusò (NE Sardinia, Italy). In: Chytry, M. (eds). 17th International Workshop European Vegetation Survey: Using phytosociological data to address ecological questions. 1. Masaryk University, Brno, pp. 90.

Petrova, A. 2006. Atlas of Bulgarian Endemic Plants. Gea Libris Publishing House, Sofia.

Pignatti, S. 1978. Evolutionary trends in Mediterranean flora and vegetation. Vegetatio 37: 175-185.

Pignatti, S. 1983. Human impact in the vegetation of the Mediterranean Basin. In: Holzner, W., Werger, M.J.A. & Ikusima, I. (eds). Man´s impact on vegetation. Dr. W. Junk Publishers, The Hague – Boston - London, pp. 151-161.

Pisati, M. 2001. Tools for spatial data analysis. Stata Technical Bulletin 60: 21-37.

Planta Europa 2002. European plant conservation strategy: Saving the plants of Europe. London.

Planta Europa 2007. Review of the European Plant Conservation Strategy: Progress and Challenges 2007. Planta Europa and Plantlife International, Wiltshire.

Pompe, S., Hanspach, J., Badeck, F., Klotz, S., Thuiller, W. & Kühn, I. 2008. Climate and land use change impacts on plant distributions in Germany. Biology Letters 4: 564-567.

Press, J.R. & Short, M.J. 1994. Flora of Madeira. Natural History Museum, London.

Pyak, A.I., Shaw, S.C., Ebel, A.L., Zverev, A.A., Hodgson, J.G., Wheeler, B.D., Gaston, K.J., Morenke, M.O., Revushkin, A.S., Kotukhov, Y.A. & Oyunchimeg, D. 2008. Endemic plants of the Altai Mountain Country. Wild Guides, Hampshire.

Rabitsch, W. & Essl, F. 2009. Kostbarkeiten in Österreichs Pflanzen- und Tierwelt. Ökologie, Naturschutz und Biogeographie österreichischer Endemiten. Umweltbundesamt Wien.

Ramsay, P.M. & Fotherbya, R.M. 2007. Implications of the spatial pattern of Vigur's Eyebright (Euphrasia vigursii) for heathland management. Basic and Applied Ecology 8: 242-251.

Rapoport, E.H. 1982. Areography: geographical strategies of species. Bergamon Press, New York.

Rat der Europäischen Gemeinschaften 1992. Richtlinie zur Erhaltung der natürlichen Lebensräume sowie der wildlebenden Tiere und Pflanzen (1992L0043). Amt für amtliche Veröffentlichungen der Europäischen Gemeinschaften, Bruxelles.

Reyes-Betancort, J.A., Santos Guerra, A., Guma, I.R., Humphries, C.J. & Carine, M.A. 2008. Diversity, rarity and the evolution and conservation of the Canary Islands endemic flora. Anales del Jardín Botánico de Madrid 65: 25-45.

Ricketts, T.H., Dinerstein, E., Olson, D.M., Louks, C.J., Eichbaum, W., DellaSala, D., Kavanagh, K., Hedao, P., Hurley, P.T., Carney, K.M., Abell, R. & Walters, S. 1999. Terrestrial ecoregions of North America: A conservation assessment. Island Press, Washington D.C.

Ricklefs, R.E. & Irby, J.L. 1999. The roles of island area per se and habitat diversity in the species-area relationships of four Lesser Antillean faunal groups. Journal of Animal Ecology 68: 1142-1160.

Rivas-Martínez, S., Díaz, T.E., Fernández-González, F., Izco, J., Loidi, J., Lousã, M. & Penas, Á. 2002. Vascular plant communities of Spain and Portugal. Addenda to the Syntaxonomical checklist of 2001. Itinera Geobotanica 15: 5-922.

Rohde, K. 1992. Latitudinal gradients in species diversity: the search for the primary cause. Oikos 65: 514-527.

Rohde, K. 1996. Rapoport's rule is a local phenomenon and cannot explain latitudinal gradients in species diversity. Biodiversity Letters 3: 10-13.

Rohde, K. 1998. Latitudinal Gradients in Species Diversity. Area Matters, but How Much? Oikos 82: 184-190.

Rosenzweig, M.L. 1995. Species diversity in space and time. Cambridge University Press, Cambridge.

Rothmaler, W. 2005. Rothmaler - Exkursionsflora von Deutschland 4 Kritischer Band. Spektrum Akademischer Verlag, Heidelberg.

Royer, D.L., Hickey, L.J. & Wing, S.L. 2003. Ecological conservatism in the `living fossil` Ginkgo. Paleobiology 29: 84-104.

Sauerbier, H. & Langer, W. 2000. Alpenpflanzen - Endemiten von Nizza bis Wien. IHW-Verlag, Eching.

Schäfer, H. 2005. Flora of the Azores. Markgraf Publishers, Weikersheim.

Schmidt, H. 1992. Pflanzen auf Teneriffa: ein naturkundlicher Führer. Basilisken-Presse,

Schönfelder, I. & Schönfelder, P. 2002. Mittelmeer- und Kanarenflora. Kosmos,

Secretariat of the Convention on Biological Diversity 2010. Global Biodiversity Outlook 3. Montréal.

Secretariat of the Convention on Biological Diversity 2010. 2010 Interational Year of Biodiversity. URL: www.cbd.int/. Accessed: 14.Jan. 2008.

Secretariat of the Convention on Biological Diversity. National Reports. URL: www.cbd.int/reports/ Accessed: 7. Oct. 2008.

Selb, P. 2006. Räumliche Regressionsmodelle. In: Behnke, J., Gschwend, T., Schindler, D. & Schnapp, K.-U. (eds). Politikwissenschaftliche Methoden. Neuere qualitative und quantitative Analyseverfahren. Nomos, Baden-Baden, pp. 297-308.

Stace, C. 1991. New Flora of the British Isles. Cambridge University Press,

Stebbins, G.L. & Major, J. 1965. Endemism and Speciation in the California Flora. Ecological Monographs 35: 2-35.

Stevens, G.C. 1992. The elevation gradient in altitudinal range: an extension of Rapoport´s latitudinal rule to altitude. American Naturalist 140: 893-911.

Strasser, W. 2002. Pflanzen des Peloponnes. Gantner, Ruggell, Liechtenstein.

Strasser, W. 2006. Die Pflanzen der östlichen Ägäis, inklusive Kreta und Zypern. Gantner, Ruggell, Liechtenstein.

Strauss, A.a.P., T. (compilers) 2009. All along the watchtowers: Field guide for the South Eastern European Green Belt. IUCN Programme Office for South-Eastern Europe, Belgrade, Serbia.

Talbot, S.S., Yurtsev, B.A., Murray, D.F., Argus, G.W., Bay, C. & Elvebakk, A. 1999. Atlas of Rare Endemic Vascular Plants of the Arctic. U.S. Fish and Wildlife Service, Washington.

Tan, K. & Iatrou, G. 2001. Endemic Plants of Greece The Peloponnese. Bent Johnsen, Copenhagen.

Tsintides, T.C. & Kourtellarides, L. 1998. The endemic plants of Cyprus. Nicolaou & Sons, Nicosia.

Tutin, T.G., Burges, N.A., Chater, A.O., Edmondson, J.R., Heywood, V.H., Moore, D.M., Valentine, D.H., Walters, S.M. & Webb, D.A. 1996a. Flora Europaea Vol. 1: Psilotaceae - Platanaceae. Cambridge University Press, Cambridge.

Tutin, T.G., Heywood, V.H., Burges, N.A., Moore, D.M., Valentine, D.H., Walters, S.M. & Webb, D.A. 1996b. Flora Europaea Vol. 2: Rosaceae - Umbelliferae. Cambridge University Press, Cambridge.

Tutin, T.G., Heywood, V.H., Burges, N.A., Valentine, D.H., Walters, S.M. & Webb, D.A. 1996c. Flora Europaea Vol. 3: Diapensiaceae - Myoporaceae. Cambridge University Press, Cambridge.

Tutin, T.G., Heywood, V.H., Burges, N.A., Valentine, D.H., Walters, S.M. & Webb, D.A. 1996d. Flora Europaea Vol. 4: Plantaginaceae - Compositae (and Rubiaceae). Cambridge University Press, Cambridge.

Tutin, T.G., Heywood, V.H., Burges, N.A., Valentine, D.H., Walters, S.M. & Webb, D.A. 1996e. Flora Europaea Vol. 5: Alismataceae - Orchidaceae. Cambridge University Press, Cambridge.

Tzvelev, N. 2002. Flora of Russia, Volume 7: The European Part and Bordering Regions A A Balkema, Leiden.
Tzvelev, N. 2003. Flora of Russia, Volume 8: The European Part and Bordering Regions A A Balkema, Leiden.
Tzvelev, N. 2006. Flora of Russia, Volume 9: The European Part and Bordering Regions Taylor & Francis, Leiden.
Tzvelev, N. 2007a. Flora of Russia, Volume 10A: The European Part and Bordering Regions A A Balkema, Leiden.
Tzvelev, N. 2007b. Flora of Russia, Volume 10B: The European Part and Bordering Regions A A Balkema, Leiden.
UNEP 2002. Global strategy for plant conservation Secretariat of the Convention on Biological Diversity (CBD), Montreal.
Ungricht, S. 2004. How many plant species are there? And how many are threatened with extinction? Endemic species in global biodiversity and conservation assessments. Taxon 53: 481-484.
United Nations 1992. Convention on Biological Diversity (CBD): Übereinkommen über die biologische Vielfalt
Übersetzung BMU 1992, Rio de Janeiro.
United Nations 2002. Plan of Implementation of the World Summit on Sustainable Development. United Nations Department of Public Information, Johannesburg.
United Nations General Assembly 2000. United Nations Millennium Declaration. United Nations, Johannesburg.
United Nations: the Millennium Development Goals. URL: www.un.org/millenniumgoals/. Accessed: 7.4.2009.
Universitat de les Illes Baleares 200x. Herbario Virtual del Mediterraneo Occidental, URL:www.herbarivirtual.uib.es/eng-med/caracteristica/llistat_124.html.
University of Georgia, Center for Invasive species and National Park Service, URL: www.invasiveplantatlas.org. Accessed 19 Oct 2010.
van der Maarel, E. & van der Maarel-Versluys, M. 1996. Distribution and conservation status of littoral vascular plant species along the European coasts. Journal of Coastal Conservation 2: 73-92.
van der Mejden, R., Weeda, E.J., Adema, F.A.C.B. & de Jonchere, G.J. 1983. Flora van Nederland. Groningen.
Vieira, R.M.S. 1992. Flora da Madeira : o interesse das plantas endémicas macaronésicas. Servio Nacional de Parques, Reservas e Conservaão da Natureza, Lisbon.
Walczak, C., Zieverink, M. & Schmidt, P.A. 2008. Populationsbiologische Untersuchungen an Dianthus seguieri Vill. im Osterzgebirge. Tuexenia 28: 133 - 150.
Welk, E. 2002. Arealkundliche Analyse und Bewertung der Schutzrelevanz seltener und gefährdeter Gefäßpflanzen Deutschlands. Schriftenreihe Vegetationskunde 37: 337.
Werner, U. & Buszko, J. 2005. Detecting biodiversity hotspots using species–area and endemics–area relationships: the case of butterflies. Biodiversity and Conservation 14: 1977–1988.
Whittaker, R.J., Willis, K.J. & Field, R. 2001. Scale and species richness: towards a general, hierarchical theory of species diversity. Journal of Biogeography 28: 453-470.
Wikramanayake, E., Dinerstein, E., Loucks, C.J., Olson, D.M., Morrison, J., Lamoreux, J., McKnight, M. & Hedao, P. 2002. Terrestrial Ecoregions of the Indo-Pacific. A conservation assessment. Island Press, Washington, DC.
Wisskirchen, R. & Haeupler, H. 1998. Standardliste der Farn- und Blütenpflanzen Deutschlands. Ulmer, Stuttgart.
Yena, A.V. 2006. One hundred and fifty years of wavering: a concise review of the plant endemism studies in the Crimea (Ukraine). Phytologia balcanica 12: 19–24.
Yena, A.V. 2007. Floristic endemism in the Crimea. Fritschiana 55: 1-8.
Yildiz, K. & Gücel, S. 2006. Chromosome Numbers of 16 Endemic Plant Taxa from Northern Cyprus. Turkish Journal of Botany 30: 181-192.

Acknowledgement

My sincere thanks go to all my colleagues and friends who supported my work, providing data, and materials, who offered the necessary infrastructure or even field trips and who spent much time and invested many cups of coffee while discussing some of the difficult topics of the thesis.

I feel even more grateful to my family and my friends who helped me to take some recreational days off, and faced all my desperate furiousness, my permanent weariness, or my visionary craziness, courageously. With a warm smile and some gentle words you rescued my self-confidence several times. Thank you very much for your patience! Now, it´s done!

Here are the names (in alphabetical order) of all those to whom I am grateful:

Bergmeier, E. (Göttingen); Bernhardt, A. (Flensburg); Boch, S. (Bern); Böther, E. (Erlangen); Bruchmann, H. (Erlangen); Bruchmann, J. (Clausthal-Zellerfeld); Bruchmann, W. (Erlangen); Bruns, A. (Flensburg/ Wilhemshaven); Dauck, H.P. (Braunschweig); Dengler, J. (Hamburg); Dobutowitsch, L. (Flensburg/ Hamburg); Dombrowski, A. (Flensburg); Ehlers, J. (Hamburg); Froome-Döring, L. (Lüneburg); Gerbils, M. (Flensburg); Harder, S. (Så som i himmelen); Hobohm, C. (Flensburg); Jakab, N. (Bremen); Jacobs, A. (Göttingen); Jahnke, H. (Flensburg); Karsten, M. (Lübeck); Krug, A. (München); Linus, D. (Lübeck); Lerche, M. (Flensburg); Mierwald, C. (Flensburg); Müller-Benedict, V. (Flensburg/ Göttingen); Neumann, M. (Heide); Nezadal, W. (Erlangen); Pioch, A. (Flensburg), Prytz, A. (Middelfart); Salomon, O. (Harashim), Soltau, C. (Flensburg); Spike, C. (Flensburg); Sünram, S. (Flensburg); Voß-Isenbeck, E. (Flensburg); Walter, A. (Flensburg) and Welß, W. (Erlangen).

Appendix

Tab. A1: Overview of names and divisions of the studied European regions sorted in alphabetical order

Geographical division	Notes
Al Albania	
Au Austria	including Liechtenstein
Az Açores (Azores)	
Be Belgium	
Bl Islas Baleares (Balearic Islands)	
Br Great Britain	including Orkney, Shetlands, Isle of Man excluding Channel Islands, Northern Ireland
Bu Bulgaria	
Ca Canary Islands	
Co La Corse (Corsica)	
Cr Kriti (Crete)	including Karpathos, Kasos and Gavdhos
Cz Czech Republic and Slovakia	
Cy Cyprus	
Da Denmark	
Fa Faroe Islands	
Fe Finland (Fennia)	including Ahvenanmaa (Åland Islands)
Ga France (Gallia)	including Channel Islands (Îles Normandes) and Monaco; excluding La Corse (Corsica)
Ge Germany	
Gr Greece	excluding those islands included under Cr (Crete) and those which are outside Europe as defined for Flora
Hb Ireland (Hibernia)	Republic of Ireland plus Northern Ireland
He Switzerland (Helvetia)	
Ho Netherlands (Hollandia)	
Hs Spain (Hispania)	including Gibraltar, Andorra excluding Islas Baleares (Balearic Islands)
Hu Hungary	
Is Iceland (Islandia)	
It Italy	including San Marino & Vatican and the Archipelago Toscano; excluding: Sardinia, Sicily
Ju Yugoslavia (Jugoslavia)	
Lu Portugal (Lusitania)	
Ma Madeira Archipelago	including Selvages
No Norway	
Po Poland	
Rm Romania	
Rs (B) Russia Baltic division	Territories of the former U.S.S.R.: Estonia, Latvia, Lithuania, Kaliningradskaja Oblast'
Rs (C) Russia Central division	Territories of former U.S.S.R.: Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnepr, Volga-Don, Ural
Rs (E) Russia Southeastern division	Territories of the former U.S.S.R.: : Lower Don, Lower Volga Region, Transvolga
Rs (K) Russia Krym (Crimea)	
Rs (N) Russia Northern division	Territories of the former U.S.S.R.: Arctic Europe, Karelo-Lapland, Dvina-Pecora
Rs (W) Russia Southwestern division	Territories of the former U.S.S.R.: Moldavia, Middle Dnepr, Black Sea, Upper Dnestr
Sa Sardegna (Sardinia)	
Sb Svalbard	comprising Spitsbergen, Björnöya (Bear Island) and Jan Mayen
Si Sicily	comprising: Pantelleria, Isole Pelagie, Isole Lipari and Ustica; also the Malta archipelago
Su Sweden (Suecia)	including Öland, Gotland
Tu Turkey	European part, including Gökçeada (Imroz)

Tab. A2: Abstract from EvaplantE database using the example of the Canary Islands division

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Adenocarpus ombriosus		1		Fabaceae	1	1							1		1		300	900	2; 119
Adenocarpus foliolosus		1		Fabaceae	1	1							1	1	2	Adenocarpo foliolosi- Cytisetum proliferi (PIN I-2a), Myrico fayae-Ericion arboreae (LAU II-1), Adenocarpus foliolosus-Gesellschaft: in höheren, besonders Kammlagen ca 800-1500m (LAU II-2c), Cistus-Cytisus prolifera- Gesellschaft: Übergang zum Canaren-Kieferwald (LAU II-2d); Gebüsche und Kiefernwald	800	1500	2; 119; 121
Adenocarpus viscosus		1		Fabaceae	1	1							1	1	2	Chamaecytisus prolifer-Pinus canariensis-Gesellschaft: Hochlagen von Teneriffe (PIN I-1f), Spartocytisietum supranubii (SPA I-1a), A.v.var. Spartioides: Teline benehoavensis-Adenocarpetum spartioides (PIN I-2c), Telino-Ardenocarpetum spartioidis (SPA I-1b)	1500	2200	2; 119
Aeonium balsamiferum		1		Crassulaceae	1	1						1			1	Lanzarote: en riscos (steile Felsen)	500	700	2; 119,120
Aeonium canariense		1		Crassulaceae	1	1						1			1	Aeonium canariense-Gesellschaft: bis 1300m hauptsächlich in N-Teneriffe (ASP I-3g)	200	1300	2; 119
Aeonium castello-paivae		1		Crassulaceae	1	1						1			1	en laderas secas y rocosas	100	1000	2; 119, 120
Aeonium ciliatum		1		Crassulaceae	1	1						1			1	Aeonietum palmensis: Tiefland bis 1100m, Schwerpunkt auf La Palma (ASP I-1c), Aeonium ciliatum-Gesellschaft (ASP I-3h)			2; 119
Aeonium cuneatum		1		Crassulaceae	1	1						1			1	Soncho-Aeonion- Gesellschaft: Myrica-Erica Stufe (ASP I-1), Aeonion cuneatum (ASP I-3i); riscos de bosques y terraplenes, cumbres			2; 119
Aeonium davidbramwellii		1		Crassulaceae	1	1						1			1		200	1000	2; 119
Aeonium decorum		1		Crassulaceae	1	1						1			1		350	800	2; 119
Aeonium gomerense		1		Crassulaceae	1	1						1			1		600	1100	2; 119
Aeonium goochiae		1		Crassulaceae	1	1						1			1	Aeonietum palmensis: Tiefland bis 1100m, Schwerpunkt auf La Palma (ASP I-1c)	200	900	2; 119
Aeonium haworthii		1		Crassulaceae	1	1						1			1		200	1000	2; 119
Aeonium hierrense		1		Crassulaceae	1	1						1			1		200	1200	2; 119
Aeonium holochrysum		1		Crassulaceae	1	1						1			1	Greenovietum diplocyclae (ASP I-2e), Aeonium holochrysum Gesellschaft, Aeonium holochrysum-Gesellschaft (ASP I-3a)			2; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Aeonium lancerottense		1		Crassulaceae	1	1						1			1	häufig in Lavafeldern um Masdache	200	600	2; 119
Aeonium lindleyi		1		Crassulaceae	1	1						1			1		100	500	2; 119
Aeonium manriqueorum		1		Crassulaceae	1	1						1	1		2	Aeonio percarnei-Euphorbietum canariensis (50-500m Gran Canaria) (KLE I-2a)	300	1200	2; 119
Aeonium mascaënse		1		Crassulaceae	1	1						1			1				119
Aeonium nobile		1		Crassulaceae	1	1						1			1	Trockene Orte, Aeonietum palmensis: Tiefland bis 1100m, Schwerpunkt auf La Palma (ASP I-1c)			2; 119
Aeonium palmense		1		Crassulaceae	1	1						1			1	Aeonietum palmensis: Tiefland bis 1100m, Schwerpunkt auf La Palma (ASP I-1c) „Lorbeerstufe“, A.p.ssp.longithyrsum: Aeonietum longithyrsi: tiefere Lagen von Hierro (ASP I-1h)			2; 119
Aeonium percarneum		1		Crassulaceae	1	1						1	1		2	Aeonio-Euphorbion canariensis (KLE I-2)	200	1500	2; 119
Aeonium pseudourbicum		1		Crassulaceae	1	1						1			1				119
Aeonium rubrolineatum		1		Crassulaceae	1	1						1			1		800	1200	2; 119
Aeonium saundersii		1		Crassulaceae	1	1						1			1	riscos secos (trockene Steilfelsen)	150	800	2; 119
Aeonium sedifolium		1		Crassulaceae	1	1						1			1	Phylliviscosae-Aeonietum sedifolii: Sonnenexponiert Felsen im Tenogebirge von Teneriffe, (ASP I-1b)	600	1000	2; 119
Aeonium simsii		1		Crassulaceae	1	1						1			1	Greenovio aureae-Aeonietum caespitosae: in größeren Höhen, über 800m, bei höherer Luftfeuchte auf Gran Canaria (ASP I-2h), z.T. An Felsen	500	2000	2; 119
Aeonium smithii		1		Crassulaceae	1	1						1	1	1	3	Aeonium smithii-Gesellschaft: 200-2400m, Schwerpunkt im Kiefern-Kontakt auf Teneriffe, hauptsächlich im S & W (ASP I-1f)			2; 119
Aeonium spathulatum		1		Crassulaceae	1	1						1			1	Cheilanthes marantae-Gesellschaft (ASP I-1d), Aeonium spathulatum- Gesellschaft: Felsen hauptsächlich im Kiefern-Kontakt, 800-2100m (ASP I-1e), Greenovia aurea-Gesellschaft: höhere Lagen Teneriffas, 1250 1800m (ASP I-2f)	800	2000	2; 119
Aeonium subplanum		1		Crassulaceae	1	1						1			1	en rocas, terraplenes, paredes y riscos de bosques	200	1100	2; 119,120
Aeonium tabulaeforme		1		Crassulaceae	1	1						1			1	Soncho-Aeonion (ASP I-1), Aeonium tabuliforme-Gesellschaft : Luftfeucht, besonders an der N-Küste bis 500m (ASP I-3f)	100	700	2; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Aeonium undulatum		1		Crassulaceae	1	1						1			1	Soncho-Aeonion (ASP I-1)	400	1500	2; 119
Aeonium urbicum		1		Crassulaceae	1	1						1			1	Aeonium urbicum-Gesellschaft: Hauptsächlich auf Dächern (ASP I-3d); rocas, paredes e incluso tejados en las zonas bajas y forestales			2; 119,120
Aeonium valverdense		1		Crassulaceae	1	1						1			1	terreno rocoso descubierto y riscos secos	200	800	2; 119,120
Aeonium vestitum		1		Crassulaceae	1	1						1			1	en paredes (Wände) y riscos (Steilhänge) de la zona xerofitica alta			2; 119
Aeonium virgineum		1		Crassulaceae	1	1						1			1	Lorbeerstufe, Phylliviscosae-Aeonietum sedifolii: sonnenexponierte Felsen im Tenogebirge von Teneriffe, (ASP I-1b),			2; 119
Aeonium viscatum		1		Crassulaceae	1	1						1	1		2		0	500	2; 119,120
Aichryson bethencourtianum		1		Crassulaceae	1	1						1			1	en riscos (steile Felsen)			2; 119
Aichryson bollei		1		Crassulaceae	1	1						1	1	1	3	pinar o laurisiva (aber natürlich im Fels)	0	1600	2; 119
Aichryson brevipetalum		1		Crassulaceae	1	1						1			1				2; 119
Aichryson laxum		1		Crassulaceae	1	1						1			1	Soncho-Aeonion (ASP I-1); en rocas, riscos, terraplenes, paredes	400	1200	2; 119,120
Aichryson pachycaulon		1		Crassulaceae	1	1						1	1	1	3	feuchte Felsen, feuchte Stellen im Bereich des Lorbeerwaldes			2; 119
Aichryson palmense		1		Crassulaceae	1	1						1			1	en rocas secas y sombreadas	300	800	2; 119
Aichryson parlatorei		1		Crassulaceae	1	1						1			1	Greenovietum diplocyclae (ASP I-2b); en rocas secas y paredes	30	1000	2; 119, 120
Aichryson porphyrogennetos		1		Crassulaceae	1	1						1			1	en barrancos sombreados			2; 119,120
Aichryson punctatum		1		Crassulaceae	1	1						1			1	Soncho-Aeonion (ASP I-1)			2; 119
Aichryson tortuosum		1		Crassulaceae	1	1						1			1	Soncho-Aeonion (ASP I-1)			2; 119
Allagopappus dichotomus		1		Asteraceae	1	1						1	1		2	Prenantho (paendulae)-Taeckholmietum = Felsgesellschaften im Bereich der Kleinio-Euphorbietea von Gran Canaria (ASP I-1a)	50	600	2; 119
Allagopappus viscosissimus		1		Asteraceae	1	1						1	1		2	Prenantho (paendulae)-Taeckholmietum = Felsgesellschaften im Bereich der Kleinio-Euphorbietea von Gran Canaria (ASP I-1a)			2; 119
Allium subhirsutum ssp. obtusipetalum			1	Liliaceae	1	1						1	1		2	sandige und steinige Orte mit Gebüsch			2; 119
Ammi procerum		1		Apiaceae	1	2				1					1	Madeira: Weed of dry ground on roadsides, field margins and in waste places in lowland areas			4; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Ammodaucus leucotrichus ssp. nanocarpus			1	Apiaceae	1	1			1						1	Crithmo-Limonietea: Felsen unter Brandung haupts. N-Exposition (CRI), Kleinio neriifolii-Euphorbietea canariensis (KLE)			2; 119
Anagrys latifolia		1		Fabaceae	1	1						1	1		2	Oleo-Rhamnetalia crenulatae: 50-500m, fast nur noch an schwer zugänglichen Orten (OLR I)			2; 119
Androcymbium gramineum ssp. psammophilum			1	Liliaceae	1	1			1						1	Küstensande			2; 119
Androcymbium hierrense		1		Liliaceae	1	1			1			1			2	im Bramwell der Vergleich mit A. psammophilum (auf Küstensanden)	125	250	2; 119,120
Andryala glandulosa		1		Asteraceae	1	2						1	1		2				2; 119
Andryala pinnatifida		1		Asteraceae	1	1						1	1	1	3	A.p.var.tolpiciflia: Lorbeerwald,	600	900	2; 119
Andryala webbii		1		Asteraceae	1	1								1	1	Lorbeerwald, Gesnouinia arborea-Gesellschaft (aufgelichtete Waldstellen, relativ nährstoffreich (LAU II-1e)			2; 119
Apollonias barbujana		1		Lauraceae	1	2								1	1	Canaries: Reine Laurus canariensis-Ges. (LAU I-1d), Oleo-Rhamnetalia crenulatae: 50-500 m, schwer zugängliche Orte → steep slopes? (OLR I), Madeira: Laurisilva and rocky hillsides near the coast, up to 1000m, rare, also Porto Santo, Deserta Grande extinct	50	1000	2; 4; 119
Arbutus canariensis		1		Ericaceae	1	1								1	1	Lorbeerwald			2; 119
Argyranthemum adauctum		1		Asteraceae	1	1							1		1	Cytision canariensis: sekundäre Strauchgesellschaft anstelle von Kiefern (PIN I-2)			2; 119
Argyranthemum broussonetii		1		Asteraceae	1	1						1	1		2	claros de laurisilva, cumbres, sowie eigene Anschauung	600	1200	2; 119,120
Argyranthemum callichrysum		1		Asteraceae	1	1								1	1	Wälder 500-1200m	500	1200	2; 119
Argyranthemum coronopifolium		1		Asteraceae	1	1			1			1			2	acantilados humedos (feuchte Steilküsten)			2; 119,120
Argyranthemum escarrei		1		Asteraceae	1	1						1	1		2				2; 119
Argyranthemum filifolium		1		Asteraceae	1	1							1		1	en las formaciones arbustivas xericas	50	500	2; 119,120
Argyranthemum foeniculaceum		1		Asteraceae	1	1						1	1		2	trockene, felsige Orte; en riscos secos	200	1800	2; 119,120

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Argyranthemum frutescens		1		Asteraceae	1	1			1			1	1		3	(sensu lato!)Helianthemo-Euphorbion balsamiferae: Küstennahe Tieflagen (KLE I-1) & subspezies auch in Frankenio-Astydamietum-Gesellschaft (CRI I-1b), A.s. Ssp frutescens: auch ruderal & Küstenfelsen & Barrancos; A.f.ssp. Pumilum Felsen in Küstennähe 500-600m	50	600	2; 119
Argyranthemum gracile		1		Asteraceae	1	1			1			1	1		3	Trockene, steinige Orte, Kleinio-euphorbietalia canariensis (KLE I)	10	800	2; 119
Argyranthemum haoarytheum		1		Asteraceae	1	1						1			1	Tolpidetum calderae: Hochlagen von La Plama 1650-2400m (ASP I-2d), Echio brevirame-Euphorbietum canariensis: Tieflagen La Palmas (KLE I-2g)	1650	2400	2; 119
Argyranthemum hierrense		1		Asteraceae	1	1						1	1		2		100	650	2; 119
Argyranthemum lemsii		1		Asteraceae	1	1						1	1		2				2; 119
Argyranthemum lidii		1		Asteraceae	1	1						1	1		2		200	400	2; 119
Argyranthemum maderense		1		Asteraceae	1	1						1	1		2	acantilados (Steilküsten); nach eigener Anschauung aber meist sehr weit oben und nicht küstennah	500	650	2; 119,120
Argyranthemum sundingii		1		Asteraceae	1	1						1	1		2		100	200	2; 119
Argyranthemum sventenii		1		Asteraceae	1	1						1	1		2	laderas (Abhänge) aridas del Sur de la isla (Hierro)			2; 119
Argyranthemum teneriffae		1		Asteraceae	1	1						1	1		2	Spartocytisietum supranubii (SPA I-1a)	1100	2600	2; 119
Argyranthemum webbii		1		Asteraceae	1	1								1	1	La Palma: Lorbeerstufe; laurisilva	500	800	2; 119,120
Argyranthemum winteri		1		Asteraceae	1	1						1	1		2	Jandia (Fuerteventura)			2; 119
Arrhenatherum calderae		1		Poaceae	1	1						1	1		2	Spartocytisetea supranubii: Gebirgshalbwüsten und alpinoide Steinschuttfluren oberhalb 2000m (SPA)			119
Artemisia thuscula		1		Asteraceae	1	1							1		1	Kleinio neriifolii-Euphorbietea canariensis (KLE), Oleo-Rhamnetalia crenulatae: 50-500 m, schwer zugängliche Orte (OLR I)			2; 119
Asparagus arborescens		1		Liliaceae	1	1						1	1		2	Küstenzone mit Plocama, Euphorbia, etc. aber gelegentlich bis 1500m, Euphorbietum balsamiferae: küstennahe Tieflagen (KLE I-1c)	100	1500	2; 119
Asparagus fallax		1		Liliaceae	1	1								1	1	im schattigen Lorbeerwald	400	700	2; 119
Asparagus nesiotes		1		Liliaceae	1	2			1			1			2	vive nas encostas rochosas e solos pedregosos da Selvagem Pequena	0	200	12,13,117,119
Asparagus plocamoides		1		Liliaceae	1	1							1	1	2	bosques de pinos	1200	2400	2; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Asparagus scoparius		1		Liliaceae	1	1						1	1		2	Aeonio percarnei-Euphorbietum canariensis (50-500m Gran Canaria) (KLE I-2a)			2; 119
Asparagus umbellatus		1		Liliaceae	1	2				1		1	1		3	Canaries: Küsten- bis Wolkenstufe eher Luv Seiten, Aeonio percarnei-Euphorbietum canariensis (50-500m Gran Canaria) (KLE I 2a), Oleo-Rhamnetalia crenulatae: 50-500 m, schwer zugängliche Orte (OLR I),; Madeira: very rare plant of cliffs and roadsides near the sea	0	500	2; 4; 31,119
Asplenium anceps		1		Aspleniaceae	1	3						1		1	2	Canaries: Asplenietea trichomanis (ASP), Azores:temperate rainforest, Madeira: mostly northern, 400-1400m shady & damp places on rocks, walls of levadas, streams and roadside ditches			1, 2; 16; 4; 11
Asplenium filare ssp. canariensis		1		Aspleniaceae	1	1						1			1				119
Asplenium terorense		1		Aspleniaceae	1	1						1			1				119
Atalanthus arboreus		1		Asteraceae	1	1						1	1		2		300	600	2; 119,120
Atalanthus canariensis		1		Asteraceae	1	1						1	1		2		200	800	2; 119,120
Atalanthus capillaris		1		Asteraceae	1	1						1	1		2		200	700	2; 119,120
Atalanthus microcarpus		1		Asteraceae	1	1						1	1		2		400	500	2; 119,120
Atalanthus pinnatus		1		Asteraceae	1	1						1	1		2	Prenantho (paendulae)-Taeckholmietum = Felsgesellschaften im Bereich der Kleinio-Euphorbietea von Gran Canaria (ASP I-1a)	10	600	2; 119,120
Atalanthus regis-jubae		1		Asteraceae	1	1				1		1	1		3	bordes de las carreteras (Landstraßen) y riscos	200	600	2; 119,120
Atalanthus webbii		1		Asteraceae	1	1						1	1		2		400	600	2; 119,120
Atractylis arbuscula		1		Asteraceae	1	1			1						1		0	10	2; 119,120
Atractylis preauxiana		1		Asteraceae	1	1			1						1	trockene, steinige Orte der Küstenregionen, z.B. mit Astydamia & Limonium, Chenoleo-Suaedetum vermiculatae: Sand über Fels, (SAL I-1b), costas rocosas	0	100	2; 119,120
Babcockia platylepis		1		Asteraceae	1	1						1	1		2	Phylliviscosae-Aeonietum sedifolii: Sonnenexponiert Felsen im Tenogebirge von Teneriffe, (ASP I-1b)	800	1700	2; 119
Barlia metlesicsiana		1		Orchidaceae	1	1						1	1		2	Einschätzung nach Ortsangaben	900	1200	2; 119,120
Bencomia brachystachya		1		Rosaceae	1	1						1	1		2		1500	1700	2; 119,120

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Bencomia caudata		1		Rosaceae	1	2						1	1		2	Canaries: Soncho-Aeonion (ASP I-1), Arbutus canariensis-Gesellschaft: Felsige Hänge (LAU II-1b), Madeira: growing on rocks in the area from Pico do Cedro southward to the coast at camara des Lobos			2; 4; 119
Bencomia exstipulata		1		Rosaceae	1	1						1	1		2	rocas sombreadas, en grietas	1800	2200	2; 119,120
Bencomia sphaerocarpa		1		Rosaceae	1	1						1	1	1	3	riscos de los bosques	500	1000	2; 119,120
Bosea yervamora		1		Amaranthaceae	1	1							1		1	Rubio fruticosae- Rubetum ulmifolii: Tieflagen bis 500m (LAU II-3b), Oleo-Rhamnetalia crenulatae: 50-500m, fast nur noch an schwer zugänglichen orten (OLR I)			2; 119
Brachypodium arbuscula		1		Poaceae	1	1						1			1	obere Küstenstufe; acantilados, riscos y laderas de la zona baja	100	500	2; 119,120
Brassica bourgeaui		1		Brassicaceae	1	1						1	1		2				2; 119,120
Bromus madritensis ssp. kunkelii			1	Poaceae	1	1						1	1		2	laderas aridas	200	400	2; 119,120
Bryonia verrucosa		1		Cucurbiaceae	1	1				1					1	Oxalidi-Urticetum membranaceae: schattig, feucht, tiefgründig (CHE I-1c)			2; 119
Bufonia teneriffae		1		Caryophyllaceae	1	1						1	1		2	Halbstrauch; lugares de la zona subalpina, con borde tubercular y caras rugosas	800	2000	2,12
Bupleurum handiense		1		Apiaceae	1	1						1	1		2	riscos desabrigados orientados al Norte	500	600	2; 119
Bupleurum salicifolium		1		Apiaceae	1	2						1	1	1	3	en riscos de la zona baja, riscos de bosques			2; 119
Bystropogon odoratissimus		1		Lamiaceae	1	1						1	1		2	cardonales y tabaibales	300	500	2; 119,120
Bystropogon canariensis		1		Lamiaceae	1	1						1	1	1	3	Rhamno glandulosae-Ericetum arborae: artenreich, anspruchsvoll und Übergang zuPruno-hixae-Lauretalia azoricae (LAU II-1a), laderas y barrancos, en los riscos, zonas humedas, dominio natural de laurisilva	500	1000	2; 119,120
Bystropogon origanifolius		1		Lamiaceae	1	1						1	1	1	3	Pinares (und natürlich auch in anderen Habitaten; eigene Anschauung)	150	2100	2; 119,120
Bystropogon plumosus		1		Lamiaceae	1	1						1	1	1	3	Cytiso proliferi-Pinetea canariensis (PIN)	400	2000	2; 119
Bystropogon wildpretii		1		Lamiaceae	1	1						1	1		2		650	800	2; 119
Campanula occidentalis		1		Campanulacae	1	1									0				119
Campylanthus salsoloides		1		Scrophulariaceae	1	1						1	1		2	Küstenzone, Kleinio neriifolii-Euphorbietea canariensis (KLE)			2; 119
Canarina canariensis		1		Campanulacae	1	1							1	1	2	Andryalo pinnatifidae-Ericetalia arboreae (LAU II), Lorbeerwald Fayal-Brezal	100	1000	119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Carduus baeocephalus		1		Asteraceae	1	1						1	1		2	cuesta de Sabinosa, malpais costero (Hierro); Sabinosa klingt nach Sabinar, malpais nach Ödland?			2; 119,120
Carduus bourgeaui		1		Asteraceae	1	1						1	1		2	montanas, region costera			2; 119,120
Carduus clavulatus		1		Asteraceae	1	1						1	1		2	untere- und Lorbeer-Stufe	50	800	2; 119,120
Carex canariensis		1		Cyperaceae	1	1							1	1	2	Gesnouinia arborea -Ges.: aufgelichtete Waldstellen, relativ nährstoffreich (LAU II-1c), Rubo ulmifolii-Cedronelletum canariensis: Waldränder (LAU II-1d)			2; 119
Carex paniculata ssp. calderae		1		Cyperaceae	1	1						1	1		2	Spartocytisetea supranubii: Gebirgshalbwüsten und alpinoide Steinschuttfluren oberhalb 2000m (SPA)			2; 119
Carex perraudieriana		1		Cyperaceae	1	1								1	1	Lorbeerwald, wahrscheinlich nur Teneriffe Anagagebirge			2; 119
Carlina canariensis		1		Asteraceae	1	1						1	1	1	3	frische Felsspalten oft mit Aeonium tabulaeforme (ASP I), Cytiso proliferi-Pinetalia canariensis (PIN I)	200	1300	2; 119
Carlina salicifolia		1		Asteraceae	1	2						1			1	Canaries: frische Felsspalten oft mit Aeonium tabulaeforme (ASP I), Madeira: cliffs and rocky slopes	200	1600	2; 4; 119,120
Carlina texedae		1		Asteraceae	1	1						1	1	1	3	roque, riscos, pinar	1000	2000	2; 119,120
Carlina xeranthemoides		1		Asteraceae	1	1						1	1		2	en la zona subalpina, Canadas			2; 119,120
Ceballosia fruticosa		1		Boraginaceae	1	1						1	1		2	Aeonio percarnei-Euphorbietum canariensis: 50-500m (KLE 1-2a), Euphorbia-Stufe			2; 119
Cedronella canariensis		1		Lamiaceae	1	3				1			1	1	3	Canaries: Lorbeerwald 300-1500m, Madeira: very common in shady places, generally above 500m, Azores: established on a few roadsides, in Myrica-Pittosporum woodland and on waste ground	300	1500	2; 16; 4; 119
Centaurea conocephala		1		Asteraceae	1	1									0				119
Cerastium sventenii		1		Caryophyllaceae	1	1						1			1	Festuco – Greenovion (ASP I-2)	1500	2400	2; 119
Ceropegia dichotoma		1		Asclepiadaceae	1	1						1	1		2	eigene Anschauung			2; 119
Ceropegia fusca		1		Asclepiadaceae	1	1			1			1			2	Euphorbietum balsamiferae: küstennahe Tieflagen (KLE I-1c), Ceropegio fuscae-Euphorbietum balsamiferae (KLE I-1f)			2; 119
Ceropegia hians		1		Asclepiadaceae	1	1						1			1	Cheilanthes marantae-Gesellschaft (ASP I-1d)	100	800	2

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Chamaecytisus proliferus		1		Fabaceae	1	1							1	1	2	Junipero cedri-Pinetum canariensis: Reliktgesellschaft der Hochlagen, Teneriffe: 200-2400m, La Palma: 1500-2400m (PIN I-1c), Chamaecytisus prolifer-Pinus canariensis-Gesellschaft: Hochlagen von Teneriffe (PIN I-1f), Adenocarpo foliolosi-Cytisetum proliferi (PIN I-2a), Cistus-Cytisus prolifer- Gesellschaft: Übergang zum Canaren-Kieferwald (LAU II-2d), Erica-Cistus-Gesellschaft (LAU II-2e)	200	2400	2; 119
Cheilanthes guanchica		1		Adiantaceae	1	8						1			1	Canaries: keine Angaben, Madeira: rare on walls (Funchal area) ; grietas de roquedos, principalmente en los de silicatos basicos	0	1200	,2,4,17(I),11
Cheilanthes pulchella		1		Adiantaceae	1	1							1		1	trockene Felsen			1,2,4,17(I),11
Cheirolophus arbutifolius		1		Asteraceae	1	1						1	1		2	sobre riscos basalticos	400	800	2; 119,120
Cheirolophus canariensis		1		Asteraceae	1	1						1	1		2	C.c. Var subexpinnatus wächst mit Limonium fruticans, Bereich Teno; sobre riscos basalticos (valle de Masca)	10	450	2; 119,120
Cheirolophus duranii		1		Asteraceae	1	1						1	1		2	mit Limonium brassicifolium; zona baja	100	500	2; 119,120
Cheirolophus falcisectus		1		Asteraceae	1	1						1	1		2		600	800	2; 119,120
Cheirolophus ghomerytus		1		Asteraceae	1	1						1	1		2	costa Noroeste	100	200	2; 119,120
Cheirolophus junonianus		1		Asteraceae	1	1						1	1		2	sobre basaltos viejos, en la zona costera al Sur de Fuencaliente	200	400	2; 119,120
Cheirolophus metlesicsii		1		Asteraceae	1	1						1	1	1	3	Bco., en riscos en el borde de los bosques	900	1000	2; 119,120
Cheirolophus santos-abreui		1		Asteraceae	1	1						1	1		2	riscos	500	600	2; 119,120
Cheirolophus satarataënsis		1		Asteraceae	1	1						1	1		2	montanas, barrancos	250	600	2; 119,120
Cheirolophus sventenii		1		Asteraceae	1	1						1	1		2		300	500	2; 119,120
Cheirolophus tagananensis		1		Asteraceae	1	1						1	1		2		50	300	2; 119,120
Cheirolophus teydis		1		Asteraceae	1	1						1	1		2	Tolpidetum calderae: Hochlagen von La Plama 1650-2400m (ASP I-2d), Junipero cedri-Pinetum canariensis: Reliktgesellschaft der Hochlagen, Teneriffe: 200-2400m, La Palma: 1500-2400m (PIN I-1c)	1800	2400	2; 119,120
Cheirolophus webbianus		1		Asteraceae	1	1						1	1		2	costa	50	400	2; 119,120
Chenopodium coronopus		1		Chenopodiaceae	1	1				1		1	1		3				2; 119
Cicer canariense		1		Fabaceae	1	1								1	1	Im Pinar an feuchten Stellen			2; 119
Cistus chinamadensis		1		Cistaceae	1	1						1	1		2		500	900	2; 119
Cistus osbaeckiaefolius		1		Cistaceae	1	1						1	1		2		2000	2000	2; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Cistus symphytifolius		1		Cistaceae	1	1						1	1	1	3	Loto-hillebrandtii-Pinetum canariensis: Hochlagen von La Palma (PIN I-1e), Cistus-Cytisus prolifer- Gesellschaft: Übergang zum Canaren-Kieferwald (LAU II-2d), Erica-Cistus-Gesellschaft (LAU II-2e)			2; 119
Convolvulus canariense		1		Convolvulaceae	1	1							1	1	2	Ixantho viscosi-Laurion azoricae (LAU I), Andryalo pinnatifidae-ericetalia arboreae (LAU II), Lorbeerwald			2; 119
Convolvulus caput-medusae		1		Convolvulaceae	1	1			1						1	Chenoleo-Suaedetum vermiculatae: Sand über Fels, (SAL I-1b), Küsten			2; 119
Convolvulus floridus		1		Convolvulaceae	1	1						1	1		2	Aeonio percarnei-Euphorbietum canariensis: 50-500m (KLE 1-2a), Oleo-rhamnetalia crenulatae: 50-500 m, schwer zugängliche Orte (OLR I), Euphorbienstufe			2; 119
Convolvulus fruticulosus		1		Convolvulaceae	1	1						1	1		2	Euphorbienstufe			2; 119
Convolvulus glandulosus		1		Convolvulaceae	1	1						1	1		2				2; 119
Convolvulus lopezsocasi		1		Convolvulaceae	1	1						1	1		2		600	600	2; 119
Convolvulus perraudieri		1		Convolvulaceae	1	1						1	1		2				2; 119
Convolvulus scoparius		1		Convolvulaceae	1	1						1	1		2	Helianthemo-Euphorbion balsamiferae: Küstennahe Tieflagen (KLE I-1)			2; 119
Convolvulus subauriculatus		1		Convolvulaceae	1	1						1	1		2				2; 119
Convolvulus volubilis		1		Convolvulaceae	1	1			1			1	1		3	Küstenfelsen			2; 119
Crambe arborea		1		Brassicaceae	1	1						1	1		2	en risco basaltico y fonoliticos en la ladera de Guimar	500	500	2; 119,120
Crambe gigantea		1		Brassicaceae	1	1						1	1	1	3	hondonadas de la laurisilva	500	700	2; 4; 119,120
Crambe gomerae		1		Brassicaceae	1	1						1	1		2	Pflanze auf Felsen aufsitzend	150	800	2; 119,120
Crambe laevigata		1		Brassicaceae	1	1						1	1		2	rocas y paredes por debajo del pueblo (de Masca)	200	1200	2; 119,120
Crambe microcarpa		1		Brassicaceae	1	1						1	1		2	an Felsen	300	1600	2; 119,120
Crambe pritzelii		1		Brassicaceae	1	1						1	1		2	en zonas forestales y bajas	300	1300	2; 119,120
Crambe scaberrima		1		Brassicaceae	1	1						1	1		2	en riscos basalticos	20	600	2; 119,120
Crambe scoparia		1		Brassicaceae	1	1						1			1	riscos montanosos altos	600	800	2; 119,120
Crambe strigosa		1		Brassicaceae	1	1						1	1	1	3	en riscos y terraplenes de la laurisilva y a veces en la zona baja, riscos de bosques	400	1000	2; 119,120
Crambe sventenii		1		Brassicaceae	1	1						1	1		2	riscos montanosos	300	500	2; 119,120
Crepis canariensis		1		Asteraceae	1	1						1			1	las rocas costeras			2; 119
Cryptotaenia elegans		1		Apiaceae	1	1								1	1	Lauro azoricae-Perseetum indicae (LAU I-1a), schattige Lorbeerwälder	600	600	2; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Culcita macrocarpa		1		Dicksoniaceae	1	5					1			1	2	Canaries: Farnreiche Laurus-Ges. mit Woodwardia (LAU I-1b), Azores: scattered in natural pastures, ravines, old Cryptomeria plantations, juniper and laurel forests above 300m, Madeira:rare in damp places in steep wooded valleys of NW-Madeira, except on Montado dos Pecegueiros where there is a population of about 200 plants	0	600	1, 2,4,16,17(I
Cytisus virgatus		1		Fabaceae	1	1						1	1		2				119
Dactylis smithii ssp smithii		1		Poaceae	1	1						1			1	riscos			119,12
Dendriopoterium pulidoi		1		Rosaceae	1	1						1	1		2	Prenantho (paendulae)-Taeckholmietum = Felsgesellschaften im Bereich der Kleinio-Euphorbietea von Gran Canaria (ASP I-1a)			2; 119
Descurainia artemisioides		1		Brassicaceae	1	1						1	1		2	Prenantho (paendulae)-Taeckholmietum = Felsgesellschaften im Bereich der Kleinio-Euphorbietea von Gran Canaria (ASP I-1a)	400	600	2; 119,120
Descurainia bourgaeana		1		Brassicaceae	1	1						1	1		2		1500	2400	2; 119,120
Descurainia gilva		1		Brassicaceae	1	1						1	1		2	Descurainio gilvae-Plantaginetum webbii = Vulkanische Rohböden auf La Palma (PIN I 2d); lugares descubiertos y soleados en la zona alta de los pinares	1000	2000	2; 119,120
Descurainia gonzalesii		1		Brassicaceae	1	1						1			1	Canadas, roques, en laderas de cenizas secas	2000	3000	2; 119,120
Descurainia lemsii		1		Brassicaceae	1	1							1	1	2	zona alta de los pinares; auch eigene Anschauung	1800	2000	2; 119,120
Descurainia millefolia		1		Brassicaceae	1	1				1		1	1	1	4	en maleza (Unkrautflur) xerofitica y en ricos, en laderas secas rocosas y riscos, y en pinares	200	1500	2; 119,120
Descurainia preauxiana		1		Brassicaceae	1	1						1	1		2	Prenantho (paendulae)-Taeckholmietum = Felsgesellschaften im Bereich der Kleinio-Euphorbietea von Gran Canaria (ASP I-1a); en laderas secas y desabrigadas	400	1600	2; 119,120
Dicheranthus plocamoides		1		Caryophyllaceae	1	1						1			1	Foto in Bramwell und Ortsbeschreibungen	0	500	2; 119
Diplazium caudatum		1		Woodsiaceae	1	4								1	1	Canaries: Lorbeerwald, Azores: shady ravines and forests, especially between 150-600m, Madeira: confined to dark, damp habitats in ravines, besides streams, usually in laurasilva	150	600	1
Dorycnium broussonetii		1		Fabaceae	1	1						1	1		2	barranco	200	1000	2; 119,120

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Dorycnium eriophthalmum		1		Fabaceae	1	1							1		1	Oleo-Rhamnetalia crenulatae: 50-500m, fast nur noch an schwer zugänglichen orten (OLR I)	200	500	2; 119,120
Dorycnium spectabile		1		Fabaceae	1	1						1			1	riscos	300	1000	2; 119,120
Dracunulus canariensis		1		Araceae	1	1								1	1	en y por debajo de la zona forestal; nach eigener Anschuung gern halbschattig, frische Standorte	100	800	2; 119,120
Dryopteris guanchica		1		Dryopteridaceae	1	3						1			1	roquedos acidos muy humedos	0	1000	*17(I)
Dryopteris oligodonta		1		Dryopteridaceae	1	1								1	1	Farnreiche Laurus-Ges. mit Woodwardia (LAU I-1b)			2; 119
Ebingeria elegans		1		Juncaceae	1	2	1					1	1		3	Canaries: Thero-Brachypodietea (TBR), Andryalo pinnatifidae-Ericetalia arboreae (LAU II); Madeira: along levadas, on rocks and walls, more frequent in the higher parts of the central eastern region of the island	0	1100	2; 4; 119
Echium acanthocarpum		1		Boraginaceae	1	1						1	1	1	3	riscos en bosques de laurisilva	800	1000	119
Echium aculeatum		1		Boraginaceae	1	1						1	1		2	Kleinio-Euphorbietalia canariensis (KLE I)	200	1000	2; 119,120
Echium auberianum		1		Boraginaceae	1	1						1			1	Echium wildpretii-Gesellschaft (SPA I-1c)	2000	2200	2; 119,120
Echium bethencourtianum		1		Boraginaceae	1	1						1	1		2		100	400	2; 119,120
Echium bonnetii		1		Boraginaceae	1	1			1						1	Frankenio-Astydamion latifoliae (CRI-I-1)	0	500	2; 119,120
Echium breviname		1		Boraginaceae	1	1			1			1			2	Echio brevirame-Euphorbietum balsamiferae: Tieflagen bis 200m, flachgründig (KLE I-1e), Echio brevirame-Euphorbietum canariensis: Tieflagen La Palmas (KLE I-2g), Echio brevirame-Retametum rhodorrhizoidis: Blocklava (KLE I-2h)	100	700	2; 119,120
Echium callithyrsum		1		Boraginaceae	1	1						1	1		2	cumbres, riscos	800	1500	2; 119,120
Echium decaisnei		1		Boraginaceae	1	1						1	1		2	E.s.ssp.decaisnei: Aeonio percarnei-Euphorbietum canariensis (50-500m Gran Canaria) (KLE I-2a)	0	100	2; 119,120
Echium gentianoides		1		Boraginaceae	1	1						1			1	Tolpidetum calderae: Hochlagen von La Plama 1650-2400m (ASP I-2d)	1900	1900	2; 119,120
Echium giganteum		1		Boraginaceae	1	1						1			1	schattige Felshänge	50	800	2; 119,120
Echium handiense		1		Boraginaceae	1	1						1	1		2	riscos y laderas seca	200	800	2; 119,120
Echium hierrense		1		Boraginaceae	1	1						1	1	1	3	en los bosques y mas abajo	400	800	2; 119,120
Echium lancerottense		1		Boraginaceae	1	1						1	1		2		300	400	2; 119
Echium leucophaeum		1		Boraginaceae	1	1						1	1		2	Kleinio-Euphorbietalia canariensis (KLE I)	100	600	2; 119,120

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Echium onosmifolium		1		Boraginaceae	1	1						1	1		2	zona baja y matorral montano, en laderas secas	400	1900	2; 119,120
Echium pininana		1		Boraginaceae	1	1							1	1	2	Barrancos der Lorbeerstufe	500	1000	2; 119,120
Echium simplex		1		Boraginaceae	1	1						1	1		2	rocas de la costa Norte	20	650	2; 119,120
Echium strictum		1		Boraginaceae	1	1						1	1		2	Aeonio percarnei-Euphorbietum canariensis (50-500m Gran Canaria) (KLE I-2a); en la zona baja y regiones forestales, riscos, barrancos	200	700	2; 119,120
Echium sventenii		1		Boraginaceae	1	1						1	1		2	regiones montanosas (auch eigene Anschauung)	350	500	2; 119,120
Echium triste		1		Boraginaceae	1	1						1	1		2	laderas secas entre rocas, en habitats parecidos (ähnliche Habitate), Gomera: desde el nivel del mar hasta los 350 m	300	600	2; 119,120
Echium virescens		1		Boraginaceae	1	1						1	1	1	3	Telinetum spachianae: felsige Standorte auf Teneriffe (PIN I-1h)	500	1300	2; 119,120
Echium webbii		1		Boraginaceae	1	1						1	1	1	3	en las zonas forestales y por debajo, barrancos, monte de laurisilva y pinares	500	1800	2; 119,120
Echium wildpretii		1		Boraginaceae	1	1						1			1	Echium wildpretii-Gesellschaft (SPA I-1c), E.w.ssp. Trichosphion in Tolpidetum calderae: Hochlagen La Palmas 1650-2400m) (ASP I-2d)	1600	2300	2; 119,120
Erica scoparia ssp. platycodon			1	Ericaceae	1	1							1		1	Myrico fayae-Ericion arboreae (LAU II-1)	300	1200	2; 119,120
Erigeron calderae		1		Asteraceae	1	1						1			1	Hochlagen			2; 119,120
Erucastrum canariense		1		Brassicaceae	1	1						1	1		2				2; 119,120
Erysimum bicolor		1		Brassicaceae	1	1						1	1	1	3	Crevices of rock faces in ravines, laurisilva and other shady places			2; 4; 119
Erysimum scoparium		1		Brassicaceae	1	1						1	1		2	Spartocytisietum supranubii (SPA I-1a)	1500	2400	2; 119
Euphorbia aphylla		1		Euphorbiaceae	1	1			1			1			2	Astydamio-Euphorbietum aphyllae (KLE I-1a)	0	100	2; 119, 120
Euphorbia atropurpurea		1		Euphorbiaceae	1	1						1	1		2	Euphorbietum atropurpureae (hauptsächlich um 1000m) (KLE I-2d)	100	1200	2; 4; 119
Euphorbia berthelotii		1		Euphorbiaceae	1	1						1	1		2	Euphorbietum berthelotii (KLE I-2n)	100	1000	2; 119,120
Euphorbia bourgeauana		1		Euphorbiaceae	1	1						1	1		2	Euphorbia bourgeauana-Gesellschaft (KLE I-2k)	300	700	2; 119,120
Euphorbia bravoana		1		Euphorbiaceae	1	1						1	1		2	barrancos de la zona baja	200	800	2; 119,120
Euphorbia canariense		1		Euphorbiaceae	1	1						1	1		2	Küstenregion, Aeonio-Euphorbion canariensis (KLE I-2)	100	1100	2; 119,120
Euphorbia handiensis		1		Euphorbiaceae	1	1						1			1		0	200	2; 119,120
Euphorbia lambii		1		Euphorbiaceae	1	1							1	1	2	Feucht-schattig (eigene Anschauung); bordes de los bosques	600	800	2; 119,120

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Euphorbia mellifera		1		Euphorbiaceae	1	2								1	1	Canaries: Lauro azoricae-Perseetum indicae (LAU I-1a), Madeira: rare but characteristic species of laurisilva growing in moist shady places in sheltered ravines, scattered throughout the island, mainly 400-1100m	400	1100	2; 4; 119
Euphorbia obtusifolia		1		Euphorbiaceae	1	1						1	1		2	Kleinio-Euphorbietalia canariensis (KLE I)			2; 119
Ferula lancerottensis		1		Apiaceae	1	1				1		1	1		3	eigene Anschauung			2; 119
Ferula latipinna		1		Apiaceae	1	1						1	1		2				2; 119
Ferula linkii		1		Apiaceae	1	1				1		1	1		3	eigene Anschauung			2; 119
Festuca agustinii		1		Poaceae	1	1						1			1	Greenovietum diplocyclae (ASP I-2b)	700	2500	2; 119
Forsskahlea angustifolia		1		Urticaceae	1	1				1					1	Launaeetum arborescentis (= Sandige Halbwüsten in Küstennähe) & Tricholaeno-Rumicetum lunariae (=Aschenkegel, grundfrisch) (KLE I-1b & 2c), Polycarpo tetraphylli-Nicotianetum-galucae(barranco Flußbetten) & Glaucium flavum-Forskohlea angustifolia-Ges. & Forskohlea angustifolia-Setaria verticillata-Ges.(CHE I-1b & k & s),Eragrostis barrelieri-Polycarpaea divaricata-Ges. (PLA I-2a), nach eigener Anschauung vor allem in anthropogenen Habitaten, überall ruderal			2; 119
Frankenia ericifolia ssp. latifolia			1	Frankeniaceae	1	1			1						1	en comunidades costeras			2
Fumaria coccinea		1		Papaveraceae	1	1						1			1	felsige Orte, Spalten & Ritzen, auch Lavaschutt, ausgedehnte Teppiche bildend			2; 119
Galium geminiflorum		1		Rubiaceae	1	2					1	1	1	1	4	Canaries: keine Angaben, Madeira: rocky places, old walls, mountain pastures and Cupressus woodland			2; 4; 119
Genista benehoavensis		1		Fabaceae	1	1							1		1	Telino-Ardenocarpetum spartioidis (SPA I-1b), Teline benehoavensis-Adenocarpetum spartioides (PIN I-2c)	2000	2400	2; 119
Geranium canariense		1		Geraniaceae	1	2							1	1	2	im Lorbeerwald & Fayal-Gebirge			2; 119
Gesnouinia arborea		1		Urticaceae	1	1								1	1	Pruno hixae-Lauretalia azoricae (LAU I), Gesnouinia arborea -Ges.: aufgelichtete Waldstellen, relativ nährstoffreich (LAU II-1c)			2; 119
Globularia ascanii		1		Globulariaceae	1	1						1	1	1	3	riscos en la zona forestal de pinares	1100	1300	2; 119,120

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Globularia salicina		1		Globulariaceae	1	2							1	1	2	Rhamno glandulosae-Ericetum arborae: artenreich, anspruchsvoll & Übergang zu Pruno-hixae-Lauretalia azoricae-Gesellschaft (LAU II-1a)	100	1000	120, 2
Globularia sarcophylla		1		Globulariaceae	1	1						1	1		2	riscos en las montanas	1500	1700	2; 119,120
Gnaphalium canariense		1		Asteraceae	1	1									0				119
Gnaphalium elegans		1		Asteraceae	1	1									0				119
Gnaphalium fruticosum		1		Asteraceae	1	1									0				119
Gnaphalium teydeum		1		Asteraceae	1	1						1			1	eigene Anschauung			119
Gonospermum canariense		1		Asteraceae	1	1						1	1		2	zonas bajas y forestales, en los riscos	200	1000	2; 119,120
Gonospermum elegans		1		Asteraceae	1	1						1	1	1	3	Hierro: Wälder und Felsen der unteren Stufe	50	700	2; 119,120
Gonospermum fruticosum		1		Asteraceae	1	1						1	1	1	3	Felsen der unteren Lorbeerstufe	100	700	2; 119,120
Gonospermum gomerae		1		Asteraceae	1	1						1	1		2	en riscos	100	500	2; 119,120
Greenovia aizoon		1		Crassulaceae	1	1						1			1	Greenovietum diplocyclae (ASP I-2e)	600	2000	2; 119
Greenovia aurea		1		Crassulaceae	1	1						1			1	Phylliviscosae-Aeonietum sedifolii: Sonnenexponiert Felsen im Tenogebirge von Teneriffe, (ASP I-1b), Greenovietum aureae: Felsen in der Kiefernstufe von Teneriffe und La Palma (ASP I-2a), Greenovia aurea-Gesellschaft: höhere Lagen1250-1800m (ASP I-2f)	400	2000	2; 119
Greenovia diplocycla		1		Crassulaceae	1	1						1			1	Greenovietum diplocyclae (ASP I-2b)	500	1700	2; 119
Greenovia dodrentalis		1		Crassulaceae	1	1						1			1	Greenovia dodrentalis- Gesellschaft: Tiefere Lagen der alten Gebirg = Anaga & Teno auf Teneriffe (ASP I-2g)	500	1200	2; 119
Habenaria tridactylites		1		Orchidaceae	1	1						1			1	Soncho-Aeonion (ASP I-1)			2; 119
Heberdenia excelsa		1		Myrsinaceae	1	2							1	1	2	Canries: Laurus-Prunus lusitanica-Gesellschaft: in höheren Lagen, Übergang zu Andryalo pinnatifidae-Ericacetalia arboreae (LAU I-1e), Madeira: becoming rare, several sites in laurisilva of the central mountains 600-1300m	600	1300	2; 4; 119
Helianthemum bramwelliorum		1		Cistaceae	1	1									0				119
Helianthemum bystropogophyllum		1		Cistaceae	1	1								1	1	montana, en pinares	1300	1400	2; 119,120
Helianthemum gonzalezferreri		1		Cistaceae	1	1									0				119
Helianthemum juliae		1		Cistaceae	1	1						1	1		2	Canadas, en matorrales de leguminosas	2200	2300	2; 119,120

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Helianthemum teneriffae		1		Cistaceae	1	1									0	ladera de Guimar (Abhang bei Guimar)	700	900	2; 119,120
Helianthemum tholiforme		1		Cistaceae	1	1								1	1	pinar	400	1400	2; 119,120
Helianthemum thymiphyllum		1		Cistaceae	1	1						1			1	riscos, en zonas secas, en valles secos	300	600	2; 119,120
Helichrysum gossypinum		1		Asteraceae	1	1						1			1	Felsenstrauch; riscos montanosos secos	300	600	2; 119,120
Helichrysum monogynum		1		Asteraceae	1	1						1	1		2	region de Famara			2; 119,120
Herniaria canariensis		1		Caryophyllaceae	1	1			1			1			2	coasta Sur (Tenerife), en sitios arenosos y rocosos			2; 119,120
Herniaria hartungii		1		Caryophyllaceae	1	1									0				119
Hypericum canariense		1		Hypericaceae	1	2							1	1	2	Canaries: Rhamno glandulosae-Ericetum arboreae, Madeira: cliffs, ravines, open rocky slopes and in laurisila, from 900-1200m	900	1200	2; 4; 119
Hypericum glandulosum		1		Hypericaceae	1	2							1	1	2	Andryalo pinnatifidae-Ericetalia arboreae (LAU II), Oleo-Rhamnetalia crenulatae (OLR I), Madeira: rocky areas, especially in ravines in E-Madeira	500	1500	2; 4; 119
Hypericum hircinum ssp. cambessedesii			1	Hypericaceae	1	3									0	estaciones humedas y umbrosas en el cauce de los torrentes	600	1000	17(III)
Hypericum inodorum		1		Hypericaceae	1	5						1	1	1	3	Canaries: Gesnouinia arborea- Ges: aufgelichtete Waldstellen, relativ nährstoffreich (LAU II 3c), Azores: keine Angaben, Madeira: common on cliffs, dry stony hillsides, edges of laurisilva, up to 800m			1,2, 4, 8, 119, 1
Hypericum reflexum		1		Hypericaceae	1	1						1			1	en riscos baslticos	200	800	2; 119
Hypochoeris oligocephala		1		Asteraceae	1	1			1			1			2	en la costa Noroeste (Tenerife)	100	200	2; 119,120
Ifloga spicata ssp. obovata			1	Asteraceae	1	1									0				2; 119
Ilex canariensis		1		Aquifoliaceae	1	2								1	1	Canaries: Ixantho viscosi-Laurion azoricae: Lorbeerwälder hauptsächlich auf den N-Seiten der Inesln 400-1200m (LAU I-1), Fayal-Brezal & Lorbeerwald, Madeira: in laurisilva, heath forests on dry, exposed soil, mainly central and N-Madeira, 300-880m	300	880	2; 4; 119
Ilex perado		1		Aquifoliaceae	1	3								1	1	Canaries: Lorbeerwald, Madeira: in laurisilva, sometimes exposed to crests but more often on the deeper soils of shaded groves mainly in Z & N Madeira, 700-1200, Azores (ssp. azorica): scattered in ravines, laurel-, Juniper and Pittosporumforest between 250-750msilva	700	1200	2; 4; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Isoplexis canariensis		1		Scrophulariaceae	1	1								1	1	Rhamno glandulosae-Ericetum arborae: artenreich, anspruchsvoll & übergang zu Pruno-hixae-Lauretalia azoricae-Gesellschaft (LAU II-1a), Lorbeerwald			2; 119
Isoplexis chalcantha		1		Scrophulariaceae	1	1								1	1	Pinetum ericetosum- Übergang zu Pruno hixae-lauretea azoricae (LAU)	600	800	2; 119
Isoplexis isabelliana		1		Scrophulariaceae	1	1								1	1	Cytiso proliferi-Pinetea canariensis (PIN)	800	1000	2; 119
Ixanthus viscosus		1		Gentianaceae	1	1								1	1	Canaries: Ixantho viscosi-Laurion azoricae: Lorbeerwälder hauptsächlich auf den N-Seiten der Inesln 400-1200m (LAU I-1), Rhamno glandulosae-Ericetum arborae: artenreich, anspruchsvoll & übergang zu Pruno-hixae-Lauretalia azoricae-Gesellschaft (LAU II-1a)			2; 119
Jasminum odoratissimum		1		Oleaceae	1	2							1	1	2	Canaries: Junipero-Rhamnetum crenulatae (OLR I-1a), Madeira: Cliffs and rocks both on the coast and in inland ravines	400	1000	2; 4; 119
Juniperus cedrus		1		Cupressaceae	1	2							1	1	2	Junipero cedri-Pinetum canariensis: Reliktgesellschaft der Hochlagen, Teneriffe: 200-2400m, La Palma: 1500-2400m (PIN I-1c), Juniperus cedrus-Ges. (SPA I-1e); vive, sobretudo, nos niveis superiores da laurisiva e altitudes mais elevadas (ate perto de 1800 m) da ilha da Madeira	200	2400	2,30,119
Juniperus turbinata ssp. canariensis			1	Cupressaceae	1	2							1		1	eigene Anschauung			117
Justicia hyssopifolia		1		Acanthaceae	1	1						1	1		2	Küstenzone bis 500 m (eigene Anschauung)			2; 119
Kickxia pendula		1		Scrophulariaceae	1	1						1			1	riscos baslticos	600	1000	2; 119,120
Kickxia scoparia		1		Scrophulariaceae	1	1			1			1	1		3	Helianthemo-Euphorbion balsamiferae: Küstennahe Tieflagen (KLE I-1), auch eigene Anschauung		600	2; 119
Kleinia neriifolia		1		Asteraceae	1	1						1	1		2	Euphorbien-Stufe 50-600(-1000m), Aeonio-Euphorbion canariensis (KLE I-2)	50	1000	2; 119
Kunkeliella canariensis		1		Santalaceae	1	1				1		1	1		3	riscos, en maleza (Unkrautflur) Teline/Euphorbia	600	800	2; 119,120
Kunkeliella psilotoclada		1		Santalaceae	1	1						1	1		2	barranco de Masca, laderas secas y rocosas (trockene und felsige Hänge)	700	900	2; 119,120
Kunkeliella subsucculenta		1		Santalaceae	1	1									0				2; 119,120

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Lactuca palmensis		1		Asteraceae	1	1						1	1		2	Telino-Ardenocarpetum spartioidis (SPA I-1b), Descurainio gilvae-Plantaginetum webbii = Vulkanische Rohböden auf La Palma (PIN I-2d)			2; 119
Lavandula buchii		1		Lamiaceae	1	1						1	1		2	barrancos	100	600	2; 119,120
Lavandula minutolii		1		Lamiaceae	1	1						1	1		2	barrancos	500	1600	2; 119,120
Lavandula pinnata		1		Lamiaceae	1	2						1	1		2	(eigene Anschauung)	0	600	2; 119,120
Lavatera acerifolia		1		Malvaceae	1	1						1	1		2	Aeonio-Euphorbion canariensis (KLE I-2), Oleo-Rhamnetalia crenulatae: 50-500 m, schwer zugängliche Orte (OLR I)	20	500	2; 119,120
Lavatera brachyfolia		1		malvaceae	1	1									0				119
Lavatera phoenica		1		Malvaceae	1	1									0		0	300	2; 119,120
Limonium arborescens		1		Plumbaginaceae	1	1						1			1				2; 119,120
Limonium bourgeaii		1		Plumbaginaceae	1	1						1			1	en los riscos orientados al Noroeste	500	700	2; 119,120
Limonium brassicifolium		1		Plumbaginaceae	1	1									0				2; 119,120
Limonium dendroides		1		Plumbaginaceae	1	1						1			1	en acantilados	50	400	2; 119,120
Limonium fruticans		1		Plumbaginaceae	1	1						1			1				2; 119,120
Limonium imbricatum		1		Plumbaginaceae	1	1			1						1	Limonium imbricatum-Gesellschaft(CRI I-1c) mit Crithmum maritimum			2; 119,120
Limonium macrophyllum		1		Plumbaginaceae	1	1			1			1			2	por la costa Norte de Anaga	50	100	2; 119,120
Limonium ovalifolium ssp. canariense			1	Plumbaginaceae	1	1			1						1	en zonas costeras arenosas	0	50	2; 119,120
Limonium papillatum		1		Plumbaginaceae	1	1			1			1			2	among stones and sand on Selvagem-Islands	0	200	2; 4; 119,120
Limonium pectinatum		1		Plumbaginaceae	1	1			1						1	Felsküsten (eigene Anschauung)	0	100	2; 119, 120
Limonium perezii		1		Plumbaginaceae	1	1						1			1	laderas de baarranco (Hänge im Barranco)	800	900	2; 119, 120
Limonium preauxii		1		Plumbaginaceae	1	1						1			1	laderas rocosas	400	600	2; 119, 120
Limonium puberulum		1		Plumbaginaceae	1	1						1			1	en los riscos y rocas	500	600	2; 119, 120
Limonium redivivum		1		Plumbaginaceae	1	1						1			1	en rscos escarpados	600	1000	2; 119, 120
Limonium spectabile		1		Plumbaginaceae	1	1						1			1	en los acantilados (Barranco de Masca)	400	600	2; 119, 120
Limonium sventenii		1		Plumbaginaceae	1	1									0		200	300	2; 119, 120
Lobularia canariensis ssp. canariensis			1	Brassicaceae	1	1				1		1			2	Felsen, steinige Hänge & Ruderalstellen	0	2000	2; 119, 120
Lobularia canariensis ssp. intermedia			1	Brassicaceae	1	1				1		1			2	Felsen, steinige Hänge, Ruderalstellen, 0-1400m	0	1400	2; 119, 120
Lobularia canariensis ssp. mircosperma			1	Brassicaceae	1	1			1						1	xerophyt. Vegetation in Küstennähe			2; 119, 120
Lobularia canariensis ssp. palmensis			1	Brassicaceae	1	1						1	1	1	3	Bereich des Kiefern- und Lorbeerwaldes, gelegentlich auf Lava			2; 119, 120

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Lolium lowei		1		Poaceae	1	2									0	region costera. Cuesta (Abhang) de silva (?)			119
Lotus berthelotii		1		Fabaceae	1	1								1	1	riscos de bosques	700	1200	2; 119,120
Lotus callis-viridis		1		Fabaceae	1	1									0		50	600	2; 119
Lotus campylocladus		1		Fabaceae	1	1								1	1	Cisto symphytifolii-Pinion canariensis (PIN I-1)			2; 119
Lotus dumetorum		1		Fabaceae	1	1									0				2; 119
Lotus emeriticus		1		Fabaceae	1	1			1			1			2	rocas de la costa Norte (La Palma)	0	300	2; 119,120
Lotus emeroides		1		Fabaceae	1	1			1			1			2	en laderas secas de tierra baja, en las costas	0		2; 119
Lotus genistoides		1		Fabaceae	1	1									0				119
Lotus glaucus		1		Fabaceae	1	2			1						1	Canaries: Ammophiletea: beweglicher Sand (AMM), Madeira: maritime cliffs, rocks, stony and sandy ground, coastal hills and dry roadside banks up to 100m	0	100	2; 4; 119
Lotus hillebrandtii		1		Fabaceae	1	1								1	1	Loto-hillebrandtii-Pinetum canariensis: Hochlagen von La Palma (PIN I-1e)			2; 119
Lotus holosericeus		1		Fabaceae	1	1				1					1	en maleza (Unkrautflur) de leguminosas (Fabaceen-Unkrautfluren)	600	800	2; 119,120
Lotus kunkelii		1		Fabaceae	1	1			1	1					2	AC Loto-Polycarpaeetum niveae, playa/costa	0	100	2; 119,120
Lotus lancerottensis		1		Fabaceae	1	2			1			1			2	Canaries: keine Angaben, Madeira: Rare on maritime cliffs on S-coast of Madeira			2; 4; 119
Lotus leptophyllus		1		Fabaceae	1	1			1			1			2	Helianthemo-Euphorbion balsamiferae: Küstennahe Tieflagen (KLE I-1), Frankenio-Astydamietum-Gesellschaft (CRI I-1b), Plantago aschersonii-Gesellschaft (PLA I-2b)			2; 119
Lotus maculatus		1		Fabaceae	1	1			1						1	en la costa Norte (Tenerife)			2; 119
Lotus mascaënsis		1		Fabaceae	1	1						1	1		2		400	500	2; 119,120
Lotus ornithopodioides		1		Fabaceae	1	2									0				2; 4; 119
Lotus pyranthus		1		Fabaceae	1	1									0		1300	1300	2; 119
Lotus sessilifolius		1		Fabaceae	1	1			1						1	Küstenregion, en regiones costeras	0	150	2; 119, 120
Lotus spartioides		1		Fabaceae	1	1				1				1	2	Cytiso proliferi-Pinetalia canariensis (PIN I); pinares y maleza de monte en la zona montanosa	300	1000	2; 119,120
Lugoa revoluta		1		Asteraceae	1	1			1			1			2	rocas costeras	20	200	2; 119,120
Luzula canariensis		1		Juncaceae	1	1								1	1	Lorbeerwald 600-1000m, in dichten Polstern, Pruno hixae-lauretea azoricae (LAU)	600	1000	900,9033
Marcetella moquiniana		1		Rosaceae	1	1							1		1	eigene Anschauung	300	600	2; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Maytenus canariensis		1		Celastraceae	1	1						1	1	1	3	en rocas y riscos en la zona baja y regiones forestales	200	1500	2; 119,120
Melica canariensis		1		Poaceae	1	2						1	1	1	3	riscos (Famara/Lanzarote), laderas aridas en el borde del pinar	400	2000	2; 119,120
Melica teneriffae		1		Poaceae	1	2									0	riscos secos, laderas secas de la zona baja	200	600	2; 119
Minuartia platyphylla		1		Caryophyllaceae	1	1							1		1	Pflanze polsterförmig od. Aus Spalten heraushängend, Felsen bis 700 m			2; 119
Minuartia webbii		1		Caryophyllaceae	1	1			1						1	Sande der Küstenregion			2; 119
Monanthes adenoscepes		1		Crassulaceae	1	1						1			1	Soncho-Aeonion (ASP I-1 Festuco-Greenovion (ASP I-2)	200	600	2; 119
Monanthes amydros		1		Crassulaceae	1	1						1			1				2; 119
Monanthes anagensis		1		Crassulaceae	1	1						1			1	Nordhang			2; 119
Monanthes brachycaulos		1		Crassulaceae	1	1						1			1				119
Monanthes dasyphylla		1		Crassulaceae	1	1						1			1				2; 119
Monanthes icterica		1		Crassulaceae	1	1						1			1				2; 119
Monanthes laxiflora		1		Crassulaceae	1	1						1			1	Soncho-Aeonion (ASP I-1)			2; 119
Monanthes minima		1		Crassulaceae	1	1						1			1	Südhang			2; 119
Monanthes muralis		1		Crassulaceae	1	1						1			1				2; 119
Monanthes niphophila		1		Crassulaceae	1	1						1			1				2; 119
Monanthes pallens		1		Crassulaceae	1	1						1			1				2; 119
Monanthes polyphylla		1		Crassulaceae	1	1						1			1	Soncho-Aeonion (ASP I-1)			2; 119
Monanthes praegeri		1		Crassulaceae	1	1						1			1				2; 119
Monanthes purpurascens		1		Crassulaceae	1	1						1			1				2; 119
Monanthes silensis		1		Crassulaceae	1	1						1			1				2; 119
Monanthes subcrassicaulis		1		Crassulaceae	1	1						1			1				2; 119
Monanthes wildpretii		1		Crassulaceae	1	1						1			1				119
Myosotis discolor ssp. canariensis			1	Boraginaceae	1	2				1		1			2	Canaries: keine Angaben, Madeira: fairly common on walls, banks, paths, cultivated ground and rocky places in both lower and montane regions of Madeira up to 1650m		1650	2; 4; 119
Myrica faya		1		Myricaceae	1	4							1	1	2	Canaries: Myrico fayae-Ericion arboreae (LAU II-1),Pinetum ericetosum- Übergang zu Pruno hixae-Lauretea azoricae (LAU), hauptsächlich 1200-1500m (Pin I-1g), Azores: lowland forests, common below 600m, Madeira: locally abundant in laurisilva, lower altitudes in Norther part of island, occasionally in South up to 1000m	300	1500	1,2,4,16
Myrica rivas-martinezii		1		Myricaceae	1	1							1		1	eigene Anschauung (Fayal-Brezal)			2; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Najas mircrocarpa		1		Najadaceae	1	1	1								1	mit Chara fragilis bei Charco des Maspalomas			2; 119
Nauplius graveolens ssp. stenophyllus			1	Asteraceae	1	1						1	1		2	Odontospermo-Ononidetum ulicinae: mittlere Höhen, 400-900m stark beweidet! (KLE I-2b)			2; 119
Nauplius intermedius		1		Asteraceae	1	1						1	1		2				2; 119
Nauplius sericeus		1		Asteraceae	1	1						1	1		2				2; 119
Neochamaelea pulverulenta		1		Cneoraceae	1	1						1	1		2	Euphorbietum balsamiferae: küstennahe Tieflagen (KLE I-1c), Aeonio-Euphorbion canariensis (KLE I-2), Euphorbiastufe			2; 119
Nepeta teydea		1		Lamiaceae	1	1						1			1	Spartocytisietum supranubii (SPA I-1a), Telino-Ardenocarpetum spartioidis (SPA I-1b)	1800	2700	2; 119
Ocotea foetens		1		Lauraceae	1	2								1	1	Canaries: Ixantho viscosi-Laurion azoricae (LAU I), Madeira: preferring moist slightly exposed sites (0-)600-1500m, formerly widespread, today rare	0	1500	2,4,19
Olea europea ssp. Cerasiformis			1	Oleaceae	1	1						1	1		2	Aeonio percarnei-Euphorbietum canariensis (50-500m Gran Canaria) (KLE I-2a), Oleo-rhamnetalia crenulatae: 50-500 m, schwer zugängliche Orte (OLR I)			2; 119
Ononis angustissima ssp. angustissima			1	Fabaceae	1	1						1	1		2	Odontospermo-Ononidetum ulicinae: mittlere Höhen, 400-900m stark beweidet! (KLE I-2b)			2; 119
Ononis angustissima ssp. Longifolia			1	Fabaceae	1	1						1	1		2	Odontospermo-Ononidetum ulicinae: mittlere Höhen, 400-900m stark beweidet! (KLE I-2b)			2; 119
Ononis christii		1		Fabaceae	1	1						1			1	riscos mas altos (Jandia)	200	600	2; 119,120
Ononis dentata		1		Fabaceae	1	6			1						1	pastizales de arenales costeros	0	10	*17(VII/II)
Ononis diffusa		1		Fabaceae	1	5			1						1	pastizales, en dunas y arenales costeros y del interior	0	600	*17(VII/II)
Ononis hebecarpa		1		Fabaceae	1	1						1			1	abunda localmente en las regiones de Famara y Jandia (Lanzarote, Fuerteventura)			2; 119,120
Onopordum carduelium		1		Asteraceae	1	1						1			1	riscos	100	1200	2; 119,120
Onopordum nogalesii		1		Asteraceae	1	1						1			1	laderas secas de la montanas de Jandia	100	500	2; 119,120
Orchis patens ssp.canariensis			1	Orchidaceae	1	1								1	1	Nebelwald, z.B. Orotavatal, Cisto symphytifolii-Pinion canariensis (PIN I-1)	900	1200	2; 119
Orobanche berthelotii		1		Orobanchaceae	1	1				1		1	1		3	schmarotzt auf Asteraceen, bes. auf Artemisia, seltener auf Solanaceen wie Lycium, Lycopersicum, Nicotiana			2; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Orobanche gratiosa		1		Orobanchaceae	1	1				1		1	1		3	auf Asteraceaen besonders Artemisia, seltener Solanaceaen oder Polygonum paronychioides			2; 119
Pancratium canariense		1		Amaryllidaceae	1	1						1			1	Felsspalten der Küstenregion			2; 119
Parietaria filamentosa		1		Urticaceae	1	1						1			1	riscos			2; 119
Parolinia filifolia		1		Brassicaceae	1	1									0				2; 119
Parolinia intermedia		1		Brassicaceae	1	1						1	1		2	Kleinio-Euphorbietalia canariensis (KLE I)			2; 119
Parolinia ornata		1		Brassicaceae	1	1						1	1		2	Aeonio percarnei-Euphorbietum canariensis (50-500m Gran Canaria) (KLE I-2a)			2; 119
Parolinia platypetala		1		Brassicaceae	1	1									0				119
Parolinia schizogynoides		1		Brassicaceae	1	1									0		200	350	2; 119
Paronychia canariensis		1		Caryophyllaceae	1	1						1	1		2	Soncho-Aeonion (ASP I-1), Kleinio neriifolii-Euphorbietea canariensis (KLE), Micromerio-Genistion = Canar. Zwergstrauchheiden, Degradationsstadien des Fayo-Ericion, wohl primär an Felsköpfen (LAU II-2)			2; 119
Paronychia capitata ssp. canariensis			1	Caryophyllaceae	1	1									0				2; 119
Pelletiera wildpretii		1		Primulaceae	1	1									0				2; 119
Pericallis appendiculata		1		Asteraceae	1	1							1	1	2	Schattenliebend im Lorbeerwald der Nordhänge, 500-900m, Laurus-Prunus lusitanica- Gesellschaft: in höheren Lagen, Übergang zu Andryalo Pinnatifidae-Ericacetalia arboreae (LAU I-1e)	500	900	2; 119
Pericallis cruenta		1		Asteraceae	1	1						1	1		2	besonders in frischeren Ausbildungen des Fayal-Brezal der Nordhänge	700	1500	2; 119
Pericallis echinata		1		Asteraceae	1	1						1	1		2	Geröll der N-Küste, besonders im NW, lichtliebende Art trockener Standorte, besonders Lavaströme, gerne mit Cistus-Arten	50	900	2; 119
Pericallis hadrosoma		1		Asteraceae	1	1						1			1	riscos			2; 119,120
Pericallis hansenii		1		Asteraceae	1	1								1	1	Pinetum ericetosum- Übergang zu Pruno hixae-Lauretea azoricae (LAU)			2; 119
Pericallis lanata		1		Asteraceae	1	1									0				2; 119
Pericallis multiflora		1		Asteraceae	1	1									0	bosques	500	700	2; 119,120
Pericallis murrayi		1		Asteraceae	1	1								1	1	lichte Stellen im Lorbeerwald, & obere Küstenzone (schwerpunkt 600-800m)	50	1100	2; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Pericallis papyracea		1		Asteraceae	1	1				1				1	2	im tiefschattigen Lorbeerwald, auch im Pinar; Galio-Toriletum: schattig ab 250m (ART I-1c), Ixantho viscosi-Laurion azoricae (LAU I), Andryalo pinnatifidae-ericetalia arboreae (LAU II), Junipero-Rhamnetum crenulatae (OLR I-1a)	100	1600	2; 119
Pericallis steetzii		1		Asteraceae	1	1								1	1	Lorbeerwald, lichte Orte	500	900	2; 119
Pericallis tussilaginis		1		Asteraceae	1	1						1			1	Galium aparine-Senecio tussilaginis Gesellschaft: halbschattig, tiefere Lagen (ART I-1a)	300	800	2; 119
Pericallis webbii		1		Asteraceae	1	1						1			1	Schluchten der N-Seite	100	1600	2; 119
Persea indica		1		Lauraceae	1	3								1	1	Canaries: Lauro azoricae-Perseetum indicae (LAU I-1a), Azores (introduced?): scattered in ravines, Myrica-Pittosporum forests between 200-500m, Madeira:	200	1000	2,4,16
Phagnalon umbelliforme		1		Asteraceae	1	1						1	1		2	Euphorbio regis-jubae-Retametum rhodorrhizoidis: Blocklava! (KLE I-2i)	100	800	2; 119
Phoenix canariensis		1		Palmaceae	1	1								1	1	an Felsen & Pionierpflanze auf rezenten Lavaströmen, Oleo-rhamnetalia crenulatae: 50-500 m, schwer zugängliche Orte (OLR I)			2; 119
Phyllis nobla		1		Rubiaceae	1	2								1	1	Canaries: Pruno hixae-Lauretea azoricae (LAU), Lorbeerwald-Saum, Madeira: cliffs, rocky banks, and levada walls from sealevel to 1800m	0	1800	2; 4; 119
Phyllis viscosa		1		Rubiaceae	1	1						1			1	Phylliviscosae-Aeonietum sedifolii: Sonnenexponiert Felsen im Tenogebirge von Teneriffe, (ASP I-1b), meist Felspflanze			2; 119
Picconia excelsa		1		Oleaceae	1	2								1	1	Canaries: Lauro azoricae-Perseetum indicae (LAU I-1a), Madeira: rare species in laurisilva, thickets, cliffs and rocks, often in ravines, also as isolated trees			2; 4; 119
Pimpinella anagodendron		1		Apiaceae	1	1						1			1	(Nach Ortsangaben und Foto in 120)	200	1200	2; 119,120
Pimpinella cumbrae		1		Apiaceae	1	1						1			1	zona subalpina de las Canadas (auch eigene Anschauung)	1850	2300	2; 119,120
Pimpinella dendrotragium		1		Apiaceae	1	1						1			1	Greenovietum diplocyclae (ASP I-2b)	120	400	2; 119
Pimpinella junoniae		1		Apiaceae	1	1						1	1	1	3	riscos en la parte alta de zona xerofitica y en bosques	600	1200	2; 119,120
Pinus canariensis		1		Pinaceae	1	1								1	1	Cisto symphytifolii-Pinion canariensis (PIN I-1)			2; 119
Plantago arborescens		1		Plantaginaceae	1	1						1	1		2	Soncho-Aeonion (ASP I-1)	0	1000	2; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Plantago asphodeloides		1		Plantaginaceae	1	1			1						1	Küstenzone			2; 119
Plantago famarae		1		Plantaginaceae	1	1						1			1	riscos costeros	300	600	2; 119
Plantago webbii		1		Plantaginaceae	1	1						1			1	Descurainio gilvae-Plantaginetum webbii = Vulkanische Rohböden auf La Palma (PIN I 2d)	1600	2800	2; 119
Pleiomeris canariensis		1		Myrsinaceae	1	1								1	1	Lorbeerwald	600	1000	2; 119
Plocama pendula		1		Rubiaceae	1	1			1	1		1	1		4	Euphorbietum balsamiferae: küstennahe Tieflagen (KLE I-1c), Polycarpo tetraphylli-Nicotianetum-galucae (barranco Flußbetten) (CHE I-1b), Euphorbien-Formation			2; 119
Poa pitardiana		1		Poaceae	1	1									0	zonas mas altas (cumbres; Gran Canaria)			2; 119
Polycarpaea aristata		1		Caryophyllaceae	1	1									0	zona baja y pinares	200	1200	2; 119,120
Polycarpaea carnosa		1		Caryophyllaceae	1	1						1			1	en riscos basalticos	50	500	2; 119,120
Polycarpaea divaricata		1		Caryophyllaceae	1	1				1					1	Eragrostis barrelieri-Polycarpaea divaricata-Geselschaft (PLA I-2a)			2; 119
Polycarpaea filifolia		1		Caryophyllaceae	1	1						1	1		2	eigene Anschauung			2; 119,120
Polycarpaea latifolia		1		Caryophyllaceae	1	1				1					1	bordes de caminos y pistas, lugares humedos en la zona forestal	600	1000	2; 119
Polycarpaea robusta		1		Caryophyllaceae	1	1									0				119
Polycarpaea smithii		1		Caryophyllaceae	1	1						1		1	2	zona baja y risocs de bosques	500	1000	2; 119,120
Polycarpaea tenuis		1		Caryophyllaceae	1	1						1			1	Polsterpflanze; zona subalpina (Canadas)	880	2200	2; 119,120
Polypodium macaronesicum		1		Polypodiaceae	1	3						1	1	1	3	Canaries: Prenantho (pendulae)-Taeckholmietum, Fels-Ges. im Bereich der Kleinio-Euphorbietea; Madeira: rocks, cliffs, walls & tree, epiphytic			1,2,4,16
Prenanthes pendula		1		Asteraceae	1	1						1	1		2	Prenantho (paendulae)-Taeckholmietum = Felsgesellschaften im Bereich der Kleinio-Euphorbietea von Gran Canaria (ASP I-1a)	200	1500	2; 119
Prunus lusitanica ssp. hixa			1	Rosaceae	1	2								1	1	a laurisilva tree formerly scattered in Central-Madeira and the Ribeira de Janela region, but now known only from Ribeira Seca valley north of Ribeiro Frio			2; 4; 119
Pterocephalus dumetorum		1		Dispacaceae	1	1						1	1		2		300	1600	2; 119,120
Pterocephalus lasiospermus		1		Dispacaceae	1	1						1	1		2	Spartocytisietum supranubii (SPA I-1a)	2000	2500	2; 119
Pterocephalus porphyranthus		1		Dispacaceae	1	1						1			1	Tolpidetum calderae: Hochlagen von La Plama 1650-2400m (ASP I-2d), Descurainio gilvae-Plantaginetum webbii = Vulkanische Rohböden auf La Palma (PIN I-2d)			2; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Pterocephalus virens		1		Dispacaceae	1	1			1			1	1		3	rocas costeras entre el nivel del mar por los roques (höher)	0	1000	2; 119,120
Pulicaria canariensis		1		Asteraceae	1	1						1	1		2	riscos, rocas costeras			119,12
Ranunculus cortusifolius		1		Ranunculaceae	1	3					1	1	1	1	4	Canaries: Pruno hixae-lauretea azoricae (LAU), Azores: scattered in ravines & natural pastures, on steep slopes and in hedges especially between 500-800m, Madeira: Central-and N-Madeira	200	1000	1,2,16,4
Ranunculus ololeucos		1		Ranunculaceae	1	7	1								1	acequias (Gräben), charcas (Tümpel) y arroyos, a menudo en medios alterados, prefiere las aguas oligotrofas	0	1600	*1,17(I),23
Reichardia crystallina		1		Asteraceae	1	1			1						1	Crithmo-Limonietea; zonas costeras (wohl auch höhergelegene Felspartien)			2; 119,120
Reichardia famarae		1		Asteraceae	1	1						1			1	riscos	50	400	2; 119,120
Reichardia ligulata		1		Asteraceae	1	1			1			1			2	Crithmo-Limonietea: Felsen unter Brandung haupts. N-Exposition (CRI), Kleinio neriifolii-Euphorbietea canariensis (KLE), Aeonietum palmensis: Tiefland bis 1100m, Schwerpunkt auf La Palma (ASP I-1c)			2; 119
Reseda lancerotae		1		Resedaceae	1	1			1			1			2	cerca de costas	10	100	2; 119,120
Reseda scoparia		1		Resedaceae	1	1			1	1		1			3	Euphorbietum balsamiferae: küstennahe Tieflagen (KLE I-1c)(auch eigene Anschauung)			2; 119
Rhamnus crenulata		1		Rhamnaceae	1	1						1	1		2	Kleinio neriifolii-Euphorbietea canariensis (KLE), Junipero-Rhamnetum crenulatae (OLR I-1a)			119
Rhamnus glandulosa		1		Rhamnaceae	1	2							1	1	2	Canaries: Pruno-hixae-Lauretalia azoricae (LAU I), Rhamno glandulosae-Ericetum arborae: artenreich, anspruchsvoll & übergang zu Pruno-hixae-Lauretalia azoricae-Gesellschaft (LAU II-1a), Madeira: very rare tree of laurisilva in high mountain valleys of Madeira, 800-1200m	800	1200	2; 4; 119
Rhamnus integrifolia		1		Rhamnaceae	1	1									0				2; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Rubia fruticosa		1		Rubiaceae	1	2						1	1	1	3	R.f.ssp.fruticosa:Aeonio percarnei-Euphorbietum canariensis (50-500m Gran Canaria), R.f.ssp.melanocarpa: Trockengeniete, R.f.ssp.periclymenum Lauro azoricae-Perseetum indicae (LAU I-1a); Madeira: cliffs and rocky places near the sea	20	50	2; 4; 119
Rubus bollei		1		Rosaceae	1	2								1	1	Canaries: Myrico fayae-Ericion arboreae (LAU II-1), Rubion canariensis (kanar. Brombeerhecken, meist sekundär um Wirtschaftsland innerhalb der Wolkenstufe (LAU II-3), Ixantho viscosi-Laurion azoricae: Lorbeerwälder hauptsächlich auf den N-Seiten der Inesln 400-1200m (LAU I-1), Madeira: woodland, scrub, ravines, humid gullies, rock faces, steep banks and levadas mainly in N-Madeira, 50-950m	50	950	2; 4; 119
Rubus palmensis		1		Rosaceae	1	1									0		1100	1300	2; 119,122
Rumex bucephalophorus ssp. canariensis		1		Polygonaceae	1	3				1		1			2	Madeira: Disturbed soils, among rocks and by tracks and levadas, up to ca. 1600m in Madeira, on Porto Santo mostly high peaks, also known from Desertas	100	500	1,2,4,16,119
Rumex lunaria		1		Polygonaceae	1	1						1	1		2	Tricholaeno-Rumicetum lunariae = Aschenkegel, grundfrisch (KLE I-2c)			2; 119
Rumex maderensis		1		Polygonaceae	1	2				1		1	1	1	4	Canaries: Myrico fayae-Ericion arboreae (LAU II-1), Straßenränder, Kiefernwald & in „Barrancos", Madeira: common on banks, cliffs, old walls & rock faces, 500-1000m			2; 4; 119
Ruta microcarpa		1		Rutaceae	1	1						1			1	rocas y riscos			2; 119,120
Ruta oreojasme		1		Rutaceae	1	1						1	1		2	Prenantho (paendulae)-Taeckholmietum = Felsgesellschaften im Bereich der Kleinio-Euphorbietea von Gran Canaria (ASP I-1a)	200	600	2; 119
Ruta pinnata		1		Rutaceae	1	1						1			1	zonas secas rocosas	150	600	2; 119,120
Rutheopsis herbanica		1		Apiaceae	1	1									0				2; 119
Salix canariensis	Salix	1		Salicaceae	1	2								1	1	Canaries: Auwälder, Salix canariensis-Gebüsch-Gesellschaft (MJU I-1b), Pruno-Hixae-Laueretea azoricae (LAU), Madeira: common along streams and damp ravines			2; 4; 119
Salsola marujae		1		Chenopodiaceae	1	1			1						1				119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Salvia broussonetii		1		Lamiaceae	1	1						1			1	riscos	200	400	2; 119,120
Salvia canariensis		1		Lamiaceae	1	1							1		1	Cytision canariensis: sekundäre Strauchgesellschaft anstelle von Kiefern (PIN I-2)	300	1700	2; 119
Salvia herbanica		1		Lamiaceae	1	1						1			1	laderas secas (Jandia)	200	400	2; 119,120
Sambucus palmensis		1		Caprifoliaceae	1	1				1			1	1	3	Rubion canariensis (kanar. Brombeerhecken, meist sekundär im Wirtschaftsland innerhalb der Wolkenstufe (LAU II-3), Lorbeerwald			2; 119
Satureja anagae		1		Lamiaceae	1	1						1			1	frische Felsspalten oft mit Aeonium tabulaeforme(ASP I)	300	400	2; 119
Satureja benthamii		1		Lamiaceae	1	1						1	1		2	Micromerio lanatae-Cytisetum congesti (PIN I-2b)	500	1900	119
Satureja helianthemifolia		1		Lamiaceae	1	1						1	1		2	Prenantho (paendulae)-Taeckholmietum = Felsgesellschaften im Bereich der Kleinio-Euphorbietea von Gran Canaria (ASP I-1a)	200	1400	2; 119
Satureja herpyllomorpha		1		Lamiaceae	1	1									0		50	1800	2; 119
Satureja kuegleri		1		Lamiaceae	1	1			1			1			2	Helianthemo-Euphorbion balsamiferae: Küstennahe Tieflagen (KLE I-1)			2; 119
Satureja lachnophylla		1		Lamiaceae	1	1						1			1	Spartocytisetea supranubii: Gebirgshalbwüsten und alpinoide Steinschuttfluren oberhalb 2000m (SPA)	1700	2400	119
Satureja lanata		1		Lamiaceae	1	1								1	1	Cytiso proliferi-Pinetea canariensis (PIN)	700	1900	2; 119
Satureja lasiophylla		1		Lamiaceae	1	1						1			1	S.l.ssp.lasiophylla: in Felsspalten, Festuco – Greenovion (ASP I-2); S.l.ssp.palmensis: Tolpidetum calderae: Hochlagen von La Plama 1650-2400m (ASP I-2d)	200	2400	2; 119
Satureja lepida		1		Lamiaceae	1	1						1	1	1	3	S.l.ssp.lepida: Pruno hixae-Lauretea azoricae (LAU); S.l.ssp.bolleana: Kleinio neriifolii-Euphorbietea canariensis (KLE)			2; 119
Satureja leucantha		1		Lamiaceae	1	1						1	1		2	Prenantho (paendulae)-Taeckholmietum = Felsgesellschaften im Bereich der Kleinio-Euphorbietea von Gran Canaria (ASP I-1a)	200	800	2; 119
Satureja pineolens		1		Lamiaceae	1	1								1	1	Cisto symphytifolii-Pinion canariensis (PIN I-1)	700	1400	2; 119
Satureja rivas-martinezii		1		Lamiaceae	1	1						1			1	in Phontolith-Spalten			2; 119
Satureja teneriffae		1		Lamiaceae	1	1						1	1		2	Kleinio-Euphorbietalia canariensis (KLE I)	20	500	2; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Satureja tenuis		1		Lamiaceae	1	1									0				2; 119
Satureja varia		1		Lamiaceae	1	2				1		1	1		3	offene, z.T. ruderale Vegetationseinheiten, Garriguen (eigene Anschauung); ssp. thymoides (Madeira): cresce em escarpas rochosas e taludes pedregosos, ate cerca de 1000 m de altitude na ilha da Madeira, e, tambem, nas Desertas e no Porto Santo (var. thymoides), locais, sobretudo rochosos, das grandes altitudes da ilha maior (entre os Picos Ruivo e Areeiro, a 1600-1800 m)	100	1800	2,4,31,117,119
Schizogyne glaberrima		1		Asteraceae	1	1			1				1		2	Chenolenetalia tomentosae (SAL I)			2; 119
Schizogyne sericea		1		Asteraceae	1	2			1				1		2	Küstenregion, Astydamio-Euphorbietum aphyllae (KLE I-1a), Echio brevirame-Euphorbietum balsamiferae: Tieflagen bis 200m, flachgründig (KLE I-1e), Schizogyne sericea-Gesellschaft (KLE I-1g), Frankenio-Astydamietum (CRI I-1b)			2; 119
Scilla dasyantha		1		Liliaceae	1	1									0				2; 119
Scilla haemorrhoidales		1		Liliaceae	1	1						1			1		0	1600	2; 119
Scrophularia calliantha		1		Scrophulariaceae	1	1								1	1	Lorbeerwald	500	1000	2; 119
Scrophularia glabrata		1		Scrophulariaceae	1	1						1		1	2	Canadas, e veces puede encontrarse en regiones bajas a donde las semillas parecen haber sido arrastradas desde las montanas altas, regioines forestales de pinares	450	2400	2; 119,120
Scrophularia smithii		1		Scrophulariaceae	1	1							1	1	2	S.s.ssp.smithii: Ixantho viscosi-Laurion azoricae (LAU I), S.s.ssp.langeana: Gesnouinia arborea-Gesellschaft (aufgelichtete Waldstellen, relativ nährstoffreich (LAU II-1e)			2; 119
Sedum nudum		1		Crassulaceae	1	2			1			1			2	exposed rocks and sea cliffs; Soncho-Aeonion (ASP I-1)	0	300	*2,4,119
Semele androgyna		1		Liliaceae	1	2						1		1	2	Canaries: Lorbeerwald,Canaries: Ixantho viscosi-Laurion azoricae (LAU I), Madeira: mainly in rocky, wooded ravines of the interior, occasionally in damp places on the N-coast	300	1000	2; 4; 119
Semele gayae		1		Liliaceae	1	1									0				2; 119
Senecio bollei		1		Asteraceae	1	1						1			1	en grietas y andenes de los riscos de Famara, en los riscos			2; 119,120

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Senecio hermosae		1		Asteraceae	1	1						1			1	acantilados			2; 119,120
Senecio hillebrandii		1		Asteraceae	1	1				1					1	Galio-Toriletum: schattig ab 250m (ART I-1c)			2; 119
Senecio palmensis		1		Asteraceae	1	1						1	1		2	oft hängender Felsenstrauch	400	2400	2; 119
Senecio teneriffae		1		Asteraceae	1	1									0				2; 119
Seseli webbii		1		Apiaceae	1	1						1			1	costa hasta las montanas	50	1600	2; 119
Sideritis argospacela		1		Lamiaceae	1	1									0				2; 119
Sideritis barbellata		1		Lamiaceae	1	1								1	1	asociada a bosques termofilos o pinar	200	1500	2; 119,120
Sideritis bolleana		1		Lamiaceae	1	1							1	1	2	Rhamno glandulosae-Ericetum arborae: artenreich, anspruchsvoll und Übergang zuPruno-hixae-Lauretalia azoricae (LAU II-1a)	200	1000	2; 119
Sideritis brevicaulis		1		Lamiaceae	1	1						1			1	en laderas y riscos de los acantilados	200	1300	2; 119,120
Sideritis cabrerae		1		Lamiaceae	1	1									0				119
Sideritis canariensis		1		Lamiaceae	1	1								1	1	Pruno hixae-Lauretea azoricae (LAU)	500	1000	2; 119
Sideritis cystosiphon		1		Lamiaceae	1	1						1			1	en rocas secas	450	800	2; 119,120
Sideritis dasygnaphala		1		Lamiaceae	1	1						1	1	1	3	zona motana central en los dominios del pinar y matorral de leguminosas	1000	1900	2; 119,120
Sideritis dendro-chahorra		1		Lamiaceae	1	1							1	1	2	en la franja del bosque termofilo y cardonal alto	150	900	2; 119,120
Sideritis discolor		1		Lamiaceae	1	1								1	1	en los dominios de la laurisiva	600	700	2; 119,120
Sideritis eriocephala		1		Lamiaceae	1	1						1			1	en fisuras y gleras	1800	2500	2; 119,120
Sideritis gomeraea		1		Lamiaceae	1	1						1			1	en riscos en el limite inferior del bosque	400	850	2; 119,120
Sideritis infernalis		1		Lamiaceae	1	1						1			1	riscos humedos			2; 119,120
Sideritis kuegleriana		1		Lamiaceae	1	1								1	1	zona forestal baja	200	500	2; 119,120
Sideritis lotsyi		1		Lamiaceae	1	1						1	1	1	3	zona montana de Laurisilva en riscos y claros del bosque	500	1000	2; 119,120
Sideritis macrostachya		1		Lamiaceae	1	1						1	1		2	Micromerion-Genistion: kanarische Zwerstrauchheiden, Degradationsstadien des Fayo-Ericion, primär an Felsköpfen (LAU II-2)			2; 119
Sideritis marmorea		1		Lamiaceae	1	1						1			1	rocas humedas algo sombrias	300	500	2; 119
Sideritis nervosa		1		Lamiaceae	1	1						1			1	heiße Felsen	50	150	2; 119
Sideritis nutans		1		Lamiaceae	1	1						1			1	en riscos basalticos de la zona baja y submontana	200	700	2; 119,120
Sideritis oroteneriffae		1		Lamiaceae	1	1						1	1	1	3	zona montana superior o de pinar, en los escarpes montanosos y laderas de ambas vertientes	1100	1200	2; 119,120
Sideritis penzigii		1		Lamiaceae	1	1									0				119
Sideritis pumila		1		Lamiaceae	1	1						1			1	riscos	300	800	2; 119,120

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Sideritis soluta		1		Lamiaceae	1	1						1	1	1	3	Kanaren-Kiefernwald der Südseite (Tenerife) mit Gebüschen und Felsen durchsetzt			2; 119;120
Sideritis spicata		1		Lamiaceae	1	1						1	1	1	3	en cardonal-tabaibal y bosque termofilo	100	1100	2; 119,120
Sideritis sventii		1		Lamiaceae	1	1									0		400	500	2; 119
Silene berthelotiana		1		Caryophyllaceae	1	1						1			1	riscos en los barrancos profundos	500	1000	2; 119,120
Silene bourgeaui		1		Caryophyllaceae	1	1						1			1	Pflanze niedrig, fast polsterförmig ; riscos de la costa Norte (Gomera)			2; 119
Silene canariensis		1		Caryophyllaceae	1	1						1			1	Kleiner Felsenstrauch			2; 119
Silene lagunensis		1		Caryophyllaceae	1	1						1			1	kleiner Felsenhalbstrauch	200	700	2; 119
Silene nocteolens		1		Caryophyllaceae	1	1						1			1	Soncho-Aeonion (ASP I-1), Viola cheiranthifolia-Ges. (SPA I-1d), Violetum cheiranthifoliae (VIO I-1a)	600	2500	2; 119
Silene sabinosae		1		Caryophyllaceae	1	1						1			1	Felsenstrauch			2; 119
Smilax canariensis		1		Liliaceae	1	2						1	1	1	3	Canaries: Anaga & Teno an Luvseiten 500-900 (- 1100m) Madeira: occuring in laurisilva and on rocky slopes along the N-coast	500	1100	2; 4; 119
Solanum lidii		1		Solanaceae	1	1						1	1		2	"tomatero sivestre", laderas montanosas	500	700	2; 119,120
Solanum nava		1		Solanaceae	1	1								1	1	bosques de Laurisilva			119
Solanum vespertilio		1		Solanaceae	1	1						1	1		2	Euphorbienstufe			2; 119
Soleirolia soleirolii		1		Urticaceae	1	4						1			1	rochers suintants, vieux murs humides pres des fontaines - Adiantetea; entradas de cuevas, taludes, roquedos extraplomadas	50	700	*1,10,17(III)
Sonchus acaulis		1		Asteraceae	1	1						1			1	Phylliviscosae-Aeonietum sedifolii: Sonnenexponiert Felsen im Tenogebirge von Teneriffe, (ASP I-1b)	100	1600	2; 119
Sonchus bornmuelleri		1		Asteraceae	1	1						1			1	riscos			2; 119,120
Sonchus brachylobus		1		Asteraceae	1	1						1	1		2	Prenantho (paendulae)-Taeckholmietum = Felsgesellschaften im Bereich der Kleinio-Euphorbietea von Gran Canaria (ASP I-1a)			2; 119
Sonchus canariensis		1		Asteraceae	1	1						1	1		2	Aeonio percarnei-Euphorbietum canariensis (50-500m Gran Canaria) (KLE I-2a)	300	900	2; 119
Sonchus congestus		1		Asteraceae	1	1							1	1	2	Lorbeerwald, Andryalo pinnatifidae-Ericetalia arboreae (LAU II)	100	800	2; 119
Sonchus fauces-orci		1		Asteraceae	1	1						1			1	eigene Anschauung	300	600	2; 119,120
Sonchus gandogeri		1		Asteraceae	1	1						1			1	en riscos			2; 119,120
Sonchus gomerensis		1		Asteraceae	1	1									0		400	1200	2; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Sonchus gummifer		1		Asteraceae	1	1						1			1	sobre riscos	200	600	2; 119,120
Sonchus hierrensis		1		Asteraceae	1	1						1	1		2	Cheilanthes marantae-Gesellschaft (ASP I-1d), Soncho hierrensis-Greenovietum diplocyclae: Hierro, nördl. Hochlagen (ASP I-1i)	200	1000	2; 119
Sonchus lidii		1		Asteraceae	1	1									0				119
Sonchus palmensis		1		Asteraceae	1	1							1		1	Junipero-Rhamnetum crenulatae (OLR I-1a)	200	1000	2; 119
Sonchus pitardii		1		Asteraceae	1	1									0				2; 119
Sonchus radicatus		1		Asteraceae	1	2						1			1	en riscos	100	400	2; 119,120
Sonchus tectifolius		1		Asteraceae	1	1						1			1	en las laderas de orientacion Sur			2; 119
Sonchus tuberifer		1		Asteraceae	1	1						1			1	en las cimas de riscos sombreados	100	1000	2; 119,120
Sonchus wildpretii		1		Asteraceae	1	1									0				119
Spartocytisus filipes		1		Fabaceae	1	1							1		1	(Oleo-Rhamnetalia crenulatae: 50-500m, fast nur noch an schwer zugänglichen orten (OLR I))	100	900	2; 119
Spartocytisus supranubius		1		Fabaceae	1	1						1			1	Spartocytisetum supranubii (SPA I-1a)	1700	2400	2; 119
Stemmacantha cynaroides		1		Asteraceae	1	1						1			1	zona subalpina (de Las Canadas)	1900	2100	119, 120
Sventenia bupleuroides		1		Asteraceae	1	1						1			1	feuchte Felswände	600	800	2; 119
Tamus edulis		1		Dioscoreaceae	1	2			1					1	2	Canaries: Küstenzone 0-500m (-1100)m, auch Lorbeerwald, Madeira: sea cliffs in eastern Madeira			2; 4; 119
Tanacetum ferulaceum		1		Asteraceae	1	1						1			1	Felspflanze untere Stufe bis 600m			2; 119
Tanacetum oshanahanii		1		Asteraceae	1	1						1			1	riscos, en lugares frescos			2; 119
Tanacetum ptarmiciflorum		1		Asteraceae	1	1						1			1	ocupa las cotas (Höhen) mas altas, riscos	1300	1800	2; 119,120
Teline canariensis		1		Fabaceae	1	1							1		1	Myrico fayae-Ericion arboreae (LAU II-1), Teline-canariensis-Gesellschaft mittlere Höhen 500-1500m (LAU II-2a)	500	1500	2; 119
Teline hillebrandtii		1		Fabaceae	1	1							1		1				2; 119
Teline linifolia ssp. gomerae			1	Fabaceae	1	1							1		1	en los brezales	400	600	2; 119,120
Teline linifolia ssp. teneriffae			1	Fabaceae	1	1			1			1			2	riscos de la costa	50	150	2; 119,120
Teline microphylla		1		Fabaceae	1	1							1		1	Micromerio lanatae-Cytisetum congesti (PIN I-2b)			2; 119
Teline nervosa		1		Fabaceae	1	1							1	1	2	riscos, en zonas de dominio de Acebuchales y Lentiscos (bosques termofilos)			2; 119,120
Teline osyroides		1		Fabaceae	1	1							1		1	en los riscos			2; 119
Teline rosmarinifolia		1		Fabaceae	1	1						1	1		2	laderas, barrancos, riscos			2; 119,120
Teline salsoloides		1		Fabaceae	1	1						1	1		2	en riscos	200	300	2; 119,120
Teline splendens		1		Fabaceae	1	1							1	1	2	zona de Laurisiva, pinares			2; 119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Teucrium heterophyllum		1		Lamiaceae	1	2			1			1			2	vive em escarpas rochosas do litoral (ate acima de 400 m de altitude) da Madeira e das Desertas; Madeira: very rare; on rocky sea cliffs; laderas del Sur, laderas secas rocosas	0	1600	2,4,30, 117,1
Thymus origanoides		1		Lamiaceae	1	1						1			1	rocas y riscos	300	400	2; 119,120
Tinguarra cervariaefolia		1		Apiaceae	1	1						1			1	salientes de riscos basalticos (Vorsprünge von Basalt-Felsen)			2; 119
Tinguarra montana		1		Apiaceae	1	1						1	1	1	3	riscos de bosques y de la zona baja (auch eigene Anschauung)	400	1600	2; 119,120
Todaroa aurea		1		Apiaceae	1	1			1			1			2	Felspflanzen, hauptsächlich in der Küstenregion; en comunidades cerca de la costa, rocas costeras	60	100	2; 119,120
Tolpis calderae		1		Asteraceae	1	1						1			1	Tolpidetum calderae: Hochlagen von La Plama 1650-2400m (ASP I-2d)	1000	2000	2; 119
Tolpis crassiuscula		1		Asteraceae	1	1						1			1	Felspflanze	50	200	2; 119
Tolpis glabrescens		1		Asteraceae	1	1						1		1	2	Felsen im Lorbeerwald			2; 119
Tolpis laciniata		1		Asteraceae	1	1						1	1		2	trockene Orte, Aeonietum palmensis: Tiefland bis 1100m, Schwerpunkt auf La Palma (ASP I-1c), Euphorbio regis-jubae-Retametum rhodorrhizoidis: Blocklava! (KLE I-2i)			2; 119
Tolpis lagopoda		1		Asteraceae	1	1						1	1		2	felsige Orte in Wäldern, Greenovietum aureae: Felsen in der Kiefernstufe von Teneriffe und La Palma (ASP I-2a), Greenovietum diplocyclae (ASP I-2e), Cytiso proliferi-Pinetea canariensis (PIN)			2; 119
Tolpis proustii		1		Asteraceae	1	1						1			1	trockene Felsstandorte	200	1000	2; 119
Tolpis webbii		1		Asteraceae	1	1						1			1	Felspflanze des Hochgebirges, Greenovia aurea-Gesellschaft: höhere Lagen1250-1800m (ASP I-2f)	1000	1800	2; 119
Trichomanes speciosum		1		Hymenophyllacea	1	9	1					1		1	3	by waterfalls, at mouths of caves, and in similar damp, dark situations; Madeira: in lush laurisilva, in gullies by streams, florishing on the forest floor or as an epiphyte; roquedos acidos, muy humedos y umbrosos	0	700	1,2,4,16
Urtica morifolia		1		Urticaceae	1	2						1	1	1	3	Canaries: Urtico morifoliae-Rubetum ulmifolii (LAU II-3a), Madeira: rare plant of ravines, cliffs and rocky places, mainly in the eastern mountains of Madeira but also along the N-coast			1,2,4,119

Name of endemic taxon	Species group	Species	Subspecies	Plant family	Canary Islands (Ca)	Number of regions	Freshwater habitats	Bogs, mires, fens	Coastal, brackish, saline habitats	Cropland, ruderal and urban habitats	Grassland formations, grassy pastures, meadows	Rocky habitats, screes, caves	Shrubland, heath, matorral, garigue, sclerophyllous scrub	Forest	Number of habitats	Ecology, plant community	Altitude min. (m)	Altitude max. (m)	Reference
Urtica stachyoides		1		Urticaceae	1	1									0	zona baja	50	500	2; 119,120
Viburnum tinus ssp. rigidum			1	Caprifoliaceae	1	1								1	1	Lorbeerwald, Pruno hixae-Lauretea azoricae (LAU)			2; 119
Vicia chaetocalyx		1		Fabaceae	1	1									0	cerca de la costa (Gran Canaria)			2; 119,120
Vicia cirrhosa		1		Fabaceae	1	1						1		1	2	sitios sombreados, rocosos y laderas descubiertas, zona costera, riscos en la zona forestal	400	1000	2; 119,120
Vicia filicaulis		1		Fabaceae	1	1									0		500	1500	2; 119,120
Vicia scandens		1		Fabaceae	1	1							1	1	2	Lorbeerwald & Fayal-Brezal			2; 119
Vieraea laevigata		1		Asteraceae	1	1									0	en riscos basalticos	50	300	2; 119,120
Viola anagae		1		Violaceae	1	1						1		1	2	en zonas de Laurisilva			2; 119,120
Viola cheiranthifolia		1		Violaceae	1	1						1			1	Viola cheiranthifolia-Ges. (SPA I-1d), Violetum cheiranthifoliae (VIO I-1a)	2000	3100	2; 119
Viola palmensis		1		Violaceae	1	1						1			1	Viola cheiranthifolia-Ges. (SPA I-1d)	1900	2400	2; 119
Viola plantaginea		1		Violaceae	1	1									0				2; 119
Visnea mocanera		1		Theaceae	1	2								1	1	Canaries: Reine Laurus canariensis Gesellschaft (LAU I-1d) Mayteno canariensis- Juniperion phoenicae (OLR I-1), Madeira: rare & probably decreasing species, confined to banks and steep rock faces in the deep ravines of the N-Coast of Madeira from Sao Vincente westwards			2; 4; 119
Volutaria bollei		1		Asteraceae	1	1									0				119

Tab. A3: Literature consulted; listed according to the predefined European regions

Region	References
Al	Tutin et al. 1996a-e; Kurtto et al. 2004
Au	Hegi et al. 1977; Langer and Sauerbier 1997; Tutin et al. 1996a-e; Fischer and Fally 2000; Kovar- Eder et al. 2000; Sauerbier and Langer 2000; Aeschimann et al. 2004a-c; Rabitsch and Essl 2009
Az	Tutin et al. 1996a-e; Hansen and Sunding 1993; Schäfer 2005
Be	Tutin et al. 1996a-e; Kurtto et al. 2004
Bl	Universitat de les Illes Baleares 200x; Bonafè Barceló 1977; Haeupler 1983; Castroviejo et al. 1986; Castroviejo et al. 1990; Tutin et al. 1996a-e; Moreno Saiz and Sainz Ollero 1992; Castroviejo et al. 1993a, b; Castroviejo et al. 1997a, b Castroviejo et al. 1998; Castroviejo 2001, 2003, 2005; Castroviejo and Talavera 2006; Castroviejo et al. 2007; Castroviejo et al. 2009
Br	Stace 1991; Tutin et al. 1996a-e; Ramsay and Fotherbya 2007
Bu	Tutin et al. 1996a-e; Petrova 2006; Kurtto et al. 2004
Ca	Schmidt 1992; Hansen and Sunding 1993; Hohenester and Welß 1993; Bramwell and Bramwell 2001; Schönfelder and Schönfelder 2002
Co	Bouchard 1978 ; Gamisans and Marzocchi 1996; Tutin et al. 1996a-e; Médail and Verlaque 1997
Cr	Jahn and Schönfelder 1995; Tutin et al. 1996a-e; Strasser 2006; Bergmeier and Abrahamczyk 2007

Region	References
Cy	Meikle 1977; Meikle 1985; Tsintides and Kourtellarides 1998; Strasser 2006; Yildiz and Gücel 2006
Cz	Hendrych 1981; Tutin et al. 1996a-e
Da	Tutin et al. 1996a-e; Mossberg et al. 1997
Eu	Tutin et al. 1996a-e; Kurtto et al. 2004; Buttler 1986; Conert, H. J. 2000; Hendrych 1982
Fa	Tutin et al. 1996a-e; Mossberg et al. 1997
Fe	Tutin et al. 1996a-e; Lid 1985; Mossberg et al. 1997; Talbot et al. 1999
Ga	Tutin et al. 1996a-e; Langer and Sauerbier 1997; Médail and Verlaque 1997; Sauerbier and Langer 2000; Aeschimann et al. 2004a, b, c; Danton et al. 2005
Ge	Hegi et al. 1977; Tutin et al. 1996a-e; Wisskirchen and Haeupler 1998; Haeupler and Muer 2000; Oberdorfer 2001; Jäger and Werner 2002; Welk 2002; Aeschimann et al. 2004a, b, c; Kurtto et al. 2004; Hobohm 2004; Cordes et al. 2006; Walczak et al. 2008
Gr	Tutin et al. 1996a-e; Tan and Iatrou 2001; Strasser 2002; Kajan 2003; Strasser 2006
Hb	Stace 1991; Tutin et al. 1996a-e

Tab. A3: Literature consulted; listed according to the predefined European regions

He	Hegi et al. 1977; Hess et al. 1984; Anchisi 1991; Tutin et al. 1996a-e; Langer and Sauerbier 1997; Sauerbier and Langer 2000; Aeschimann et al. 2004a, b, c	**Rm**	Tutin et al. 1996a-e; Kurtto et al. 2004;
Ho	van der Mejden et al. 1983; Tutin et al. 1996a-e	**Rs (B)**	Tutin et al. 1996a-e; Fedorov 1999a, b, 2001a, b, 2002; Tzvelev 2002, 2003, 2006, 2007a, b
Hs	Universitat de les Illes Baleares 200x; de Bolos and Vigo 1984; Castroviejo et al. 1986; Castroviejo et al. 1990; de Bolos and Vigo 1990; Moreno Saiz and Sainz Ollero 1992; Castroviejo et al. 1993a, b; de Bolos and Vigo 1996; Tutin et al. 1996a-e; Castroviejo et al. 1997a,b; Castroviejo and al. 1998; Castroviejo 2001; de Bolos and Vigo 2001; Castroviejo 2003, 2005; Castroviejo and Talavera 2006; Castroviejo et al. 2007; Castroviejo et al. 2009	**Rs (C)**	Tutin et al. 1996a-e; Fedorov 1999a, b, 2001a, b, 2002; Tzvelev 2002, 2003, 2006, 2007a, b
Hu	Tutin et al. 1996a-e; Kurtto et al. 2004;	**Rs (E)**	Tutin et al. 1996a-e; Fedorov 1999a, b, 2001a, b, 2002; Tzvelev 2002, 2003, 2006, 2007a, b
Is	Tutin et al. 1996a-e; Talbot et al. 1999	**Rs (K)**	Tutin et al. 1996a-e; Fedorov 1999a, b, 2001a, b, 2002; Tzvelev 2002, 2003, 2006, 2007a, b
It	Tutin et al. 1996a-e; Langer and Sauerbier 1997; Sauerbier and Langer 2000; Aeschimann et al. 2004a, b, c; Kurtto et al. 2004;	**Rs (N)**	Tutin et al. 1996a-e; Talbot et al. 1999; Fedorov 1999a, b, 2001a, b, 2002; Tzvelev 2002, 2003, 2006, 2007a, b
Ju	Tutin et al. 1996a-e; Domac 2002; Aeschimann et al. 2004a, b, c; Nicolic and Topic 2005	**Rs (W)**	Tutin et al. 1996a-e; Fedorov 1999a, b, 2001a, b, 2002; Tzvelev 2002, 2003, 2006, 2007a, b
Lu	Castroviejo et al. 1986; Castroviejo et al. 1990; Moreno Saiz and Sainz Ollero 1992; Castroviejo et al. 1993a, b; Castroviejo et al. 1997a,b; Castroviejo and al. 1998; Castroviejo 2001; Jansen 2002; Castroviejo 2003, 2005; Castroviejo and Talavera 2006; Castroviejo et al. 2007; Castroviejo et al. 2009	**Sa**	Tutin et al. 1996a-e
Ma	Vieira 1992; Hansen and Sunding 1993; Press and Short 1994; Franquinho and Da Costa 1999; Borges et al. 2007 (Madeira/Selvagens)	**Sb**	Tutin et al. 1996a-e; Mossberg et al. 1997; Talbot et al. 1999
No	Tutin et al. 1996a-e; Lid 1985; Mossberg et al. 1997; Talbot et al. 1999	**Si**	Tutin et al. 1996a-e; Tutin et al. 1996a-e; Kurtto et al. 2004
Po	Tutin et al. 1996a-e; Kurtto et al. 2004;	**Su**	Tutin et al. 1996a-e; Lid 1985; Mossberg et al. 1997

Tab A4: Resulted geographical data from GIS analyses

Region	Area (km^2)	Altitude max (m)	Altitude min (m)	Relief (m)	Border-line (km)	Coastline (km)	Perimeter (km)	Centroid (Lat)	Centroid (Long)	No. Veg Type	No. Soil groups	SGM ice (km^2)	SGM refugia	LGM ice (km^2)	LGM refugia	TGM ice (km^2)	TGM refugia
Al	28,657	2,764	0	2,764	613	342	955	41,1423	20,0684	7	10	0	28,657	0	28,657	830	27,827
Au	84,128	3,798	115	3,683	1,890	0	1,890	47,592	14,1307	8	10	41,445	42,683	34,421	49,707	41,663	42,465
Az	2,569	2,351	0	2,351	0	610	610	38,3324	-27,3033	4	1	0	2,569	10	2,559	10	2,559
Be	33,235	694	0	694	981	93	1,074	50,5762	4,7727	5	9	0	33,235	0	33,235	0	33,235
BI	5,100	1,445	0	1,445	0	550	550	39,5597	2,8999	3	3	0	5,100	0	5,100	0	5,100
Br	230,709	1,344	0	1,344	0	8,605	8,605	54,1276	-2,6623	7	9	151,414	79,295	130,547	100,162	189,207	41,502
Bu	111,024	2,925	0	2,925	1,561	285	1,846	42,7615	25,2315	8	8	0	111,024	355	110,669	355	110,669
Ca	7,556	3,718	0	3,718	0	990	990	28,3366	-15,674	6	5	0	7,556	1	7,555	1	7,555
Co	8,780	2,707	0	2,707	0	532	532	42,1577	9,1044	5	4	0	8,780	928	7,852	928	7,852
Cr	8,508	2,456	0	2,456	0	813	813	35,2438	24,9355	5	5	0	8,508	0	8,508	0	8,508
Cy	9,138	1,951	0	1,951	0	587	587	35,0459	33,2218	5	5	0	9,138	0	9,138	0	9,138
Cz	127,692	2,655	94	2,561	2,358	0	2,358	49,3512	16,9096	7	11	0	127,692	0	127,692	3,386	124,306
Da	42,714	173	-7	180	56	3,614	3,670	55,9634	10,0463	5	7	42,714	0	31,992	10,722	42,714	0
Fa	1,484	882	0	882	0	427	427	62,0311	-6,8841	1	1	1,484	0	1,484	0	1,484	0
Fe	335,313	1,328	0	1,328	2,339	2,470	4,809	64,5004	26,2664	10	5	335,313	0	335,313	0	335,313	0
Ga	539,527	4,807	-2	4,809	2,137	3,318	5,455	46,632	2,4514	10	10	38,803	500,724	29,479	510,048	49,251	490,276
Ge	357,251	2,963	-4	2,967	2,761	1,944	4,705	51,1066	10,3936	9	11	177,854	179,397	64,796	292,455	190,603	166,648
Gr	121,564	2,919	0	2,919	941	5,997	6,938	39,3222	22,8286	10	6	0	121,564	124	121,440	124	121,440
Hb	83,924	1,041	0	1,041	0	2,816	2,816	53,426	-7,896	7	9	83,310	614	65,525	18,399	83,924	0
He	41,493	4,634	195	4,439	1,394	0	1,394	46,8025	8,2344	8	10	41,204	289	33,328	8,165	41,204	289
Ho	35,549	322	-7	329	762	1,449	2,211	52,2493	5,6034	5	7	20,822	14,727	0	35,549	20,822	14,727

Region	Area (km^2)	Altitude max (m)	Altitude min (m)	Relief (m)	Border-line (km)	Coastline (km)	Perimeter (km)	Centroid (Lat)	Centroid (Long)	No. Veg Type	No. Soil groups	SGM ice (km^2)	SGM refugia	LGM ice (km^2)	LGM refugia	TGM ice (km^2)	TGM refugia
Hs	494,053	3,478	0	3,478	1,529	2,726	4,255	40,3942	-3,5513	10	12	0	494,053	10,638	483,415	10,638	483,415
Hu	93,002	1,014	78	936	1,559	0	1,559	47,1665	19,4134	8	13	0	93,002	0	93,002	0	93,002
Is	102,962	2,119	0	2,119	0	3,637	3,637	64,9976	-18,6055	6	7	102,962	0	102,962	0	102,962	0
It	250,631	4,748	0	4,748	1,421	3,261	4,682	43,5267	12,1556	10	11	50,543	200,088	36,505	214,126	52,455	198,176
Ju	255,252	2,864	0	2,864	2,271	2,019	4,290	44,1607	18,7281	10	12	2,319	252,933	2,426	252,826	3,021	252,231
Lu	88,573	1,991	0	1,991	985	941	1,926	39,6919	-7,9622	6	9	0	88,573	86	88,487	86	88,487
Ma	774	1,862	0	1,862	0	124	124	32,7479	-16,9849	5	1	0	774	0	774	0	774
No	320,915	2,469	0	2,469	2,420	15,852	18,272	64,4482	14,0848	9	7	320,915	0	320,915	0	320,915	0
Po	311,695	2,499	-2	2,501	2,270	638	2,908	52,1246	19,4009	7	10	252,496	59,199	118,587	193,108	295,467	16,228
Rm	237,396	2,544	0	2,544	2,231	362	2,593	45,8436	24,9693	10	12	0	237,396	2,443	234,953	2,443	234,953
Rs(B)	189,125	318	0	318	1,325	2,308	3,633	56,6718	24,5036	8	10	189,125	0	187,562	1,563	189,125	0
Rs(C)	,625,765	1,750	0	1,750	8,705	1,330	10,035	56,0875	40,4615	12	11	745,572	880,193	282,382	1,343,383	1,232,664	393,101
Rs(E)	953,366	1,640	0	1,640	2,575	5,079	7,654	50,598	48,8228	13	11	0	953,366	0	953,366	53,890	899,476
Rs(K)	25,831	1,545	0	1,545	17	1,287	1,304	45,2811	34,3282	8	7	0	25,831	0	25,831	0	25,831
Rs(N)	,463,824	1,894	0	1,894	4,605	16,836	21,441	65,7585	47,1967	11	10	1,426,768	37,056	578,688	885,136	1,462,433	1,391
Rs(W)	605,414	2,061	0	2,061	3,675	1,527	5,202	49,0678	31,1139	10	11	143,530	461,884	0	605,414	147,251	458,163
Sa	24,099	1,834	0	1,834	0	838	838	40,0884	9,0339	5	7	0	24,099	0	24,099	0	24,099
Sb	62,912	2,277	0	2,277	0	5,414	5,414	78,8286	18,3635	3	1	62,912	0	62,912	0	62,912	0
Si	25,726	3,323	0	3,323	0	920	920	37,5682	14,1533	5	7	0	25,726	0	25,726	0	25,726
Su	446,070	2,111	-2	2,113	2,052	4,867	6,919	62,7899	16,7398	10	6	446,070	0	446,070	0	446,070	0
Tu	23,877	1,000	0	1,000	331	748	1,079	41,2611	27,2998	5	4	0	23,877	0	23,877	0	23,877

Tab. A5: List of names and respective calculations of all generated data used in the statistics (alphabetical order)

Variable	explanation / calculation
Alpha-index	Measure of biodiversity or regional endemism. It enables comparisons of (endemic) species densities as it uses the residuals of the species-area-relationship (SAR) or endemic-area-relationship (EAR). This measure is often applied in the field of applied conservation biology e.g. for the ranking and identification of species-rich or distinctive (biodiversity hotspot) areas. Not applied in this thesis.
Altitude (max.)	The maximum altitude of a study region was quantified in metres (m). This measure was calculated from the base map of the EvaplantE study area (GIS).
Altitude (min.)	The minimum altitude of a study region was quantified in metres (m). This measure was calculated from the base map of the EvaplantE study area (GIS).
Area **(A)**	The area of the each region was quantified in square kilometres (km^2). This measure was calculated from the base map of the EvaplantE study area (GIS).
Beta coefficient	Standardised regression coefficient z is needed to compare the relative strength of the various explanatory variables fed into regression calculation. Formula: $beta(x) = (x - \bar{x}) / SD(x)$
Borderline **('borderline')**	The borderline value represents the cumulated length of borders to neighbouring terrestrial study regions and was quantified in kilometres (km). This measure was calculated from the base map of the EvaplantE study area. Formula: borderline = perimeter – coastline
Bykov´s Index **(I_E)**	Measure of regional endemism. It determines whether the ratio of endemism within a defined area is higher or lower than the standard value that was given by Bykov. I_E is calculated by the factual endemism (E_f) divided by the expected endemism (E_n). If $E_f - E_n > 0$ then E_f / E_n ; if $E_f - E_n < 0$ then $- E_n / E_f$. The expected endemism E_n value is either read from the log-log plot of area against percentage endemism derived from Bykov's data or calculated with the formula: $\log(E_n) = 0.373 * \log(\text{area}) - 1.043$. A value of $I_E = 1$ indicates that the focused area has the normal expected degree of endemicity. If $I_E < 1$, there is lower than normal endemicity, whereas areas with $I_E > 1$ have higher than normal endemicity.
Centroid (lat./ long.)	The geometric centre of each study region was calculated from the base map of the EvaplantE study area with the help of GIS applications. The centroid points are exactly defined by latitude (lat.) and longitude (long.) data (spatial reference system: WGS 84).

Variable	explanation / calculation
Coastline ('coastline')	The coastline value represents the cumulated length of borders to adjacent marine regions and was quantified in kilometres (km). Formula: coastline = perimeter – borderline
Coastline index ('coastline index')	Explanatory index describing the isolation degree of a region. It is the proportion of coastline per perimeter of a region. Formula: 'coastline index' = $coastline_{region\ x}$ / $perimeter_{region\ x}$
Distance index ('distance index')	Explanatory index describing the isolation degree of a region. It is calculated with the natural logarithm of the minimum distance of a division to the nearest continent. Formula: 'distance index' = ln($distance_{region\ x}$ + 1)
Endemic area relationship (EAR)	Graph for the visualisation of endemic species diversity over space. Generally the displayed pattern is a positive correlation between area size and species numbers.
Endemics local	Absolute number of endemic taxa confined to exactly one of the 42 study regions. Counts of E_{local} were evaluated from EvaplantE.
Endemics 2-region	Absolute number of endemic taxa confined to one or two of the 42 study regions. Counts of Endemics 2-region were evaluated from EvaplantE.
Endemics 3-region	Absolute number of endemic taxa confined to one, two or three of the 42 study regions. Counts of Endemics 3-region were evaluated from EvaplantE.
European endemics	Absolute number of endemic taxa confined to one, two, three or more of the 42 study regions. Counts of European endemics were evaluated from EvaplantE.
Endemism (E)	Measure of regional endemism. It is the absolute number of endemic taxa within a given area.
Endemism ratio	Measure of regional endemism. It is the percentage value of endemic taxa divided by the absolute number of taxa within a given area. Formula: endemism ratio = $^{E}/_{S}$

Variable	explanation / calculation
Gearys *C*	Gearys *C* is a value for measuring spatial autocorrelation using paired comparisons of the data. It is inversely related to Moran's *I* $$C = \frac{(N-1)\sum_i \sum_j w_{ij} (x_i - x_j)^2}{2W \sum_i (x_i - \bar{x})^2}$$ where *x* as the variable of interest; *N* the number of observations and w_{ij} a weight matrix of the spatial weights and *W* is the sum of all w_{ij}.
Isolation index ('isolation index')	Explanatory index describing the isolation degree of a region. It is based on the proportion of 'coastline' per 'perimeter' but includes distance measures. All measures are calculated by dividing the distance values by 1,500, which is the maximum distance (km) of the most isolated region (Azores Archipelago) within this study.
LGM ice	Explanatory index describing the ecological (dis-)continuity of a region. Glaciation events can be interpreted as severe ecological disturbance events interrupting evolutionary processes – thus discontinuity. The extension of the ice shields of the respective glacial event in each study region was quantified in square kilometres (km^2). LGM ice was calculated from an overlay of the map showing the extent of Quaternary glaciations in Europe (focussing on the glacial maximum of the last (Weichselian) glaciation; Ehlers and Gibbard 2003, Ehlers and Gibbard 2004) and the base map of EvaplantE using GIS applications.
LGM refugia	Explanatory index describing the ecological (dis-)continuity of a region. Non-glaciated areas can be interpreted as areas of refuge in which species can survive and evolutionary processes were not interrupted – thus continuity. The refugial area of the respective glacial event in each study region was quantified in square kilometres (km^2) by subtracting the glaciated area ($A_{glaciated}$) from the total area (A) of a region focussing on the respective glacial event. Formula: LGM refugia = $A_{region\ x} - A_{LGM\text{-}glaciated\ region\ x}$
Mean	Mean is the arithmetic mean of all cases $_i$ of a respective variable *x*. Formula: Mean = $\sum x_i / N$
Moran´s *I*	Moran´s *I* is a value for measuring spatial autocorrelation dealing with the covariance of the data. It is inversely related to Geary´s *C*. Moran's *I* is defined as follows with *x* as the variable of interest; *N* the number of observations and w_{ij} a weight matrix of the spatial weights $$I = \frac{N}{\sum_i \sum_j w_{ij}} \quad \frac{\sum_i \sum_j w_{ij} (xi - \bar{x})(x_j - \bar{x})}{\sum_i (x_i - \bar{x})^2}$$

Variable	explanation / calculation
N	Number of samples. In the present thesis, number of study regions: N = 42
'neighbour-values'	For mainland regions the neighbour-value was calculated by dividing the length of the adjoining border by the distance of the centroids of the respective neighbouring region. For single island regions and archipelagos the neighbour-value was calculated by dividing an artificial borderline value of 10 km by the distance of the centroid to the respective neighbouring region (to avoid division by zero).
Non endemics ('non endmics')	Explanatory index describing the regional species pool of a region. It is quantified by the total numbers of species inhabiting one study region (literature sources) minus the number of local endemics Formula: 'non endemics' = $S_{region\ x} - E_{local\ region\ x}$
Perimeter	The perimeter of a study region was quantified in kilometres (km). This measure was calculated from the base map of the EvaplantE study area. Formula: perimeter = coastline + borderline
adjusted R^2	value for the strength of relationship of the dependent variable and the predictor variables in linear regression (LR) models
pseudo R^2	value for model strength in models of geographically weighted regression (GWR)
Relief index ('relief index')	Explanatory index describing the habitat diversity of a region. It is calculated as the difference between maximum and minimum elevation within a region. Formula: 'relief index'= $altitude_{min.\ region\ x} - altitude_{max.\ region\ x}$
Range-size-rarity	The range-size-rarity (or, more precisely, the inverse range size rarity) is a measure for quantifying features of biodiversity and endemism. Its calculation is based on counts of grid-cell units in which a taxon is present or, conversely in which the taxon is absent. The range size rarity is defined as the inverse number of cells occupied by the taxon under consideration (Heywood, 1996). To quantify the endemism richness of the grid unit the sum of range size rarities of taxa occurring within a grid cell is calculated. Not applied in this thesis.
Relief-area index ('relief-area index')	Explanatory index describing the habitat diversity of a region. It is defined as the squared altitudinal range divided by area and gives an idea of how altitude is allocated across the region. Formula: 'relief-area index' = $(altitude_{min.\ region\ x} - altitude_{max.\ region\ x})^2$ / area
Total species (S)	Absolute species number of a given region.

Variable	explanation / calculation
Species area relationship (SAR)	Graph for the visualization of species diversity over space. Generally the displayed pattern is a positive correlation between area size and species numbers. SAR fits best to the power equation with logarithmic transformation: $\log S = c + z * \log A$ (S = species number; A = area; c, z = constants). Usually, SAR is graphically displayed in a log-log-linear plot, which means that by log-transformation of the axes the resulting graph is linear-shaped.
Standard deviation (SD)	SD is a value for measuring variability in statistics. The SD gives an idea of the variation of the evaluated data points and how much the data points disperse around the average or mean value.
SGM ice	Explanatory index describing the ecological (dis-)continuity of a region. Glaciation events can be interpreted as severe ecological disturbance events interrupting evolutionary processes – thus discontinuity. The extension of the ice shields of the respective glacial event in each study region was quantified in square kilometres (km^2). SGM ice was calculated from an overlay of the map showing the extent of Quaternary glaciations in Europe (focussing on the glacial maximum of the Saalian glaciation; Ehlers and Gibbard 2003, Ehlers and Gibbard 2004) and the base map of EvaplantE using GIS applications.
SGM refugia	Explanatory index describing the ecological (dis-)continuity of a region. Non-glaciated areas can be interpreted as areas of refuge in which species can survive and evolutionary processes were not interrupted – thus continuity. The refugial area of the respective glacial event in each study region was quantified in square kilometres (km^2) by subtracting the glaciated area ($A_{glaciated}$) from the total area (A) of a region focussing on the respective glacial event. Formula: SGM refugia = $A_{region\ x} - A_{SGM\text{-}glaciated\ region\ x}$
Shape index ('shape index')	Explanatory index describing the isolation degree of a region. It is based on the assumption that the geometrical shape of a region might influence the chances of species immigration. The longer the borders towards the neighbouring regions are, the higher the chances of species immigration. However, the perimeter of a region is strongly influenced by the shape of the region or rather by its compactness. Regions that are geometrically approximately circular are more compact than regions of other forms. Formula: 'shape index' = $area_{region\ x} / (^1/_2\, perimeter_{region\ x} * \pi^2) * \pi$
Soil index ('soil index')	Explanatory index describing the habitat diversity of a region. It was based on counts of soil groups within a study region and was derived from an overlay of the latest version of the Harmonized World Soil Database (Nachtergaele et al. 2009) and the base map of EvaplantE (GIS).
Stenoecious endemics	Endemics that are absolutely bound to one habitat category, thus have narrow ecological amplitude. Counts were evaluated from EvaplantE.

Variable	explanation / calculation
TGM ice	Explanatory index describing the ecological (dis-)continuity of a region. Glaciation events can be interpreted as severe ecological disturbance events interrupting evolutionary processes – thus discontinuity. The extension of the ice shields of the respective glacial event in each study region was quantified in square kilometres (km^2). TGM ice was calculated from an overlay of a merged map layer showing the extent of all Quaternary glaciations in Europe (Ehlers and Gibbard 2003, Ehlers and Gibbard 2004) and the base map of EvaplantE using GIS applications.
TGM refugia	Explanatory index describing the ecological (dis-)continuity of a region. Non-glaciated areas can be interpreted as areas of refuge in which species can survive and evolutionary processes were not interrupted – thus continuity. The refugial area of the respective glacial event in each study region was quantified in square kilometres (km^2) by subtracting the glaciated area ($A_{glaciated}$) from the total area (A) of a region focussing on the respective glacial event. Formula: TGM refugia = $A_{region\ x} - A_{TGM\text{-}glaciated\ region\ x}$
Tolerance value (tolerance)	Value for detecting and quantifying model errors caused by multicollinearity within the multiple regression model. The tolerance value was calculated for each of the explanatory variables. It is complementary with the VIF: The smaller the tolerance value, the higher the VIF.
Total species number ('total species'; N)	Explanatory index describing the regional species pool of a region. The total number of species inhabiting one study region was evaluated by literature sources or by personal communication with local experts.
Vegetation index ('vegetation index')	Explanatory index describing the habitat diversity of a region. It was based on the number of vegetation types within a study region and was derived from an overlay of the digital maps of the natural vegetation of Europe (Bohn and Neuhäusl 2004) and the base map of EvaplantE (GIS).
Variance of inflation factor (VIF)	Value for detecting and quantifying model errors caused by multicollinearity within the multiple regression model. VIF was calculated for each of the explanatory variables. It is complementary with the tolerance value: The smaller the tolerance value, the higher the VIF.

Tab. A6: Symmetric and standardized weights matrix defining the mutual influences of neighbouring regions ('neighbour-values')

	Al	Au	Az	Be	Bi	Br	Bu	Ca	Co	Cr	Cy	Cz	Da	Fa	Fe	Ga	Ge	Gr	Hb	He	Ho
Al	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67.742	0	0	0
Au	0	0	0	0	0	0	0	0	0	0	0	134.752	0	0	0	0	123.207	0	0	37.719	0
Az	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Be	0	0	0	0	0	1.560	0	0	0	0	0	0	0	0	0	96.829	47.132	0	0	0	169.543
BI	0	0	0	0	0	0	0	0	1.669	0	0	0	0	0	0	1.267	0	0	0	0	0
Br	0	0	0	1.560	0	0	0	0	0	0	0	0	0	1.092	0	1.100	0	0	2.825	0	1.704
Bu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	88.551	0	0	0
Ca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Co	0	0	0	0	1.669	0	0	0	0	0	0	0	0	0	0	1.372	0	0	0	0	0
Cr	0	0	0	0	0	0	0	0	0	0	1.316	0	0	0	0	0	0	2.049	0	0	0
Cy	0	0	0	0	0	0	0	0	0	1.316	0	0	0	0	0	0	0	941	0	0	0
Cz	0	134.752	0	0	0	0	0	0	0	0	0	0	0	0	0	0	103.770	0	0	0	0
Da	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.294	0	0	0	0
Fa	0	0	0	0	0	1.092	0	0	0	0	0	0	0	0	0	0	0	0	1.049	0	0
Fe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ga	0	0	0	96.829	1.267	1.100	0	0	1.372	0	0	0	0	0	0	0	45.763	0	938	94.077	0
Ge	0	123.207	0	47.132	0	0	0	0	0	0	0	103.770	10.294	0	0	45.763	0	0	0	49.507	120.225
Gr	67.742	0	0	0	0	0	88.551	0	0	2.049	941	0	0	0	0	0	0	0	0	0	0
Hb	0	0	0	0	0	2.825	0	0	0	0	0	0	0	1.049	0	938	0	0	0	0	0
He	0	37.719	0	0	0	0	0	0	0	0	0	0	0	0	0	94.077	49.507	0	0	0	0
Ho	0	0	0	169.543	0	1.704	0	0	0	0	0	0	0	0	0	0	120.225	0	0	0	0

	Hs	Hu	Is	It	Ju	Lu	Ma	No	Po	Rm	Rs(B)	Rs(C)	Rs(E)	Rs(K)	Rs(N)	Rs(W)	Sa	Sb	Si	Su	Tu
Hs	0	0	0	0	0	257.180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hu	0	0	0	0	122.647	0	0	0	0	75.551	0	0	0	0	0	10.268	0	0	0	0	0
Is	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
It	0	0	0	0	33.583	0	0	0	0	0	0	0	0	0	0	0	2.169	0	1.466	0	0
Ju	0	122.647	0	33.583	0	0	0	0	0	84.121	0	0	0	0	0	0	0	0	0	0	0
Lu	257.180	0	0	0	0	0	895	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ma	0	0	0	0	0	895	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.543	0	0	619	0	696.930	0
Po	0	0	0	0	0	0	0	0	0	0	45.545	22.585	0	0	0	43.862	0	0	0	837	0
Rm	0	75.551	0	0	84.121	0	0	0	0	0	0	0	0	0	0	146.587	0	0	0	0	0
Rs(B)	0	0	0	0	0	0	0	0	45.545	0	0	106.497	0	0	0	0	0	0	0	0	0
Rs(C)	0	0	0	0	0	0	0	0	22.585	0	106.497	0	255.097	0	295.940	174.826	0	0	0	0	0
Rs(E)	0	0	0	0	0	0	0	0	0	0	0	255.097	0	0	0	36.924	0	0	0	0	0
Rs(K)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.498	0	0	0	0	0
Rs(N)	0	0	0	0	0	0	0	10.543	0	0	0	295.940	0	0	0	0	0	583	0	0	0
Rs(W)	0	10.268	0	0	0	0	0	0	43.862	146.587	0	174.826	36.924	3.498	0	0	0	0	0	0	0
Sa	0	0	0	2.169	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.908	0	0
Sb	0	0	0	0	0	0	0	619	0	0	0	0	0	0	583	0	0	0	0	0	0
Si	0	0	0	1.466	0	0	0	0	0	0	0	0	0	0	0	0	1.908	0	0	0	0
Su	0	0	0	0	0	0	0	696.930	837	0	0	0	0	0	0	0	0	0	0	0	0
Tu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Abbreviations:
Al - Albania; Au - Austria; Az - Azores Archipelago; Be - Belgium with Luxembourg; BI - Balearic Islands; Br - Great Britain; Bu - Bulgaria; Ca - Canary Islands; Co - Corsica; Cr - Crete; Cy - Cypres; Cz - Czech Republic with Slovakia; Da - Denmark; Fa - Faero; Fe - Finland; Ga - France (mainland); Ge - Germany; Gr - Greece; Hb - Ireland; He - Switzerland; Ho - The Netherlands; Hs - Spain (mainland); Hu - Hungary; Is - Iceland; It - Italy (mainland); Ju - former Yugoslavia; Lu - Portugal (mainland); Ma - Madeira Archipelago; No - Norway; Po - Poland; Rm - Romania; Rs (B) - Russia Baltic division; Rs (C) - Russia central division; Rs (E) - Russia Southeastern division; Rs (K) - Russia Crimean division; Rs (N) - Russia Northern division; Rs (W) - Russia Western division; Sa - Sardinia; Sb - Svalbard; Si - Sicily; Su - Sweden; Tu - European Turkey

Tab. A7: Plant genera of the European endemic taxa (sorted according to the total number of endemic taxa per genus)

Genus	No. of endemic taxa	Genus	No. of endemic taxa	Genus	No. of endemic taxa	Genus	No. of endemic taxa
Centaurea	250	*Senecio*	52	*Minuartia*	35	*Seseli*	25
Hieracium	174	*Erysimum*	51	*Carduus*	34	*Anthyllis*	24
Festuca	144	*Armeria*	49	*Genista*	33	*Phyteuma*	24
Campanula	132	*Sideritis*	49	*Primula*	33	*Veronica*	24
Silene	113	*Anthemis*	48	*Achillea*	32	*Arabis*	23
Galium	99	*Linaria*	47	*Pedicularis*	32	*Argyranthemum*	23
Saxifraga	95	*Thymus*	47	*Potentilla*	32	*Biscutella*	23
Alchemilla	94	*Carex*	46	*Lotus*	30	*Salix*	23
Dianthus	88	*Cerastium*	45	*Sedum*	30	*Sesleria*	23
Limonium	85	*Alyssum*	44	*Stachys*	30	*Stipa*	23
Verbascum	64	*Cirsium*	43	*Echium*	28	*Draba*	22
Ranunculus	63	*Teucrium*	43	*Polygala*	28	*Onosma*	22
Allium	61	*Knautia*	41	*Scabiosa*	28	*Peucedanum*	22
Euphorbia	57	*Euphrasia*	40	*Chamaecytisus*	27	*Brassica*	21
Astragalus	56	*Arenaria*	37	*Hypericum*	26	*Helianthemum*	21
Viola	56	*Crocus*	36	*Myosotis*	26	*Moehringia*	21
Asperula	55	*Trifolium*	36	*Leontodon*	25	*Narcissus*	21
Crepis	53	*Aeonium*	35	*Satureja*	25	*Sonchus*	21

Genus	No. of endemic taxa	Genus	No. of endemic taxa	Genus	No. of endemic taxa	Genus	No. of endemic taxa
Avenula	20	*Artemisia*	17	*Rumex*	15	*Oxytropis*	13
Dactylorhiza	20	*Cardamine*	17	*Tragopogon*	15	*Pericallis*	13
Melampyrum	20	*Geranium*	17	*Alkanna*	14	*Pimpinella*	13
Micromeria	20	*Scorzonera*	17	*Cheirolophus*	14	*Sorbus*	13
Poa	20	*Taraxacum*	17	*Globularia*	14	*Thesium*	13
Rhinanthus	20	*Thlaspi*	17	*Jurinea*	14	*Thymelaea*	13
Aquilegia	19	*Trisetum*	17	*Lathyrus*	14	*Carlina*	12
Cytisus	19	*Androsace*	16	*Onobrychis*	14	*Crambe*	12
Erodium	19	*Antirrhinum*	16	*Ornithogalum*	14	*Crataegus*	12
Fritillaria	19	*Bromus*	16	*Valeriana*	14	*Heracleum*	12
Gentiana	19	*Gentianella*	16	*Vicia*	14	*Laserpitium*	12
Ononis	19	*Salvia*	16	*Aichryson*	13	*Petrorhagia*	12
Scrophularia	19	*Delphinium*	15	*Convolvolus*	13	*Reseda*	12
Sempervivum	19	*Elymus*	15	*Helichrysum*	13	*Scilla*	12
Asplenium	18	*Iberis*	15	*Herniaria*	13	*Chaenorhinum*	11
Bupleurum	18	*Jasione*	15	*Linum*	13	*Fumaria*	11
Luzula	18	*Nepeta*	15	*Odontites*	13	*Gypsophila*	11
Monanthes	18	*Ophrys*	15	*Onopordum*	13	*Orobanche*	11

Genus	No. of endemic taxa
Plantago	11
Pulmonaria	11
Rhamnus	11
Teline	11
Tolpis	11
Vincetoxicum	11
Anchusa	10
Daphne	10
Digitalis	10
Dryopteris	10
Edraianthus	10
Erica	10
Eryngium	10
Inula	10
Iris	10
Lavandula	10
Paronychia	10
Soldanella	10

Genus	No. of endemic taxa
Aconitum	9
Aristolochia	9
Asparagus	9
Coincya	9
Cymbalaria	9
Helictotrichon	9
Helleborus	9
Hesperis	9
Pterocephalus	9
Rosa	9
Thalictrum	9
Aster	8
Centaurium	8
Cochlearia	8
Isoetes	8
Lepidium	8
Leucanthemum	8
Oenanthe	8

Genus	No. of endemic taxa
Polycarpaea	8
Scutellaria	8
Serratula	8
Symphytum	8
Agrostis	7
Andryala	7
Atalanthus	7
Bystropogon	7
Centranthus	7
Cephalaria	7
Cistus	7
Corydalis	7
Descurainia	7
Erigeron	7
Gagea	7
Holcus	7
Nigella	7
Origanum	7

Genus	No. of endemic taxa
Picris	7
Pinguicula	7
Pinus	7
Polygonum	7
Saponaria	7
Sisymbrium	7
Ulex	7
Agropyron	6
Aubrieta	6
Aurinia	6
Bolanthus	6
Chaerophyllum	6
Colchicum	6
Cynoglossum	6
Ferulago	6
Geum	6
Goniolimon	6
Hedysarum	6

Genus	No. of endemic taxa	Genus	No. of endemic taxa	Genus	No. of endemic taxa	Genus	No. of endemic taxa
Lactuca	6	*Bunium*	5	*Rubus*	5	*Calendula*	4
Lavatera	6	*Callitriche*	5	*Salicornia*	5	*Carduncellus*	4
Lilium	6	*Deschampsia*	5	*Salsola*	5	*Carum*	4
Lobularia	6	*Epilobium*	5	*Sanguisorba*	5	*Conopodium*	4
Medicago	6	*Juniperus*	5	*Scleranthus*	5	*Consolida*	4
Orchis	6	*Lamium*	5	*Sinapidendron*	5	*Coronilla*	4
Phlomis	6	*Leucanthemopsis*	5	*Tulipa*	5	*Daucus*	4
Pyrus	6	*Leucojum*	5	*Abies*	4	*Dorycnium*	4
Saussurea	6	*Ligusticum*	5	*Acer*	4	*Erucastrum*	4
Tanacetum	6	*Lonicera*	5	*Alnus*	4	*Evax*	4
Trinia	6	*Oenothera*	5	*Anarrhinum*	4	*Ferula*	4
Urtica	6	*Parolinia*	5	*Anemone*	4	*Galeopsis*	4
Adenocarpus	5	*Petrocoptis*	5	*Astrantia*	4	*Gnaphalium*	4
Aethionema	5	*Phagnalon*	5	*Bellevalia*	4	*Gonospermum*	4
Angelica	5	*Ptilostemon*	5	*Bencomia*	4	*Greenovia*	4
Athamanta	5	*Puccinellia*	5	*Biarum*	4	*Haplophyllum*	4
Atractylis	5	*Pulsatilla*	5	*Bufonia*	4	*Heptaptera*	4
Barbarea	5	*Romulea*	5	*Buglossoides*	4	*Hippocrepis*	4

Genus	No. of endemic taxa	Genus	No. of endemic taxa	Genus	No. of endemic taxa	Genus	No. of endemic taxa
Hypochoeris	4	*Spergula*	4	*Echinospartum*	3	*Narthecium*	3
Isoplexis	4	*Succisella*	4	*Epipactis*	3	*Nauplius*	3
Juncus	4	*Adenostyles*	3	*Halimium*	3	*Omalotheca*	3
Koeleria	4	*Adonis*	3	*Hierochloe*	3	*Paeonia*	3
Leuzaea	4	*Ammi*	3	*Homogyne*	3	*Petasites*	3
Lychnis	4	*Androcymbium*	3	*Ilex*	3	*Pyrola*	3
Malcolmia	4	*Antennaria*	3	*Isatis*	3	*Ramonda*	3
Melica	4	*Arum*	3	*Jonopsidium*	3	*Reichardia*	3
Omphalodes	4	*Asyneuma*	3	*Kunkeliella*	3	*Ribes*	3
Oreochloa	4	*Bellis*	3	*Lithodora*	3	*Rorippa*	3
Papaver	4	*Bornmuellera*	3	*Lupinus*	3	*Sagina*	3
Pastinaca	4	*Calamagrostis*	3	*Lysimachia*	3	*Santolina*	3
Prunus	4	*Callianthemum*	3	*Malus*	3	*Sisymbrella*	3
Quercus	4	*Ceropegia*	3	*Malva*	3	*Spiraea*	3
Rhododendron	4	*Cyclamen*	3	*Matthiola*	3	*Staehelina*	3
Ruta	4	*Cynara*	3	*Moltkia*	3	*Symphyandra*	3
Solanum	4	*Diplotaxis*	3	*Muscaria*	3	*Trachelium*	3
Solenanthus	4	*Doronicum*	3	*Murbeckiella*	3		

Genus	No. of endemic taxa	Genus	No. of endemic taxa	Genus	No. of endemic taxa	Genus	No. of endemic taxa
Acinos	2	*Frangula*	2	*Moricandia*	2	*Polystichum*	2
Ajuga	2	*Gaudinia*	2	*Musschia*	2	*Procopiania*	2
Allagopappus	2	*Gladiolus*	2	*Myrica*	2	*Pseudarrhenatherum*	2
Dracunculus	2	*Huetia*	2	*Najas*	2	*Pulicaria*	2
Drymocallis	2	*Hymenonema*	2	*Nigritella*	2	*Ricotia*	2
Cuscuta	2	*Jasminum*	2	*Olea*	2	*Rindera*	2
Chrysosplenium	2	*Jovibarba*	2	*Paederota*	2	*Rosularia*	2
Cicer	2	*Kickxia*	2	*Pancratium*	2	*Rubia*	2
Cicerbita	2	*Lathraea*	2	*Paradisea*	2	*Sambucus*	2
Clematis	2	*Launaea*	2	*Parietaria*	2	*Schizogyne*	2
Cotoneaster	2	*Lunaria*	2	*Peltaria*	2	*Semele*	2
Ctenopsis	2	*Lythrum*	2	*Phalacrocarpum*	2	*Sibthorpia*	2
Daboecia	2	*Marcetella*	2	*Picea*	2	*Spartina*	2
Echinops	2	*Marrubium*	2	*Pilularia*	2	*Spartocytisus*	2
Endressia	2	*Maytenus*	2	*Phleum*	2	*Suaeda*	2
Festucopsis	2	*Mentha*	2	*Phoenix*	2	*Syringa*	2
Fibigia	2	*Mercurialis*	2	*Phyllis*	2	*Tinguarra*	2
Filago	2	*Merendera*	2	*Picconia*	2	*Trigonella*	2

Genus	No. of endemic taxa
Tuberaria	2
Vaccinium	2
Vahlodea	2
Vella	2
Vinca	2
Waldsteinia	2
Wulfenia	2
Aesculus	1
Aetheorhiza	1
Alcea	1
Alopecurus	1
Alyssoides	1
Ammodaucus	1
Amphoricarpos	1
Anagrys	1
Anthericum	1
Apollonias	1
Arachniodes	1
Arbutus	1
Arceuthobium	1
Azorina	1
Acanthus	1
Achnatherum	1
Adenophora	1
Aremonia	1
Arisarum	1
Armoracia	1
Arnica	1
Arrhenatherum	1
Asarina	1
Asarum	1
Asphodelus	1
Babcockia	1
Baldellia	1
Barlia	1
Bassia	1
Bellium	1
Berardia	1
Betula	1
Bonannia	1
Boleum	
Borago	1
Braya	1
Bryonia	1
Bulbocodium	1
Buxus	1
Calamintha	1
Calophaca	1
Calycocorsus	1
Camphorosma	1
Campylanthus	1
Canarina	1
Cardaminsis	1
Cardaria	1
Castilleja	1
Ceballosia	1
Cedronella	1
Cedrus	1
Centrantius	1
Cephalorhynchus	1
Ceratocapnos	1
Ceterach	1
Chamaemeles	1
Chamomilla	1
Chamorchis	1
Chionodoxa	1
Chrysochamela	1
Clethra	1
Clypeola	1
Cneorum	1
Colutea	1
Corema	1

Genus	No. of endemic taxa	Genus	No. of endemic taxa	Genus	No. of endemic taxa	Genus	No. of endemic taxa
Coris	1	*Diphasiastrum*	1	*Fraxinus*	1	*Himantoglossum*	1
Corispermum	1	*Diplazium*	1	*Fumana*	1	*Hispidella*	1
Cremnophyton	1	*Dittrichia*	1	*Galanthus*	1	*Hladnikia*	1
Crucianella	1	*Drypis*	1	*Gesnouinia*	1	*Holosteum*	1
Cruciata	1	*Ebenus*	1	*Goodyera*	1	*Hornungia*	1
Cryptotaenia	1	*Ebingeria*	1	*Grafia*	1	*Huguenínia*	1
Culcita	1	*Elaphoglossum*	1	*Gratiola*	1	*Huperzia*	1
Cyanopsis	1	*Ephedra*	1	*Guillonea*	1	*Hyacinthella*	1
Cymbaria	1	*Eragrostis*	1	*Guiraoa*	1	*Hyacinthoides*	1
Cyperus	1	*Eupatorium*	1	*Habenaria*	1	*Hymenolobus*	1
Cytinus	1	*Euzomodendron*	1	*Haberlea*	1	*Hymenophyllum*	1
Dactylis	1	*Eremurus*	1	*Hacquetia*	1	*Hymenostemma*	1
Danthonia	1	*Erinus*	1	*Halacsya*	1	*Hyoseris*	1
Degenia	1	*Erythronium*	1	*Heberdenia*	1	*Ifloga*	1
Dendriopoterium	1	*Fagus*	1	*Hedera*	1	*Isopyrum*	1
Dethawia	1	*Forsskahlea*	1	*Heliotropium*	1	*Ixanthus*	1
Dicheranthus	1	*Forsythia*	1	*Hemerocallis*	1	*Jankaea*	1
Dioscorea	1	*Frankenia*	1	*Hepatica*	1	*Jasonia*	1

Genus	No. of endemic taxa	Genus	No. of endemic taxa	Genus	No. of endemic taxa	Genus	No. of endemic taxa
Johrenia	1	*Lycocarpus*	1	*Nonea*	1	*Platanthera*	1
Justicia	1	*Mandragora*	1	*Normania*	1	*Pleiomeris*	1
Kernera	1	*Marsilea*	1	*Ocotea*	1	*Pleurospermum*	1
Kitaibela	1	*Matricaria*	1	*Ophioglossum*	1	*Plocama*	1
Lafuentea	1	*Melanoselinum*	1	*Palaeocyanus*	1	*Polycnemum*	1
Lamiastrum	1	*Melilotus*	1	*Parafestuca*	1	*Polypodium*	1
Lamyropsis	1	*Melittis*	1	*Parvotrisetum*	1	*Populus*	1
Lappula	1	*Meum*	1	*Pelletiera*	1	*Portenschlagiella*	1
Larix	1	*Micropyrum*	1	*Persea*	1	*Prenanthes*	1
Laurus	1	*Misopates*	1	*Petagnia*	1	*Pritzelago*	1
Lepidophorum	1	*Molopospermum*	1	*Petrocallis*	1	*Prolongoa*	1
Lereschia	1	*Monizia*	1	*Petromarula*	1	*Prunella*	1
Limosella	1	*Morisia*	1	*Petroselinum*	1	*Pseudofumaria*	1
Lindbergella	1	*Mucizonia*	1	*Petteria*	1	*Pseudorchis*	1
Loeflingia	1	*Nanantheaa*	1	*Phalaris*	1	*Pseudorlaya*	1
Logfia	1	*Naufraga*	1	*Physoplexis*	1	*Pseudostellaria*	1
Lolium	1	*Nectaroscordum*	1	*Pittosporum*	1	*Remex*	1
Lugoa	1	*Neochamaelea*	1	*Plagius*	1	*Rheum*	1

Genus	No. of endemic taxa	Genus	No. of endemic taxa	Genus	No. of endemic taxa	Genus	No. of endemic taxa
Rhizobotrya	1	*Sideroxylon*	1	*Telekia*	1	*Viburnum*	1
Rhodothamnus	1	*Smilax*	1	*Thorella*	1	*Vieraea*	1
Rothmaleria	1	*Sobolewskia*	1	*Thymbra*	1	*Visnea*	1
Ruscus	1	*Soleirolia*	1	*Tilia*	1	*Vitaliana*	1
Rutheopsis	1	*Stauracanthus*	1	*Todaroa*	1	*Volutaria*	1
Sanicula	1	*Stemmacantha*	1	*Tofieldia*	1	*Vulpia*	1
Sarcocapnos	1	*Strangeia*	1	*Tozzia*	1	*Wagenitzia*	1
Scariola	1	*Succisa*	1	*Trachomitum*	1	*Wahlenbergia*	1
Schivereckia	1	*Sventenia*	1	*Trichomanes*	1	*Woodsia*	1
Sclerochorton	1	*Syrenia*	1	*Trochiscanthes*	1	*Xatardia*	1
Securinega	1	*Tamus*	1	*Ulmus*	1	*Zelkova*	1
Selinum	1	*Teesdaliopsis*	1	*Valentia*	1	*Ziziphora*	1

Tab. A8: Results of bivariate correlation within index group 'habitat continuity'

Spearman-Rho (2-tailed)		European endemics	Local endemics	Area	SGM ice	SGM refugia	LGM ice	LGM refugia	TGM ice	TGM-refugia
European endemics	Rho	1.000	0.561**	0.253	-0.181	0.602**	-0.049	0.519**	-0.065	0.637**
	p	.	0.000	0.105	0.252	0.000	0.759	0.000	0.682	0.000
local endemics	Rho		1.000	-0.124	-0.530**	0.460**	-0.354*	0.288	-0.465**	0.516**
	p		.	0.435	0.000	0.002	0.022	0.065	0.002	0.000
area of region	Rho			1.000	0.606**	0.519**	0.571**	0.604**	0.774**	0.430**
	p			.	0.000	0.000	0.000	0.000	0.000	0.005
SGM ice	Rho				1.000	-0.185	0.844**	-0.008	0.910**	-0.292
	p				.	0.241	0.000	0.96	0.000	0.061
SGM refugia	Rho					1.000	-0.191	0.949**	0.009	0.976**
	p					.	0.225	0.000	0.953	0.000
LGM ice	Rho						1.000	-0.064	0.844**	-0.301
	p						.	0.687	0.000	0.053
LGM refugia	Rho							1.000	0.166	0.878**
	p							.	0.295	0.000
TGM ice	Rho								1.000	-0.102
	p								.	0.521
TGM refugia	Rho									1.000
	p									.

** Significance level of 0.01 * Significance level of 0.05 (two-tailed)

Tab. A9: Results of bivariate correlation within index group 'regional species pool'

Spearman-Rho (2-tailed)		European endemics	local endemics	species pool	non-endemics
European endemics	Rho	1.000	0.561**	0.742**	0.713**
	p	.	0.000	0.000	0.000
local endemics	Rho		1.000	0.533**	0.475**
	p		.	0.000	0.001
species pool	Rho			1.000	0.994**
	p			.	0.000
non-endemics	Rho				1.000
	p				.

** Significance level of 0.01

Tab. A10: Results of bivariate correlation within index group 'habitat diversity'

Spearman-Rho (2-tailed)		European endemics	local endemics	relief index	relief area index	vegetation index	soil index
European endemics	Rho	1.000	0.561**	0.629**	0.126	0.408**	0.557**
	p	.	0.000	0.000	0.428	0.007	0.000
local endemics	Rho		1.000	0.552**	0.530**	0.126	0.049
	p		.	0.000	0.000	0.427	0.759
relief index	Rho			1.000	0.466**	0.239	0.225
	p			.	0.002	0.127	0.152
relief area index	Rho				1.000	-0.550**	-0.506**
	p				.	0.000	0.001
vegetation index	Rho					1.000	0.703**
	p					.	0.000
soil index	Rho						1.000
	p						.

** Significance level of 0.01 * Significance level of 0.05 (two-tailed)

Tab. A11: Results of bivariate correlation within index group 'isolation degree'

Spearman-Rho (2-tailed)		European endemics	local endemics	distance index	isolation index	coastline index	shape index
European endemics	Rho	1.000	0.561**	-0.405**	-0.450**	-0.500**	0.364*
	p	.	0.000	0.008	0.003	0.001	0.018
local endemics	Rho		1.000	0.106	0.203	0.150	0.232
	p		.	0.506	0.197	0.342	0.139
distance index	Rho			1.000	0.821**	0.811**	-0.180
	p			.	0.000	0.000	0.255
isolation index	Rho				1.000	0.956**	-0.392*
	p				.	0.000	0.010
coastline index	Rho					1.000	-0.412**
	p					.	0.007
shape index	Rho						1.000
	p						.

** Significance level of 0.01 * Significance level of 0.05 (two-tailed)

Tab. A12: Results of bivariate correlation within index groups of 'habitat diversity' and 'isolation degree'

Spearman-Rho (2-tailed)		relief index	relief area index	soil index	vegetation index	coastline index	isolation index	distance index	shape index
relief index	Rho	1.000	0.467**	0.239	0.295	-0.171	-0.098	-0.063	0.15
	p	.	0.002	0.127	0.058	0.279	0.538	0.694	0.344
relief area index	Rho		1.000	-0.501**	-0.534**	0.393*	0.434**	0.577**	0.217
	p		.	0.001	0.000	0.01	0.004	0.000	0.168
soil index	Rho			1.000	0.703**	-0.731**	-0.654**	-0.642**	0.292
	p			.	0.000	0.000	0.000	0.000	0.061
vegetation index	Rho				1.000	-0.536**	-0.522**	-0.686**	-0.025
	p				.	0.000	0.000	0.000	0.874
coastline index	Rho					1.000	0.956**	0.811**	-0.412**
	p					.	0.000	0.000	0.007
isolation index	Rho						1.000	.839**	-.392*
	p						.	0.000	0.01
distance index	Rho							1.000	-0.139
	p							.	0.38
shape index	Rho								1.000
	p								.

** Significance level of 0.01 * Significance level of 0.05 (two-tailed)

Tab. A13: Results of bivariate correlation between index groups of 'species pool' and 'habitat continuity'

Spearman-Rho (2-tailed)		non-endemics	LGM refugia	SGM refugia	TGM refugia	LGM ice	SGM ice	TGM ice
non-endemics	Rho	1.000	0.592**	0.625**	0.639**	0.123	0.035	0.169
	p	.	0.000	0.000	0.000	0.436	0.824	0.285
LGM refugia	Rho		1.000	0.949**	0.878**	-0.064	-0.008	0.166
	p		.	0.000	0.000	0.687	0.96	0.295
SGM refugia	Rho			1.000	0.976**	-0.191	-0.185	0.009
	p			.	0.000	0.225	0.241	0.953
TGM refugia	Rho				1.000	-0.301	-0.292	-0.102
	p				.	0.053	0.061	0.521
LGM ice	Rho					1.000	0.844**	0.844**
	p					.	0.000	0.000
SGM ice	Rho						1.000	0.910**
	p						.	0.000
TGM ice	Rho							1.000
	p							.

** Significance level of 0.01

Tab. A14: Values of standard descriptive statistics and of collinearity statistics

	Descriptive statistics				Collinearity	
	N	mean	standard deviation	variance	tolerance	VIF
local endemics	42	6.0908	5.88904	34.681	0.398	2.51
European endemics	42	18.4158	9.52672	90.758	0.167	6.0
total species	42	2450.88	1315.859	1.731E+06	0.131	7.641
non-endemics	42	2380.05	1267.341	1.606E+06	0.109	9.188
SGM ice	42	193.448	275.23153	75752.394	0.018	56.293
SGM refugia	42	240.3686	257.23501	66169.852	0.01	98.854
LGM ice	42	155.9633	212.92659	45337.733	0.063	15.909
LGM refugia	42	284	294.22	86565.307	0.098	10.231
TGM ice	42	216.1012	288.93253	83482.008	0.02	49.45
TGM refugia	42	222.1486	239.93526	57568.929	0.015	67.426
relief index	42	2208.57	1124.65	1.265E+06	0.298	3.354
relief-area index	42	11.8165	13.81576	190.875	0.335	2.988
vegetation index	42	7.29	2.653	7.038	0.171	5.855
soil index	42	7.74	3.35	11.222	0.318	3.148
coastline index	42	64.4174	36.19666	1310.198	0.068	14.787
isolation index	42	0.7674	0.38249	0.146	0.072	13.877
distance index	42	0.528539	0.7587202	0.576	0.182	5.503
shape index	42	0.453042	0.1664214	0.028	0.434	2.304

Abbreviation:
VIF- variance of inflation factor; N - number of samples

Tab. A15: Stata Output of calculated Eigen values of weights (matrix list E)

```
Matrix list
Name: E
E[42.1]

e1   1
e2   0.96871819
e3   0.92615511
e4   0.8730019
e5   0.84909228
e6   0.83822717
e7   0.7387334
e8   0.66970177
e9   0.63829717
e10  0.52374687
e11. 0.38918823
e12  0.36122987
e13  0.26466438
e14  0.20578071
e15  0.1880715
e16  0.11989836
e17  0.0621205
e18  0.02274486
e19  0.0085386
e20  -2.776e-17
e21  -0.00012908
e22  -0.02850227
e23  -0.04875329
e24  -0.17149492
e25  -0.21017158
e26  -0.26238044
e27  -0.26411579
e28  -0.28739466
e29  -0.28812076
e30  -0.32797312
e31  -0.38675312
e32  -0.38761413
e33  -0.47568046
e34  -0.52015655
e35  -0.54202839
e36  -0.60600512
e37  -0.6750778
e38  -0.67713956
e39  -0.8310514
e40  -0.86539682
e41  -0.86915333
e42  -0.922818
```

Tab. A16: Values of spatial autocorrelation (Moran´s I and Geary´s C; Stata Output)

Measures of global spatial autocorrelation

Weights matrix — Name: Weighted
Type: Imported (non-binary) — Row-standardized: Yes

Moran's I

Variables	**I**	E(I)	sd(I)	z	p-value*
z_european-endemics	**0.393**	-0.024	0.125	3.335	0.001

*2-tail test

Measures of global spatial autocorrelation

Weights matrix — Name: Weighted
Type: Imported (non-binary) — Row-standardized: Yes

Geary's c

Variables	**c**	E(c)	sd(c)	z	p-value*
z_local-endemics	**0.640**	1.000	0.159	-2.269	0.023

*2-tail test

Measures of global spatial autocorrelation

Weights matrix — Name: Weighted
Type: Imported (non-binary) — Row-standardized: Yes

Moran's I

Variables	**I**	E(I)	sd(I)	z	p-value*
z_european-endemics	**0.475**	-0.024	0.129	3.871	0.000

*2-tail test

Measures of global spatial autocorrelation

Weights matrix — Name: Weighted
Type: Imported (non-binary) — Row-standardized: Yes

Geary's c

Variables	**c**	E(c)	sd(c)	z	p-value*
z_european-endemics	**0.593**	1.000	0.142	-2.866	0.004

*2-tail test

Tab. A17: Overview on all calculated LR regression models with local endemics as dependant variable and different sets of indices for explanatory variables 'species pool'; 'isolation degree', 'habitat diversity', 'habitat continuity'. The overview is assorted according to model strength (adjusted R^2).

Regression type	**endemism**	**species pool**	**isolation degree**				**habitat diversity**			**habitat continuity**			
No.	local endemics	non-endemics	coastline index	isolation index	distance index	shape index	relief index	relief-area index	vegetation index	SGM ice	LGM ice	TGM ice	adjusted R^2
LR 1	x	x**				x**		x**		x			0.543
LR 2	x	x**	x**				x**			x*			0.542
LR 3	x	x**				x**		x**				x	0.541
LR 4	x	x**	x**				x**					x*	0.535
LR 5	x	x*	x**				x**				x*		0.534
LR 6	x	x**		x**			x**			x*			0.525
LR 7	x	x**		x**			x*					x*	0.518
LR 8	x	x*		x**			x**				x*		0.518
LR 9	x	x**				x*		x**			x		0.514
LR 10	x	x**			x			x*				x	0.480
LR 11	x	x**			x			x*		x			0.479
LR 12	x	x**			x			x**			x		0.471
LR 13	x	x*			x*		x			x			0.444
LR 14	x	x*			x*		x					x	0.443
LR 15	x	x*			x**				x			x*	0.433
LR 16	x	x*			x*		x				x		0.425
LR 17	x	x*			x**				x	x			0.417
LR 18	x	x				x	x**			x**			0.416
LR 19	x	x				x	x*					x**	0.403
LR 20	x	x				x	x**				x**		0.398
LR 21	x	x*			x**				x		x		0.379
LR 22	x	x				x			x			x*	0.292
LR 23	x	x				x			x	x*			0.290
LR 24	x	x				x			x		x		0.240

Tab. A 18: Overview on all calculated LR regression models with European endemics as dependant variable and different sets of indices for explanatory variables 'species pool'; 'isolation degree', 'habitat diversity', 'habitat continuity'. The overview is assorted according to model strength (adjusted R^2).

Regression type	**endemism**	**species pool**	**isolation degree**			**habitat diversity**				**habitat continuity**			
	European endemics	non-endemics	coastline index	isolation index	distance index	shape index	relief index	relief-area index	vegetation index	SGM ice	LGM ice	TGM ice	adjusted R^2
LR 1	x	x**			x		x**					x*	0.778
LR 2	x	x**			x		x**			x*			0.772
LR 3	x	x**	x				x**					x*	0.771
LR 4	x	x**		x			x**					x*	0.768
LR 5	x	x**	x				x**			x			0.764
LR 6	x	**x****		x			x**			x			0.762
LR 7	x	**x***			x		x**				x		0.757
LR 8	x	**x****				x	x**					x	0.756
LR 9	x	**x****	x				x**				x		0.751
LR 10	x	**x****				x	x**			x			0.750
LR 11	x	**x****		x			x**				x*		0.749
LR 12	x	**x****				x	x**				x		0.739
LR 13	x	**x****				x		x				x	0.640
LR 14	x	**x****			x			x				x	0.639
LR 15	x	**x****				x		x		x			0.632
LR 16	x	**x****			x			x		x			0.631
LR 17	x	**x****			x			x			x		0.627
LR 18	x	**x****				x		x			x		0.627
LR 19	x	**x****				x			x			x	0.624
LR 20	x	**x****			x				x			x	0.621
LR 21	x	**x****			x				x	x			0.607
LR 22	x	**x****				x			x	x			0.609
LR 23	x	**x****			x				x		x		0.598
LR 24	x	**x****				x			x		x		0.597

Tab. A19: Overview on all calculated GWR regression models with local endemics as dependant variable and different sets of indices for explanatory variables 'species pool'; 'isolation degree', 'habitat diversity', 'habitat continuity'. The overview is assorted according to model strength (pseudo-R^2).

Regression type	endemism	species pool	isolation degree			habitat diversity				habitat continuity			
No.	local endemics	non-endemics	coastline index	isolation index	distance index	shape index	relief index	relief-area-index	vegetation index	SGM ice	LGM ice	TGM ice	pseudo R^2
GWR 1	x	x**	x**				x**			x			0.618
GWR 2	x	x**	x**				x**					x	0.614
GWR 3	x	x**	x**				x**				x		0.612
GWR 4	x	x**				x**		x**		x			0.604
GWR 5	x	x**				x**		x**				x	0.602
GWR 6	x	x**		x**			x**			x			0.596
GWR 7	x	x**		x**			x**					x	0.593
GWR 8	x	x**		x**			x**				x		0.591
GWR 9	x	x**				x**		x**			x		0.585
GWR 10	x	x*				x*	x**			x*			0.545
GWR 11	x	x*			x**				x*			x	0.540
GWR 12	x	x**			x			x*				x	0.537
GWR 13	x	x**			x*			x*		x			0.537
GWR 14	x	x**			x			x*			x		0.536
GWR 15	x	x*				x*	x**					x*	0.536
GWR 16	x	x**			x*		x					x	0.531
GWR 17	x	x**			x*		x			x			0.531
GWR 18	x	x				x*	x**				x*		0.531
GWR 19	x	x*			x**				x	x			0.530
GWR 20	x	x*			x*		x				x		0.524
GWR 21	x	x*			x**				x		x		0.509
GWR 22	x	x				x*			x	x*			0.478
GWR 23	x	x				x			x			x*	0.477
GWR 24	x	x				x*			x		x		0.448

Tab. A20: Overview on all calculated GWR regression models with European endemics as dependant variable and different sets of indices for explanatory variables 'species pool'; 'isolation degree', 'habitat diversity', 'habitat continuity'. The overview is assorted according to model strength (pseudo-R^2).

Regression type	endemism	species pool	isolation degree			habitat diversity				habitat continuity			
No.	European endemics	non-endemics	coastline index	isolation index	distance index	shape index	relief index	relief-area index	vegetation index	SGM ice	LGM ice	TGM ice	pseudo R^2
GWR 1	x	x**			x		x**					x	0.807
GWR 2	x	x**			x		x**			x			0.805
GWR 3	x	x**				x	x**					x	0.805
GWR 4	x	x**	x				x**					x	0.804
GWR 5	x	x**				x	x**			x			0.804
GWR 6	x	x**		x			x**					x	0.803
GWR 7	x	x**	x				x**			x			0.802
GWR 8	x	x**				x	x**				x		0.802
GWR 9	x	x**		x			x**			x			0.801
GWR 10	x	x**	x				x**				x		0.800
GWR 11	x	x**			x		x**				x		0.800
GWR 12	x	x**		x			x**				x		0.799
GWR 13	x	x**				x		x*			x		0.729
GWR 14	x	x**			x			x			x		0.718
GWR 15	x	x**				x		x				x	0.716
GWR 16	x	x**				x		x		x			0.716
GWR 17	x	x**			x			x		x			0.699
GWR 18	x	x**			x				x			x	0.699
GWR 19	x	x**			x				x		x		0.699
GWR 20	x	x**				x			x			x	0.699
GWR 21	x	x**			x			x				x	0.697
GWR 22	x	x**			x				x	x			0.694
GWR 23	x	x**				x			x	x			0.692
GWR 24	x	x**				x			x		x		0.687

Tab. A21: Linear regression (dependent variable: local endemics; Stata output)

Model 1:

Source	SS	df	MS
Model	24.0862154	4	6.02155385
Residual	16.9137907	37	.457129477
Total	41.0000061	41	1.00000015

Number of obs	=	42
F(4, 37)	=	13.17
Prob > F	=	0.0000
R-squared	=	0.5875
Adj R-squared	**=**	**0.5429**
Root MSE	=	.67611

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
z_non-endemics	.68445	.1219275	5.61	0.000	.4374015	.9314986
z_sgm-ice	-.2391333	.1246265	-1.92	0.063	-.4916506	.013384
z_reliefarea-index	.5797253	.1273567	4.55	0.000	.3216761	.8377745
z_shape-index	-.3517851	.1229436	-2.86	0.007	-.6008925	-.1026777
constant	2.68e-07	.1043266	0.00	1.000	-.2113855	.211386

Model 2:

Source	SS	df	MS
Model	24.0697633	4	6.01744082
Residual	16.9302428	37	.457574129
Total	41.0000061	41	1.00000015

Number of obs	=	42
F(4, 37)	=	13.15
Prob > F	=	0.0000
R-squared	=	0.5871
Adj R-squared	**=**	**0.5424**
Root MSE	=	.67644

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
z_non-endemics	.4144642	.1413335	2.93	0.006	.1280952	.7008332
z_SGM-ice	-.2843311	.1076633	-2.64	0.012	-.5024778	-.0661845
z_relief-index	.3712144	.1253399	2.96	0.005	.1172516	.6251771
z_coastline-index	.4501156	.1221412	3.69	0.001	.202634	.6975971
constant	-2.76e-08	.1043773	-0.00	1.000	-.2114885	.2114885

Model 3:

Source	SS	df	MS
Model	24.0069448	4	6.00173621
Residual	16.9930612	37	.459271925
Total	41.0000061	41	1.00000015

Number of obs	=	42
F(4, 37)	=	13.07
Prob > F	=	0.0000
R-squared	=	0.5855
Adj R-squared	**=**	**0.5407**
Root MSE	=	.6777

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
z_non-endemics	.6993469	.1213736	5.76	0.000	.4534206	.9452732
z_tgm-ice	-.2307276	.12347	-1.87	0.070	-.4809017	.0194464
z_reliefarea-index	.5809137	.1278558	4.54	0.000	.3218534	.8399741
z_shape-index	-.3447686	.1224425	-2.82	0.008	-.5928607	-.0966765
constant	2.71e-07	.1045708	0.00	1.000	-.2118802	.2118808

Model 4:

Source	SS	df	MS
Model	23.7830678	4	5.94576695
Residual	17.2169383	37	.465322656
Total	41.0000061	41	1.00000015

Number of obs =	42
F(4, 37) =	12.78
Prob > F =	0.0000
R-squared =	0.5801
Adj R-squared =	**0.5347**
Root MSE =	.68215

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.4401305	.1415917	3.11	0.004	.1532384	.7270226
z_TGM-ice	-.2707524	.1083682	-2.50	0.017	-.4903272	-.0511775
z_relief-index	.3607615	.126589	2.85	0.007	.1042678	.6172552
z_coastline-index	.4505138	.1232938	3.65	0.001	.2006968	.7003307
constant	-1.53e-08	.1052574	-0.00	1.000	-.2132717	.2132716

Model 5:

Source	SS	df	MS
Model	23.7575099	4	5.93937748
Residual	17.2424962	37	.46601341
Total	41.0000061	41	1.00000015

Number of obs =	42
F(4, 37) =	12.75
Prob > F =	0.0000
R-squared =	0.5795
Adj R-squared =	**0.5340**
Root MSE =	.68265

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.3769888	.14563	2.59	0.014	.0819143	.6720633
z_LGM-ice	-.2736513	.1100952	-2.49	0.018	-.4967253	-.0505772
z_relief-index	.400947	.1267201	3.16	0.003	.1441877	.6577063
z_coastline-index	.458884	.1228948	3.73	0.001	.2098755	.7078924
constant	-6.44e-08	.1053355	-0.00	1.000	-.21343	.2134298

Model 6:

Source	SS	df	MS
Model	23.4074777	4	5.85186943
Residual	17.5925284	37	.475473739
Total	41.0000061	41	1.00000015

Number of obs =	42
F(4, 37) =	12.31
Prob > F =	0.0000
R-squared =	0.5709
Adj R-squared =	**0.5245**
Root MSE =	.68955

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.3835288	.1417378	2.71	0.010	.0963406	.6707169
z_SGM-ice	-.2818713	.1100305	-2.56	0.015	-.5048142	-.0589283
z_relief-index	.3543919	.1284169	2.76	0.009	.0941945	.6145892
z_isolation-index	.4153915	.1215624	3.42	0.002	.1690826	.6617004
constant	2.96e-08	.1063993	0.00	1.000	-.2155854	.2155854

Model 7:

Source	SS	df	MS
Model	23.164928	4	5.79123201
Residual	17.835078	37	.482029136
Total	41.0000061	41	1.00000015

Number of obs =	42
F(4, 37) =	12.01
Prob > F =	0.0000
R-squared =	0.5650
Adj R-squared =	**0.5180**
Root MSE =	.69428

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.4096277	.141714	2.89	0.006	.1224879	.6967674
z_TGM-ice	-.2699854	.1104962	-2.44	0.019	-.4938718	-.0460989
z_relief-index	.3436681	.129457	2.65	0.012	.0813633	.6059729
z_isolation-index	.4170893	.1224274	3.41	0.002	.1690279	.6651507
constant	4.21e-08	.1071302	0.00	1.000	-.2170664	.2170665

Model 8:

Source	SS	df	MS
Model	23.1614406	4	5.79036015
Residual	17.8385654	37	.48212339
Total	41.0000061	41	1.00000015

Number of obs =	42
F(4, 37) =	12.01
Prob > F =	0.0000
R-squared =	0.5649
Adj R-squared =	**0.5179**
Root MSE =	.69435

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.3466451	.1457329	2.38	0.023	.0513622	.6419279
z_LGM-ice	-.2736781	.1120863	-2.44	0.020	-.5007866	-.0465696
z_relief-index	.3832454	.1296329	2.96	0.005	.1205842	.6459065
z_isolation-index	.4262893	.1218456	3.50	0.001	.1794067	.6731719
constant	-5.65e-09	.1071407	-0.00	1.000	-.2170877	.2170877

Model 9:

Source	SS	df	MS
Model	23.0263958	4	5.75659896
Residual	17.9736102	37	.485773249
Total	41.0000061	41	1.00000015

Number of obs =	42
F(4, 37) =	11.85
Prob > F =	0.0000
R-squared =	0.5616
Adj R-squared =	**0.5142**
Root MSE =	.69697

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.6810557	.1285358	5.30	0.000	.4206175	.9414939
z_lgm-ice	-.1511124	.1334107	-1.13	0.265	-.4214281	.1192034
z_reliefarea-index	.6104402	.1330655	4.59	0.000	.3408238	.8800566
z_shape-index	-.3280001	.1273259	-2.58	0.014	-.5859868	-.0700134
constant	2.65e-07	.1075455	0.00	1.000	-.2179076	.2179081

Model 10:

Source	SS	df	MS
Model	21.768463	4	5.44211576
Residual	19.231543	37	.519771434
Total	41.0000061	41	1.00000015

Number of obs =	42
F(4, 37) =	10.47
Prob > F =	0.0000
R-squared =	0.5309
Adj R-squared =	**0.4802**
Root MSE =	.72095

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.7182015	.148242	4.84	0.000	.4178347	1.018568
z_tgm-ice	-.1034836	.128761	-0.80	0.427	-.3643782	.157411
z_reliefarea-index	.3849198	.1519345	2.53	0.016	.0770713	.6927683
z_distance-index	.2899039	.1764631	1.64	0.109	-.0676444	.6474522
constant	2.14e-07	.1112453	0.00	1.000	-.2254041	.2254045

Model 11:

Source	SS	df	MS
Model	21.7202749	4	5.43006873
Residual	19.2797311	37	.521073815
Total	41.0000061	41	1.00000015

Number of obs =	42
F(4, 37) =	10.42
Prob > F =	0.0000
R-squared =	0.5298
Adj R-squared =	**0.4789**
Root MSE =	.72185

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.7122428	.1516419	4.70	0.000	.4049872	1.019499
z_sgm-ice	-.0967116	.1301906	-0.74	0.462	-.3605028	.1670797
z_reliefarea-index	.389024	.1516021	2.57	0.014	.081849	.696199
z_distance-index	.2885026	.17749	1.63	0.113	-.0711264	.6481315
constant	2.14e-07	.1113846	0.00	1.000	-.2256863	.2256868

Model 12:

Source	SS	df	MS
Model	19.4341473	4	4.85853684
Residual	21.5658587	37	.582861046
Total	41.0000061	41	1.00000015

Number of obs =	42
F(4, 37) =	8.34
Prob > F =	0.0001
R-squared =	0.4740
Adj R-squared =	**0.4171**
Root MSE =	.76345

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.5205229	.2126894	2.45	0.019	.0895733	.9514724
z_sgm-ice	-.3514079	.1711445	-2.05	0.047	-.6981796	-.0046362
z_vegetation-index	.3281938	.2341547	1.40	0.169	-.1462487	.8026364
z_distance-index	.5692323	.1710184	3.33	0.002	.2227162	.9157484
constant	7.76e-08	.1178034	0.00	1.000	-.2386923	.2386925

Model 13:

Source	SS	df	MS
Model	20.4197117	4	5.10492793
Residual	20.5802944	37	.556224172
Total	41.0000061	41	1.00000015

Number of obs	=	42
F(4, 37)	=	9.18
Prob > F	=	0.0000
R-squared	=	0.4980
Adj R-squared	**=**	**0.4438**
Root MSE	=	.7458

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.4778601	.1984707	2.41	0.021	.0757201	.88
z_sgm-ice	-.2294676	.1292777	-1.77	0.084	-.491409	.0324738
z_relief-index	.2916483	.1490161	1.96	0.058	-.010287	.5935835
z_distance-index	.374717	.1745246	2.15	0.038	.0210966	.7283375
constant	2.28e-08	.1150801	0.00	1.000	-.2331744	.2331745

Model 14:

Source	SS	df	MS
Model	20.394432	4	5.09860801
Residual	20.605574	37	.556907406
Total	41.0000061	41	1.00000015

Number of obs	=	42
F(4, 37)	=	9.16
Prob > F	=	0.0000
R-squared	=	0.4974
Adj R-squared	=	0.4431
Root MSE	=	.74626

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.5084046	.1934132	2.63	0.012	.1165123	.9002969
z_tgm-ice	-.2236831	.1270156	-1.76	0.086	-.4810411	.0336749
z_relief-index	.2784708	.1483587	1.88	0.068	-.0221325	.5790741
z_distance-index	.3872481	.1719631	2.25	0.030	.0388179	.7356783
constant	3.60e-08	.1151508	0.00	1.000	-.2333176	.2333177

Model 15:

Source	SS	df	MS
Model	20.0274617	4	5.00686542
Residual	20.9725444	37	.566825524
Total	41.0000061	41	1.00000015

Number of obs	=	42
F(4, 37)	=	8.83
Prob > F	=	0.0000
R-squared	=	0.4885
Adj R-squared	**=**	**0.4332**
Root MSE	=	.75288

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.496813	.2078361	2.39	0.022	.0756971	.917929
z_tgm-ice	-.4085489	.1761057	-2.32	0.026	-.765373	-.0517248
z_vegetation-index	.4095719	.2441518	1.68	0.102	-.0851267	.9042704
z_distance-index	.5832244	.1677572	3.48	0.001	.2433161	.9231328
constant	4.95e-08	.1161716	0.00	1.000	-.235386	.2353861

Model 16:

Source	SS	df	MS
Model	19.7352028	4	4.9338007
Residual	21.2648033	37	.574724413
Total	41.0000061	41	1.00000015

Number of obs	=	42
F(4, 37)	=	8.58
Prob > F	=	0.0001
R-squared	=	0.4813
Adj R-squared	**=**	**0.4253**
Root MSE	=	.75811

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.4575857	.2161075	2.12	0.041	.0197104	.895461
z_lgm-ice	-.189182	.1387829	-1.36	0.181	-.4703829	.0920189
z_relief-index	.3117722	.1553084	2.01	0.052	-.0029124	.6264569
z_distance-index	.3825629	.1843486	2.08	0.045	.0090372	.7560887
constant	3.82e-09	.1169783	0.00	1.000	-.2370205	.2370205

Model 17:

Source	SS	df	MS
Model	21.4329167	4	5.35822916
Residual	19.5670894	37	.528840254
Total	41.0000061	41	1.00000015

Number of obs	=	42
F(4, 37)	=	10.13
Prob > F	=	0.0000
R-squared	=	0.5228
Adj R-squared	**=**	**0.4712**
Root MSE	=	.72721

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.7499203	.1591602	4.71	0.000	.427431	1.07241
z_lgm-ice	.0025169	.1361124	0.02	0.985	-.2732731	.2783069
z_reliefarea-index	.4239214	.1538766	2.75	0.009	.1121378	.735705
z_distance-index	.3151935	.179524	1.76	0.087	-.0485567	.6789438
constant	2.37e-07	.1122116	0.00	1.000	-.227362	.2273625

Model 18:

Source	SS	df	MS
Model	19.3750408	4	4.84376021
Residual	21.6249652	37	.584458519
Total	41.0000061	41	1.00000015

Number of obs	=	42
F(4, 37)	=	8.29
Prob > F	=	0.0001
R-squared	=	0.4726
Adj R-squared	**=**	**0.4155**
Root MSE	=	.7645

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.2345025	.1465948	1.60	0.118	-.0625268	.5315318
z_sgm-ice	-.429906	.1308566	-3.29	0.002	-.6950467	-.1647653
z_relief-index	.4030278	.1412123	2.85	0.007	.1169046	.6891511
z_shape-index	-.219878	.1363676	-1.61	0.115	-.496185	.056429
constant	-5.51e-08	.1179647	-0.00	1.000	-.2390193	.2390192

Model 19:

Source	SS	df	MS
Model	18.9088138	4	4.72720345
Residual	22.0911922	37	.59705925
Total	41.0000061	41	1.00000015

Number of obs	= 42
F(4, 37)	= 7.92
Prob > F	= 0.0001
R-squared	= 0.4612
Adj R-squared	**= 0.4029**
Root MSE	= .7727

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.2681962	.1490852	1.80	0.080	-.0338791	.5702716
z_tgm-ice	-.4094226	.1308877	-3.13	0.003	-.6746262	-.1442191
z_relief-index	.3877856	.1431274	2.71	0.010	.097782	.6777893
z_shape-index	-.2048182	.1367915	-1.50	0.143	-.4819841	.0723477
constant	-4.14e-08	.1192296	-0.00	1.000	-.2415821	.2415821

Model 20:

Source	SS	df	MS
Model	18.7374276	4	4.68435691
Residual	22.2625784	37	.601691309
Total	41.0000061	41	1.00000015

Number of obs	= 42
F(4, 37)	= 7.79
Prob > F	= 0.0001
R-squared	= 0.4570
Adj R-squared	**= 0.3983**
Root MSE	= .77569

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.1695108	.1492321	1.14	0.263	-.1328621	.4718838
z_lgm-ice	-.4172834	.1359258	-3.07	0.004	-.6926951	-.1418716
z_relief-index	.449613	.1431667	3.14	0.003	.1595297	.7396964
z_shape-index	-.2183902	.139376	-1.57	0.126	-.5007928	.0640124
constant	-1.15e-07	.1196912	-0.00	1.000	-.2425175	.2425173

Model 21:

Source	SS	df	MS
Model	18.0314692	4	4.5078673
Residual	22.9685369	37	.620771266
Total	41.0000061	41	1.00000015

Number of obs	= 42
F(4, 37)	= 7.26
Prob > F	= 0.0002
R-squared	= 0.4398
Adj R-squared	**= 0.3792**
Root MSE	= .78789

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.5587976	.2478938	2.25	0.030	.056517	1.061078
z_lgm-ice	-.2560953	.1964782	-1.30	0.200	-.6541978	.1420073
z_vegetation-indext	.2591908	.2609778	0.99	0.327	-.2696004	.7879821
z_distance-index	.58158	.1768782	3.29	0.002	.2231907	.9399693
constant	9.61e-08	.1215741	0.00	1.000	-.2463325	.2463327

Model 22:

Source	SS	df	MS
Model	14.7859766	4	3.69649415
Residual	26.2140295	37	.708487283
Total	41.0000061	41	1.00000015

Number of obs	=	42
F(4, 37)	=	5.22
Prob > F	=	0.0020
R-squared	=	0.3606
Adj R-squared	**=**	**0.2915**
Root MSE	=	.84172

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.3696355	.2286377	1.62	0.114	-.0936286	.8328996
z_tgm-ice	-.5300123	.2017367	-2.63	0.012	-.9387697	-.1212549
z_vegetation-index	.1591652	.2627412	0.61	0.548	-.373199	.6915295
z_shape-index	-.224365	.1488551	-1.51	0.140	-.5259741	.077244
constant	1.01e-07	.1298797	0.00	1.000	-.2631612	.2631614

Model 23:

Source	SS	df	MS
Model	14.7418653	4	3.68546632
Residual	26.2581408	37	.70967948
Total	41.0000061	41	1.00000015

Number of obs	=	42
F(4, 37)	=	5.19
Prob > F	=	0.0020
R-squared	=	0.3596
Adj R-squared	**=**	**0.2903**
Root MSE	=	.84242

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.3751379	.228009	1.65	0.108	-.0868522	.8371281
z_sgm-ice	-.5071223	.1940637	-2.61	0.013	-.9003327	-.1139118
z_vegetation-index	.1057689	.2494252	0.42	0.674	-.3996144	.6111523
z_shape-index	-.2368933	.1502088	-1.58	0.123	-.5412452	.0674586
constant	1.18e-07	.129989	0.00	1.000	-.2633825	.2633828

Model 24:

Source	SS	df	MS
Model	12.8599105	4	3.21497761
Residual	28.1400956	37	.760543124
Total	41.0000061	41	1.00000015

Number of obs	=	42
F(4, 37)	=	4.23
Prob > F	=	0.0064
R-squared	=	0.3137
Adj R-squared	**=**	**0.2395**
Root MSE	=	.87209

z_local-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.3530527	.2629994	1.34	0.188	-.1798346	.88594
z_lgm-ice	-.443655	.2247255	-1.97	0.056	-.898992	.011682
z_vegetation-index	.0770105	.2819108	0.27	0.786	-.494195	.6482161
z_shape-index	-.2229641	.1567052	-1.42	0.163	-.540479	.0945509
constant	9.59e-08	.1345666	0.00	1.000	-.2726577	.2726579

Tab. A22: Linear regression (dependent variable: European endemics; Stata output)

Model 1:

```
      Source        SS        df       MS            Number of obs =      42
-------------------------------------------          F(  4,    37) =   36.97
       Model   32.7955073    4  8.19887684           Prob > F      =  0.0000
    Residual   8.20449137   37  .22174301            R-squared     =  0.7999
-------------------------------------------          Adj R-squared =  0.7783
       Total   40.9999987   41  .999999969           Root MSE      =   .4709

------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      t     P>|t|      [95% Conf. Interval]
------------------------------------------------------------------------------
z_non-endemics      .3978291   .1220449     3.26   0.002      .1505427    .6451155
z_tgm-ice         -.2016802   .0801476    -2.52   0.016     -.3640747   -.0392858
z_relief-index     .4836142   .0936152     5.17   0.000      .2939317    .6732967
z_distance-index  -.2124466   .1085097    -1.96   0.058     -.4323081    .007415
constant          1.60e-07   .0726608     0.00   1.000     -.1472247    .147225
------------------------------------------------------------------------------
```

Model 2:

```
      Source        SS        df       MS            Number of obs =      42
-------------------------------------------          F(  4,    37) =   35.61
       Model   32.5452873    4  8.13632181           Prob > F      =  0.0000
    Residual   8.45471147   37  .228505715           R-squared     =  0.7938
-------------------------------------------          Adj R-squared =  0.7715
       Total   40.9999987   41  .999999969           Root MSE      =  .47802

------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      t     P>|t|      [95% Conf. Interval]
------------------------------------------------------------------------------
z_non-endemics      .3812799   .1272097     3.00   0.005      .1235286    .6390311
z_SGM_ice          -.186199   .0828604    -2.25   0.031     -.3540901   -.0183079
z_relief-index     .4924818   .0955117     5.16   0.000      .2989566    .6860069
z_distance-index  -.2119716   .1118614    -1.89   0.066     -.4386243    .0146811
constant          1.55e-07   .0737605     0.00   1.000     -.1494528    .1494531
-------------------------------------------------------------------------------
```

Model 3:

```
Source          SS        df        MS              Number of obs =      42
-------------------------------------------          F(  4,    37) =   35.57
Model      32.537444     4      8.13436099           Prob > F      =  0.0000
Residual    8.46255476   37      .228717696          R-squared     =  0.7936
-------------------------------------------          Adj R-squared =  0.7713
Total      40.9999987    41      .999999969          Root MSE      =  .47824

---------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------------------------------------------------------------------------
z_non-endemics     .4923737   .0992683     4.96   0.000      .291237    .6935104
z_TGM-ice        -.1604096   .0759757    -2.11   0.042     -.314351   -.0064682
z_relief-index     .4287201   .0887501     4.83   0.000     .2488953    .6085449
z_coastline-index -.1390583   .0864398    -1.61   0.116     -.314202    .0360855
constant          2.08e-07   .0737947     0.00   1.000    -.1495221    .1495225
---------------------------------------------------------------------------------
```

Model 4:

Source	SS	df	MS
Model	32.4294882	4	8.10737205
Residual	8.57051051	37	.231635419
Total	40.9999987	41	.999999969

Number of obs =	42
F(4, 37) =	35.00
Prob > F =	0.0000
R-squared =	0.7910
Adj R-squared =	**0.7684**
Root MSE =	.48129

z_european-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.5048067	.0982378	5.14	0.000	.305758	.7038553
z_TGM-ice	-.1596985	.0765972	-2.08	0.044	-.3148992	-.0044978
z_relief-index	.4331565	.0897411	4.83	0.000	.2513237	.6149892
z_isolation-index	-.1226733	.0848681	-1.45	0.157	-.2946323	.0492858
constant	1.93e-07	.0742639	0.00	1.000	-.1504728	.1504732

Model 5:

Source	SS	df	MS
Model	32.2753313	4	8.06883281
Residual	8.72466746	37	.235801823
Total	40.9999987	41	.999999969

Number of obs =	42
F(4, 37) =	34.22
Prob > F =	0.0000
R-squared =	0.7872
Adj R-squared =	**0.7642**
Root MSE =	.48559

z_european-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.4823627	.1014584	4.75	0.000	.2767884	.687937
z_SGM-ice	-.1385199	.0772878	-1.79	0.081	-.2951198	.0180799
z_relief-index	.435856	.0899771	4.84	0.000	.253545	.618167
z_coastline-index	-.1339792	.0876809	-1.53	0.135	-.3116375	.0436792
constant	2.06e-07	.0749288	0.00	1.000	-.15182	.1518204

Model 6:

Source	SS	df	MS
Model	32.1751183	4	8.04377957
Residual	8.82488045	37	.238510282
Total	40.9999987	41	.999999969

Number of obs =	42
F(4, 37) =	33.73
Prob > F =	0.0000
R-squared =	0.7848
Adj R-squared =	**0.7615**
Root MSE =	.48838

z_european-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.4942988	.1003867	4.92	0.000	.2908961	.6977016
z_SGM-ice	-.1384229	.0779298	-1.78	0.084	-.2963236	.0194777
z_relief-index	.4400906	.0909521	4.84	0.000	.2558042	.6243769
z_isolation-index	-.118308	.0860973	-1.37	0.178	-.2927578	.0561417
constant	1.91e-07	.0753579	0.00	1.000	-.1526895	.1526898

Model 7:

Source	SS	df	MS
Model	32.0140828	4	8.00352071
Residual	8.98591588	37	.242862591
Total	40.9999987	41	.999999969

Number of obs =	42
F(4, 37) =	32.95
Prob > F =	0.0000
R-squared =	0.7808
Adj R-squared =	**0.7571**
Root MSE =	.49281

z_european-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.3716307	.1404819	2.65	0.012	.0869874	.656274
z_LGM_ice	-.1444556	.0902166	-1.60	0.118	-.3272518	.0383406
z_relief-index	.5062489	.1009591	5.01	0.000	.3016864	.7108114
z_distance-index	-.1997334	.1198368	-1.67	0.104	-.4425459	.0430791
constant	1.44e-07	.0760424	0.00	1.000	-.1540763	.1540766

Model 8:

Source	SS	df	MS
Model	31.983205	4	7.99580124
Residual	9.01679376	37	.243697129
Total	40.9999987	41	.999999969

Number of obs =	42
F(4, 37) =	32.81
Prob > F =	0.0000
R-squared =	0.7801
Adj R-squared =	**0.7563**
Root MSE =	.49366

z_european-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.5768883	.095247	6.06	0.000	.3838996	.7698769
z_tgm-ice	-.1530012	.083621	-1.83	0.075	-.3224334	.016431
z_relief-index	.4138958	.0914406	4.53	0.000	.2286194	.5991721
z_shape-index	-.0343662	.0873928	-0.39	0.696	-.2114408	.1427085
constant	2.43e-07	.0761729	0.00	1.000	-.1543407	.1543412

Model 9:

Source	SS	df	MS
Model	31.8024461	4	7.95061152
Residual	9.19755265	37	.248582504
Total	40.9999987	41	.999999969

Number of obs =	42
F(4, 37) =	31.98
Prob > F =	0.0000
R-squared =	0.7757
Adj R-squared =	**0.7514**
Root MSE =	.49858

z_european-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.4791079	.1063621	4.50	0.000	.2635977	.6946181
z_LGM-ice	-.086031	.080409	-1.07	0.292	-.248955	.0768931
z_relief-index	.4467512	.0925511	4.83	0.000	.2592248	.6342775
z_coastline-index	-.1224991	.0897572	-1.36	0.181	-.3043645	.0593663
constant	2.04e-07	.0769326	0.00	1.000	-.1558801	.1558805

Model 10:

```
      Source         SS       df       MS              Number of obs =      42
-------------------------------------------           F(  4,    37) =   31.74
       Model   31.7486349     4  7.93715874           Prob > F      =  0.0000
    Residual   9.25136378    37  .250036859           R-squared     =  0.7744
-------------------------------------------           Adj R-squared =  0.7500
       Total   40.9999987    41  .999999969           Root MSE      =  .50004

------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      t    P>|t|      [95% Conf. Interval]
------------------------------------------------------------------------------
z_non-endemics      .5627358   .0958835     5.87   0.000      .3684574    .7570142
z_SGM-ice         -.1305002   .0855896    -1.52   0.136     -.3039211    .0429208
z_relief-index     .4215108   .0923629     4.56   0.000      .2343657    .6086558
z_shape-index     -.0275605   .0891942    -0.31   0.759     -.208285     .153164
constant          2.39e-07    .0771574     0.00   1.000     -.1563354    .1563359
------------------------------------------------------------------------------
```

Model 11:

```
      Source         SS       df       MS              Number of obs =      42
-------------------------------------------           F(  4,    37) =   31.53
       Model    31.6992075     4  7.92480187          Prob > F      =  0.0000
    Residual    9.30079124    37  .251372736          R-squared     =  0.7732
-------------------------------------------^          Adj R-squared =  0.7486
       Total    40.9999987    41  .999999969          Root MSE      =  .50137

--------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------------------------------------------------------------------
z_non-endemics      .491736   .1052295     4.67   0.000     .2785208    .7049513
z_LGM-ice        -.0848995   .0809343    -1.05   0.301     -.248888     .079089
z_relief-index    .4501057   .0936041     4.81   0.000     .2604457    .6397657
z_isolation-index -.1052564  .0879812    -1.20   0.239    -.2835232    .0730104
       _cons     1.91e-07   .0773632     0.00   1.000    -.1567525    .1567529
--------------------------------------------------------------------------------
```

Model 12:

```
      Source         SS       df       MS              Number of obs =      42
-------------------------------------------           F(  4,    37) =   30.01
       Model   31.3400354     4  7.83500884           Prob > F      =  0.0000
    Residual   9.65996336    37  .261080091           R-squared     =  0.7644
-------------------------------------------           Adj R-squared =  0.7389
       Total   40.9999987    41  .999999969           Root MSE      =  .51096

------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_non-endemics      .5485223   .098302      5.58   0.000      .3493436     .747701
z_LGM_ice         -.0728174   .0895368    -0.81   0.421     -.2542362    .1086015
z_relief-index     .4331705   .0943066     4.59   0.000      .2420872    .6242538
z_shape-index     -.0044259   .0918096    -0.05   0.962     -.1904498     .181598
constant          2.30e-07    .0788428     0.00   1.000     -.1597505     .159751
-------------------------------------------------------------------------------
```

Model 13:

```
      Source         SS        df        MS             Number of obs =      42
-------------------------------------------             F(  4,    37) =   19.22
       Model   27.6801489     4  6.92003723             Prob > F      =  0.0000
    Residual   13.3198498    37   .35999594             R-squared     =  0.6751
-------------------------------------------             Adj R-squared =  0.6400
       Total   40.9999987    41  .999999969             Root MSE      =      .6

------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_non-endemics      .8620633   .1074578     8.02   0.000      .644333    1.079794
z_tgm-ice         -.1317115   .1093139    -1.20   0.236    -.3532025    .0897795
z_reliefarea-index .1566984   .1131968     1.38   0.175    -.0726601    .3860568
z_shape-index     -.0908852   .1084042    -0.84   0.407    -.3105329    .1287626
constant           4.94e-07   .0925815     0.00   1.000    -.1875874    .1875884
------------------------------------------------------------------------------
```

Model 14:

```
      Source         SS        df        MS             Number of obs =      42
-------------------------------------------             F(  4,    37) =   19.10
       Model    27.623034     4  6.90575851             Prob > F      =  0.0000
    Residual   13.3769647    37  .361539586             R-squared     =  0.6737
-------------------------------------------             Adj R-squared =  0.6385
       Total   40.9999987    41  .999999969             Root MSE      =  .60128

-------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      t     P>|t|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_non-endemics      .7765582   .1236354     6.28   0.000      .526049    1.027067
z_tgm-ice          -.121529   .1073881    -1.13   0.265    -.3391179     .09606
z_reliefarea-index  .181929    .126715     1.44   0.159     -.07482      .438678
z_distance-index  -.1083413   .1471722    -0.74   0.466    -.4065405    .1898578
constant           4.56e-07   .0927798     0.00   1.000    -.1879892    .1879901
-------------------------------------------------------------------------------
```

Model 15:

```
      Source         SS        df        MS             Number of obs =      42
-------------------------------------------             F(  4,    37) =   18.62
       Model   27.3941935     4  6.84854838             Prob > F      =  0.0000
    Residual   13.6058052    37  .367724465             R-squared     =  0.6682
-------------------------------------------             Adj R-squared =  0.6323
       Total   40.9999987    41  .999999969             Root MSE      =   .6064

-------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      t     P>|t|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_non-endemics      .8600513   .1093562     7.86   0.000     .6384746     1.081628
z_SGM-ice         -.0896741   .1117769    -0.80   0.428    -.3161556    .1368075
z_reliefarea-index .1739731   .1142256     1.52   0.136    -.0574699    .4054162
z_shape-index     -.0818393   .1102675    -0.74   0.463    -.3052625    .1415839
constant           4.98e-07    .09357      0.00   1.000    -.1895903    .1895913
-------------------------------------------------------------------------------
```

Model 16:

```
      Source         SS        df        MS              Number of obs =      42
-------------------------------------------              F(  4,    37) =   18.56
       Model   27.3610383     4  6.84025958              Prob > F      =  0.0000
    Residual   13.6389604    37  .368620551              R-squared     =  0.6673
-------------------------------------------              Adj R-squared =  0.6314
       Total   40.9999987    41  .999999969              Root MSE      =  .60714

------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      t     P>|t|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_non-endemics      .7818878   .1275438     6.13   0.000      .5234595    1.040316
z_SGM-ice          -.0808646   .1095014    -0.74   0.465     -.3027356    .1410064
z_reliefarea-index  .1982413   .1275103     1.55   0.129     -.0601191    .4566017
z_distance-index   -.1012012   .1492843    -0.68   0.502     -.4036799    .2012775
constant            4.63e-07   .0936839     0.00   1.000     -.1898212    .1898221
------------------------------------------------------------------------------
```

Model 17:

```
      Source         SS        df        MS              Number of obs =      42
-------------------------------------------              F(  4,    37) =   18.24
       Model   27.2030423     4  6.80076057              Prob > F      =  0.0000
    Residual   13.7969564    37  .372890714              R-squared     =  0.6635
-------------------------------------------              Adj R-squared =  0.6271
       Total   40.9999987    41  .999999969              Root MSE      =  .61065

-------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      t     P>|t|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_non-endemics      .8313627   .1336482     6.22   0.000      .5605657     1.10216
z_LGM_ice           .0388268   .1142948     0.34   0.736     -.1927564      .27041
z_reliefarea-index  .240844    .1292115     1.86   0.070     -.0209633    .5026513
z_distance-index   -.0684431   .1507478    -0.45   0.652     -.3738873     .237001
constant            4.95e-07   .094225      0.00   1.000     -.1909175    .1909185
------------------------------------------------------------------------------
```

Model 18:

```
      Source         SS        df        MS              Number of obs =      42
-------------------------------------------              F(  4,    37) =   18.22
       Model    27.191804     4    6.797951              Prob > F      =  0.0000
    Residual   13.8081947    37  .373194452              R-squared     =  0.6632
-------------------------------------------              Adj R-squared =  0.6268
       Total   40.9999987    41  .999999969              Root MSE      =   .6109

------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      t     P>|t|      [95% Conf. Interval]
------------------------------------------------------------------------------
z_non-endemics      .8810514   .1126613     7.82   0.000      .6527779    1.109325
z_LGM_ice           .0354428   .1169342     0.30   0.764     -.2014884    .2723739
z_reliefarea-index  .2226428   .1166316     1.91   0.064     -.0136754    .4589609
z_shape-index      -.0468      .1116008    -0.42   0.677     -.2729248    .1793247
constant            5.16e-07   .0942634     0.00   1.000     -.1909952    .1909962
-------------------------------------------------------------------------------
```

Model 19

```
      Source         SS        df        MS              Number of obs =      42
-------------------------------------------              F(  4,    37) =   18.02
       Model   27.0926541     4  6.77316352              Prob > F      =  0.0000
    Residual   13.9073447    37  .37587418               R-squared     =  0.6608
-------------------------------------------              Adj R-squared =  0.6241
       Total   40.9999987    41  .999999969              Root MSE      =  .61309

------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      t     P>|t|      [95% Conf. Interval]
------------------------------------------------------------------------------
z_non-endemics      .7336729   .1665341     4.41   0.000     .3962428    1.071103
z_tgm-ice          -.243508    .14694      -1.66   0.106    -.5412368    .0542208
z_vegetation-index  .0998686   .1913742     0.52   0.605    -.2878924    .4876296
z_shape-index      -.0569817   .1084224    -0.53   0.602    -.2766663    .1627029
constant           4.25e-07    .0946012     0.00   1.000    -.1916798    .1916806
------------------------------------------------------------------------------
```

Model 20:

```
      Source         SS        df        MS              Number of obs =      42
-------------------------------------------              F(  4,    37) =   17.83
       Model   26.9931052     4   6.7482763              Prob > F      =  0.0000
    Residual   14.0068935    37  .378564689              R-squared     =  0.6584
-------------------------------------------              Adj R-squared =  0.6214
       Total   40.9999987    41  .999999969              Root MSE      =  .61528

-----------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      t     P>|t|     [95% Conf. Interval]
-----------------------------------------------------------------------------
z_non-endemics      .7193484   .1698503     4.24   0.000      .375199    1.063498
z_tgm-ice          -.2242853   .1439192    -1.56   0.128    -.5158933    .0673228
z_vegetation-index  .1101271   .1995287     0.55   0.584    -.2941563    .5144106
z_distance-index    .0145602   .1370965     0.11   0.916    -.2632238    .2923441
constant           4.10e-07    .0949392     0.00   1.000    -.1923646    .1923654
-----------------------------------------------------------------------------
```

Model 21:

```
      Source         SS        df        MS              Number of obs =      42
-------------------------------------------              F(  4,    37) =   16.86
       Model   26.4745954     4  6.61864886              Prob > F      =  0.0000
    Residual   14.5254033    37  .392578467              R-squared     =  0.6457
-------------------------------------------              Adj R-squared =  0.6074
       Total   40.9999987    41  .999999969              Root MSE      =  .62656

------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_non-endemics      .7716218  .1745527     4.42   0.000     .4179445    1.125299
z_SGM_ice          -.141936   .1404571    -1.01   0.319    -.4265291    .1426571
z_vegetation-index  .0207021  .1921692     0.11   0.915    -.3686696    .4100738
z_distance-index    .01359    .1403536     0.10   0.923    -.2707934    .2979733
constant           4.49e-07   .0966804     0.00   1.000    -.1958927    .1958936
-----------------------------------------------------------------------------
```

Model 22:

Source	SS	df	MS
Model	26.542936	4	6.635734
Residual	14.4570627	37	.390731425
Total	40.9999987	41	.999999969

Number of obs =	42
F(4, 37) =	16.98
Prob > F =	0.0000
R-squared =	0.6474
Adj R-squared =	**0.6093**
Root MSE =	.62509

z_european-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.7812785	.1691843	4.62	0.000	.4384786	1.124078
z_SGM-ice	-.1600222	.1439967	-1.11	0.274	-.4517871	.1317428
z_vegetation-index	.0124351	.1850752	0.07	0.947	-.3625629	.3874331
z_shape-index	-.0478514	.111456	-0.43	0.670	-.2736826	.1779799
constant	4.61e-07	.0964527	0.00	1.000	-.1954313	.1954323

Model 23:

Source	SS	df	MS
Model	26.1132041	4	6.52830101
Residual	14.8867947	37	.402345802
Total	40.9999987	41	.999999969

Number of obs =	42
F(4, 37) =	16.23
Prob > F =	0.0000
R-squared =	0.6369
Adj R-squared =	**0.5977**
Root MSE =	.63431

z_european-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.9258804	.199572	4.64	0.000	.5215091	1.330252
z_LGM_ice	.0495604	.1581788	0.31	0.756	-.2709402	.3700611
z_vegetation-index	-.1502302	.2101055	-0.72	0.479	-.5759445	.275484
z_distance-index	.0388381	.1423994	0.27	0.787	-.2496906	.3273667
constant	5.46e-07	.0978757	0.00	1.000	-.1983146	.1983156

Model 24:

Source	SS	df	MS
Model	26.0848261	4	6.52120653
Residual	14.9151726	37	.403112773
Total	40.9999987	41	.999999969

Number of obs =	42
F(4, 37) =	16.18
Prob > F =	0.0000
R-squared =	0.6362
Adj R-squared =	**0.5969**
Root MSE =	.63491

z_european-endemics	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
z_non-endemics	.9105802	.1914723	4.76	0.000	.5226204	1.29854
z_LGM_ice	.0402771	.1636077	0.25	0.807	-.2912235	.3717777
z_vegetation-index	-.1625836	.2052405	-0.79	0.433	-.5784404	.2532731
z_shape-index	-.0070777	.1140867	-0.06	0.951	-.2382393	.2240838
constant	5.45e-07	.097969	0.00	1.000	-.1985035	.1985046

Tab. A23: Geographically weighted regression (dependent variable: local endemics;Stata output)

```
Model 1:
initial:       log likelihood = -40.677274
rescale:       log likelihood = -40.677274
rescale eq:    log likelihood = -40.677274
Iteration 0:   log likelihood = -40.677274
Iteration 1:   log likelihood = -39.464809
Iteration 2:   log likelihood = -39.159808
Iteration 3:   log likelihood = -39.158859
Iteration 4:   log likelihood = -39.158858

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs   =        42
                                                    Variance ratio  =     0.607
                                                    Squared corr.   =     0.618
Log likelihood = -39.158858                         Sigma           =      0.61
------------------------------------------------------------------------------
                      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics     .4113866   .1275379     3.23   0.001     .1614169    .6613564
z_SGM-ice        -.1946876   .1106291    -1.76   0.078    -.4115166    .0221414
z_relief-index     .3384471    .114737     2.95   0.003     .1135667    .5633275
z_coastline-index  .4397962   .1103761     3.98   0.000     .2234631    .6561293
constant         -.0173877   .0947374    -0.18   0.854    -.2030695    .1682942
------------------------------------------------------------------------------
         rho        .211153    .124679     1.69   0.090    -.0332133    .4555193
------------------------------------------------------------------------------
Wald test of rho=0:                   chi2(1) =   2.868 (0.090)
Likelihood ratio test of rho=0:       chi2(1) =   2.713 (0.100)
Lagrange multiplier test of rho=0:    chi2(1) =   2.835 (0.092)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 2:
initial:        log likelihood =  -41.02991
rescale:        log likelihood =  -41.02991
rescale eq:     log likelihood =  -41.02991
Iteration 0:    log likelihood =  -41.02991
Iteration 1:    log likelihood = -39.769008
Iteration 2:    log likelihood = -39.417389
Iteration 3:    log likelihood = -39.415922
Iteration 4:    log likelihood = -39.415921

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs   =        42
                                                    Variance ratio  =     0.602
                                                    Squared corr.   =     0.614
Log likelihood = -39.415921                         Sigma           =      0.61
------------------------------------------------------------------------------
                     Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics    .4288851   .1275515     3.36   0.001     .1788888    .6788814
z_TGM-ice        -.1776361    .110988    -1.60   0.109    -.3951685    .0398964
z_relief-index    .3304057   .1151972     2.87   0.004     .1046234     .556188
z_coastline-index .4404418   .1110761     3.97   0.000     .2227367    .6581469
constant         -.0180911   .0952592    -0.19   0.849    -.2047958    .1686136
------------------------------------------------------------------------------
         rho      .2196958   .1251183     1.76   0.079    -.0255315    .4649231
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   3.083 (0.079)
Likelihood ratio test of rho=0:        chi2(1) =   2.904 (0.088)
Lagrange multiplier test of rho=0:     chi2(1) =   3.010 (0.083)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 3:
initial:        log likelihood =  -41.06106
rescale:        log likelihood =  -41.06106
rescale eq:     log likelihood =  -41.06106
Iteration 0:    log likelihood =  -41.06106
Iteration 1:    log likelihood = -39.809556
Iteration 2:    log likelihood =  -39.50511
Iteration 3:    log likelihood = -39.504161
Iteration 4:    log likelihood =  -39.50416

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs   =        42
                                                    Variance ratio  =     0.600
                                                    Squared corr.   =     0.612
Log likelihood = -39.50416                          Sigma           =      0.62
------------------------------------------------------------------------------
                     Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics    .3886696   .1313925     2.96   0.003     .1311451     .646194
z_LGM-ice        -.1761553   .1142551    -1.54   0.123    -.4000913    .0477807
z_relief-index    .3567764   .1170314     3.05   0.002     .1273991    .5861538
z_coastline-index .4466425   .1109602     4.03   0.000     .2291645    .6641205
constant         -.0179629   .0954832    -0.19   0.851    -.2051066    .1691807
------------------------------------------------------------------------------
         rho      .2181385     .12684     1.72   0.085    -.0304634    .4667404
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   2.958 (0.085)
Likelihood ratio test of rho=0:        chi2(1) =   2.790 (0.095)
Lagrange multiplier test of rho=0:     chi2(1) =   2.937 (0.087)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 4:
initial:       log likelihood = -40.656858
rescale:       log likelihood = -40.656858
rescale eq:    log likelihood = -40.656858
Iteration 0:   log likelihood = -40.656858
Iteration 1:   log likelihood = -39.899676
Iteration 2:   log likelihood = -39.829327
Iteration 3:   log likelihood = -39.829219
Iteration 4:   log likelihood = -39.829219

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.597
                                                    Squared corr.    =     0.604
Log likelihood = -39.829219                         Sigma            =      0.62
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P> z      [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics      .6569574   .1145675     5.73   0.000     .4324093    .8815056
z_sgm-ice         -.2038642   .1185051    -1.72   0.085    -.4361299    .0284015
z_reliefarea-index  .516446   .1289654     4.00   0.000     .2636785    .7692135
z_shape-index     -.3777475   .1152247    -3.28   0.001    -.6035838   -.1519112
constant          -.0137403   .0966678    -0.14   0.887    -.2032058    .1757252
------------------------------------------------------------------------------
             rho    .1668633   .1422692     1.17   0.241    -.1119792    .4457058
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   1.376 (0.241)
Likelihood ratio test of rho=0:        chi2(1) =   1.332 (0.249)
Lagrange multiplier test of rho=0:     chi2(1) =   1.350 (0.245)
Acceptable range for rho: -1.084 < rho < 1.000


Model 5:
initial:       log likelihood = -40.755049
rescale:       log likelihood = -40.755049
rescale eq:    log likelihood = -40.755049
Iteration 0:   log likelihood = -40.755049
Iteration 1:   log likelihood = -40.010962
Iteration 2:   log likelihood = -39.942802
Iteration 3:   log likelihood = -39.942691
Iteration 4:   log likelihood = -39.942691

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.595
                                                    Squared corr.    =     0.602
Log likelihood = -39.942691                         Sigma            =      0.62
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P> z      [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics      .6700442    .114507     5.85   0.000     .4456146    .8944738
z_tgm-ice         -.1943425   .1178675    -1.65   0.099    -.4253585    .0366735
z_reliefarea-inde   .5188588   .1292553     4.01   0.000     .2655231    .7721946
z_shape-index     -.3709353   .1149044    -3.23   0.001    -.5961439   -.1457268
constant          -.0136551   .0969388    -0.14   0.888    -.2036517    .1763415
------------------------------------------------------------------------------
             rho    .1658293   .1430717     1.16   0.246    -.1145861    .4462447
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   1.343 (0.246)
Likelihood ratio test of rho=0:        chi2(1) =   1.301 (0.254)
Lagrange multiplier test of rho=0:     chi2(1) =   1.294 (0.255)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 6:
initial:       log likelihood = -41.483102
rescale:       log likelihood = -41.483102
rescale eq:    log likelihood = -41.483102
Iteration 0:   log likelihood = -41.483102
Iteration 1:   log likelihood = -40.445012
Iteration 2:   log likelihood = -40.277088
Iteration 3:   log likelihood = -40.276951
Iteration 4:   log likelihood = -40.276951

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs   =        42
                                                    Variance ratio  =     0.587
                                                    Squared corr.   =     0.596
Log likelihood = -40.276951                         Sigma           =      0.63
------------------------------------------------------------------------------
                    Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics    .3772373   .1290985     2.92   0.003      .124209    .6302657
z_SGM-ice        -.2028244   .1135575    -1.79   0.074    -.4253931    .0197443
z_reliefarea-index.3265429   .1184117     2.76   0.006     .0944603    .5586254
z_isolation-index .3987021    .111237     3.58   0.000     .1806817    .6167226
constant         -.0155878   .0974314    -0.16   0.873    -.2065497    .1753742
------------------------------------------------------------------------------
         rho      .1892961   .1281233     1.48   0.140    -.0618209    .4404131
------------------------------------------------------------------------------
Wald test of rho=0:                   chi2(1) =   2.183 (0.140)
Likelihood ratio test of rho=0:       chi2(1) =   2.089 (0.148)
Lagrange multiplier test of rho=0:    chi2(1) =   2.243 (0.134)
Acceptable range for rho: -1.084 < rho < 1.000


Model 7:
initial:       log likelihood = -41.770653
rescale:       log likelihood = -41.770653
rescale eq:    log likelihood = -41.770653
Iteration 0:   log likelihood = -41.770653
Iteration 1:   log likelihood = -40.690399
Iteration 2:   log likelihood = -40.495079
Iteration 3:   log likelihood = -40.494864
Iteration 4:   log likelihood = -40.494864

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs   =        42
                                                    Variance ratio  =     0.582
                                                    Squared corr.   =     0.593
Log likelihood = -40.494864                         Sigma           =      0.63
------------------------------------------------------------------------------
                    Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics    .3957848   .1290534     3.07   0.002     .1428447    .6487248
z_TGM-ice        -.1881282   .1137727    -1.65   0.098    -.4111185    .0348622
z_relief-index    .3180931   .1187854     2.68   0.007     .0852779    .5509082
z_isolation-index .3999084   .1117817     3.58   0.000     .1808203    .6189964
constant         -.0161749   .0978926    -0.17   0.869    -.2080409     .175691
------------------------------------------------------------------------------
         rho      .1964268   .1285268     1.53   0.126    -.0554811    .4483348
------------------------------------------------------------------------------
Wald test of rho=0:                   chi2(1) =   2.336 (0.126)
Likelihood ratio test of rho=0:       chi2(1) =   2.228 (0.136)
Lagrange multiplier test of rho=0:    chi2(1) =   2.377 (0.123)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 8:
initial:       log likelihood = -41.774759
rescale:       log likelihood = -41.774759
rescale eq:    log likelihood = -41.774759
Iteration 0:   log likelihood = -41.774759
Iteration 1:   log likelihood = -40.738102
Iteration 2:   log likelihood = -40.562522
Iteration 3:   log likelihood = -40.562367
Iteration 4:   log likelihood = -40.562367

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                  Number of obs    =        42
                                                   Variance ratio   =     0.581
                                                   Squared corr.    =     0.591
Log likelihood = -40.562367                        Sigma            =      0.63
------------------------------------------------------------------------------
                   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics    .3529305   .1326799     2.66   0.008     .0928827    .6129783
z_LGM-ice       -.1884639   .1170716    -1.61   0.107    -.4179201    .0409922
z_relief-index     .345968    .120611     2.87   0.004     .1095749    .5823612
z_isolation-index .4071879   .1116214     3.65   0.000      .188414    .6259618
constant        -.0159187   .0980839    -0.16   0.871    -.2081596    .1763221
------------------------------------------------------------------------------
         rho      .1933152   .1303754     1.48   0.138    -.0622158    .4488462
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   2.199 (0.138)
Likelihood ratio test of rho=0:        chi2(1) =   2.101 (0.147)
Lagrange multiplier test of rho=0:     chi2(1) =   2.265 (0.132)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 9:
initial:       log likelihood = -41.933138
rescale:       log likelihood = -41.933138
rescale eq:    log likelihood = -41.933138
Iteration 0:   log likelihood = -41.933138
Iteration 1:   log likelihood = -40.990162
Iteration 2:   log likelihood =  -40.87496
Iteration 3:   log likelihood = -40.874872
Iteration 4:   log likelihood = -40.874872

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                  Number of obs    =        42
                                                   Variance ratio   =     0.575
                                                   Squared corr.    =     0.585
Log likelihood = -40.874872                        Sigma            =      0.64
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P> z      [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics      .6525182   .1192086     5.47   0.000     .4188737    .8861627
z_lgm-ice         -.1116033   .1251956    -0.89   0.373    -.3569821    .1337755
z_relief-index      .5360347   .1331126     4.03   0.000     .2751388    .7969306
z_shape-index     -.3588979   .1184374    -3.03   0.002    -.5910311   -.1267648
constant          -.0161633   .0989116    -0.16   0.870    -.2100264    .1776999
------------------------------------------------------------------------------
             rho    .1962875   .1434028     1.37   0.171    -.0847768    .4773517
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   1.874 (0.171)
Likelihood ratio test of rho=0:        chi2(1) =   1.793 (0.181)
Lagrange multiplier test of rho=0:     chi2(1) =   1.800 (0.180)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 10:
initial:       log likelihood =  -45.81696
rescale:       log likelihood =  -45.81696
rescale eq:    log likelihood =  -45.81696
Iteration 0:   log likelihood =  -45.81696
Iteration 1:   log likelihood = -44.346046
Iteration 2:   log likelihood = -43.282421
Iteration 3:   log likelihood = -43.276314
Iteration 4:   log likelihood = -43.276313

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.513
                                                    Squared corr.    =     0.545
Log likelihood = -43.276313                         Sigma            =      0.67
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics      .2597128   .1283907     2.02   0.043     .0080717    .5113539
z_sgm-ice          -.3227646   .1232754    -2.62   0.009      -.56438   -.0811491
z_relief-index      .3489044   .1254415     2.78   0.005     .1030437    .5947652
z_shape-index      -.2944406   .1233118    -2.39   0.017    -.5361273   -.0527539
constant           -.0258617   .1035496    -0.25   0.803    -.2288152    .1770918
------------------------------------------------------------------------------
             rho    .3140609   .1361473     2.31   0.021     .0472171    .5809046
------------------------------------------------------------------------------
Wald test of rho=0:                  chi2(1) =   5.321 (0.021)
Likelihood ratio test of rho=0:      chi2(1) =   4.758 (0.029)
Lagrange multiplier test of rho=0:   chi2(1) =   4.656 (0.031)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 11:
initial:       log likelihood =  -45.17364
rescale:       log likelihood =  -45.17364
rescale eq:    log likelihood =  -45.17364
Iteration 0:   log likelihood =  -45.17364
Iteration 1:   log likelihood = -43.767594
Iteration 2:   log likelihood = -43.266812
Iteration 3:   log likelihood = -43.262806
Iteration 4:   log likelihood = -43.262804

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.519
                                                    Squared corr.    =     0.540
Log likelihood = -43.262804                         Sigma            =      0.67
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics      |
z_non-endemics      .4317233    .188109     2.30   0.022     .0630365      .80041
z_tgm-ice          -.3204598   .1632571    -1.96   0.050    -.6404378   -.0004817
z_vegetation-index  .4388979   .2179736     2.01   0.044     .0116775    .8661182
z_distance-index    .5533898   .1501968     3.68   0.000     .2590094    .8477701
constant           -.0212679   .1040435    -0.20   0.838    -.2251893    .1826536
------------------------------------------------------------------------------
             rho    .2582743   .1328149     1.94   0.052    -.0020381    .5185868
------------------------------------------------------------------------------
Wald test of rho=0:                  chi2(1) =   3.782 (0.052)
Likelihood ratio test of rho=0:      chi2(1) =   3.498 (0.061)
Lagrange multiplier test of rho=0:   chi2(1) =   3.692 (0.055)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 12:
initial:       log likelihood =  -43.35373
rescale:       log likelihood =  -43.35373
rescale eq:    log likelihood =  -43.35373
Iteration 0:   log likelihood =  -43.35373
Iteration 1:   log likelihood = -42.983246
Iteration 2:   log likelihood = -42.965017
Iteration 3:   log likelihood = -42.964981
Iteration 4:   log likelihood = -42.964981

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.534
                                                    Squared corr.    =     0.537
Log likelihood = -42.964981                         Sigma            =      0.67
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics      .7005523   .1405961     4.98   0.000     .4249889    .9761156
z_tgm-ice         -.0754621   .1269255    -0.59   0.552    -.3242315    .1733073
z_relief-index     .3383485    .157386     2.15   0.032     .0298776    .6468195
z_distance-index   .3021556    .165458     1.83   0.068    -.0221361    .6264473
constant          -.0083559   .1044134    -0.08   0.936    -.2130025    .1962906
------------------------------------------------------------------------------
             rho    .1014758   .1496635     0.68   0.498    -.1918592    .3948108
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   0.460 (0.498)
Likelihood ratio test of rho=0:        chi2(1) =   0.454 (0.500)
Lagrange multiplier test of rho=0:     chi2(1) =   0.434 (0.510)
Acceptable range for rho: -1.084 < rho < 1.000


Model 13:
initial:       log likelihood = -43.406283
rescale:       log likelihood = -43.406283
rescale eq:    log likelihood = -43.406283
Iteration 0:   log likelihood = -43.406283
Iteration 1:   log likelihood = -43.020628
Iteration 2:   log likelihood = -43.001024
Iteration 3:   log likelihood = -43.000983
Iteration 4:   log likelihood = -43.000983

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.534
                                                    Squared corr.    =     0.537
Log likelihood = -43.000983                         Sigma            =      0.67
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics      |
z_non-endemics      .6963039   .1430724     4.87   0.000     .4158872    .9767206
z_sgm-ice         -.0678876   .1280301    -0.53   0.596    -.3188221    .1830468
z_reliefarea-index .3402986   .1573341     2.16   0.031     .0319294    .6486678
z_distance-index   .3020355   .1664594     1.81   0.070    -.0242189      .62829
constant          -.0086452   .1044876    -0.08   0.934    -.2134372    .1961468
------------------------------------------------------------------------------
             rho    .1049883   .1494284     0.70   0.482    -.1878859    .3978626
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   0.494 (0.482)
Likelihood ratio test of rho=0:        chi2(1) =   0.487 (0.485)
Lagrange multiplier test of rho=0:     chi2(1) =   0.467 (0.494)
Acceptable range for rho: -1.084 < rho < 1.000
```

Model 14:

```
initial:       log likelihood = -43.716972
rescale:       log likelihood = -43.716972
rescale eq:    log likelihood = -43.716972
Iteration 0:   log likelihood = -43.716972
Iteration 1:   log likelihood = -43.131674
Iteration 2:   log likelihood = -43.091641
Iteration 3:   log likelihood = -43.091515
Iteration 4:   log likelihood = -43.091515

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                  Number of obs    =        42
                                                   Variance ratio   =     0.530
                                                   Squared corr.    =     0.536
Log likelihood = -43.091515                        Sigma            =      0.67
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics      |
z_non-endemics      .7322644   .1483698     4.94   0.000      .441465    1.023064
z_lgm-ice           .0418089   .1322291     0.32   0.752    -.2173554    .3009732
z_relief-index      .3572904   .1579305     2.26   0.024     .0477523    .6668286
z_reliefarea-index  .3343348   .1672579     2.00   0.046     .0065153    .6621544
constant           -.0118978   .1045367    -0.11   0.909    -.2167859    .1929903
------------------------------------------------------------------------------
             rho    .1444879   .1482268     0.97   0.330    -.1460314    .4350072
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   0.950 (0.330)
Likelihood ratio test of rho=0:        chi2(1) =   0.927 (0.336)
Lagrange multiplier test of rho=0:     chi2(1) =   0.901 (0.343)
Acceptable range for rho: -1.084 < rho < 1.000
```

Model 15:

```
initial:       log likelihood = -46.264901
rescale:       log likelihood = -46.264901
rescale eq:    log likelihood = -46.264901
Iteration 0:   log likelihood = -46.264901
Iteration 1:   log likelihood = -44.836024
Iteration 2:   log likelihood = -43.704617
Iteration 3:   log likelihood = -43.698383
Iteration 4:   log likelihood = -43.698382

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                  Number of obs    =        42
                                                   Variance ratio   =     0.503
                                                   Squared corr.    =     0.536
Log likelihood = -43.698382                        Sigma            =      0.67
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics      |
z_non-endemics      .2844976   .1301398     2.19   0.029     .0294282     .539567
z_tgm-ice          -.3002377   .1233949    -2.43   0.015    -.5420872   -.0583882
z_reliefarea-index   .337283   .1266381     2.66   0.008     .0890768    .5854892
z_shape~index      -.2820979   .1237904    -2.28   0.023    -.5247227   -.0394731
constant           -.0262528   .1045396    -0.25   0.802    -.2311467    .1786411
------------------------------------------------------------------------------
             rho    .3188105   .1372706     2.32   0.020      .049765     .587856
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   5.394 (0.020)
Likelihood ratio test of rho=0:        chi2(1) =   4.809 (0.028)
Lagrange multiplier test of rho=0:     chi2(1) =   4.619 (0.032)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 16:
initial:       log likelihood = -44.802936
rescale:       log likelihood = -44.802936
rescale eq:    log likelihood = -44.802936
Iteration 0:   log likelihood = -44.802936
Iteration 1:   log likelihood = -43.688358
Iteration 2:   log likelihood = -43.490372
Iteration 3:   log likelihood = -43.490144
Iteration 4:   log likelihood = -43.490144

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.517
                                                    Squared corr.    =     0.531
Log likelihood = -43.490144                         Sigma            =      0.68
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics       .488075    .175869     2.78   0.006     .1433781    .8327719
z_tgm-ice         -.1385273   .1274995    -1.09   0.277    -.3884217    .1113671
z_relief-index     .2544349   .1354118     1.88   0.060    -.0109673    .5198372
z_distance-index   .3687102   .1563869     2.36   0.018     .0621975    .6752229
constant          -.0173134    .105007    -0.16   0.869    -.2231234    .1884966
------------------------------------------------------------------------------
             rho     .210252   .1350248     1.56   0.119    -.0543917    .4748957
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   2.425 (0.119)
Likelihood ratio test of rho=0:        chi2(1) =   2.302 (0.129)
Lagrange multiplier test of rho=0:     chi2(1) =   2.567 (0.109)
Acceptable range for rho: -1.084 < rho < 1.000


Model 17:
initial:       log likelihood = -44.777157
rescale:       log likelihood = -44.777157
rescale eq:    log likelihood = -44.777157
Iteration 0:   log likelihood = -44.777157
Iteration 1:   log likelihood = -43.665638
Iteration 2:   log likelihood = -43.467443
Iteration 3:   log likelihood = -43.467217
Iteration 4:   log likelihood = -43.467217

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.518
                                                    Squared corr.    =     0.531
Log likelihood = -43.467217                         Sigma            =      0.68
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics       .468557   .1800895     2.60   0.009     .1155881     .821526
z_sgm-ice         -.1435638   .1296033    -1.11   0.268    -.3975816     .110454
z_relief-index     .2628581   .1364028     1.93   0.054    -.0044864    .5302026
z_distance-index   .3603189   .1585443     2.27   0.023     .0495778    .6710601
constant          -.0172598    .104953    -0.16   0.869    -.2229639    .1884443
------------------------------------------------------------------------------
             rho    .2096011   .1347907     1.56   0.120    -.0545838    .4737861
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   2.418 (0.120)
Likelihood ratio test of rho=0:        chi2(1) =   2.296 (0.130)
Lagrange multiplier test of rho=0:     chi2(1) =   2.561 (0.110)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 18:
initial:       log likelihood = -46.427193
rescale:       log likelihood = -46.427193
rescale eq:    log likelihood = -46.427193
Iteration 0:   log likelihood = -46.427193
Iteration 1:   log likelihood = -44.951478
Iteration 2:   log likelihood = -43.906959
Iteration 3:   log likelihood = -43.900966
Iteration 4:   log likelihood = -43.900966

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                  Number of obs    =        42
                                                   Variance ratio   =     0.498
                                                   Squared corr.    =     0.531
Log likelihood = -43.900966                        Sigma            =      0.68
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics      .2125747   .1315437     1.62   0.106    -.0452461    .4703956
z_lgm-ice          -.3014157   .1288345    -2.34   0.019    -.5539268   -.0489047
z_relief-index      .3824598   .1282754     2.98   0.003     .1310447    .6338749
z_shape-index      -.2900235    .125525    -2.31   0.021    -.5360479    -.043999
constant           -.0262321   .1050519    -0.25   0.803      -.23213    .1796657
------------------------------------------------------------------------------
             rho    .3185588   .1383737     2.30   0.021     .0473513    .5897663
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   5.300 (0.021)
Likelihood ratio test of rho=0:        chi2(1) =   4.729 (0.030)
Lagrange multiplier test of rho=0:     chi2(1) =   4.749 (0.029)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 19:
initial:       log likelihood = -45.759483
rescale:       log likelihood = -45.759483
rescale eq:    log likelihood = -45.759483
Iteration 0:   log likelihood = -45.759483
Iteration 1:   log likelihood = -44.319885
Iteration 2:   log likelihood = -43.752392
Iteration 3:   log likelihood = -43.746821
Iteration 4:   log likelihood = -43.746816

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                  Number of obs    =        42
                                                   Variance ratio   =     0.507
                                                   Squared corr.    =     0.530
Log likelihood = -43.746816                        Sigma            =      0.68
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics       .453464   .1917501     2.36   0.018     .0776408    .8292873
z_sgm-ice          -.2654303   .1578631    -1.68   0.093    -.5748362    .0439756
z_vegetation-index  .3702664   .2089242     1.77   0.076    -.0392176    .7797504
z_distance-index    .5424081   .1524078     3.56   0.000     .2436943    .8411218
constant           -.0220485    .105155    -0.21   0.834    -.2281484    .1840515
------------------------------------------------------------------------------
             rho    .2677541   .1334932     2.01   0.045     .0061122    .5293959
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   4.023 (0.045)
Likelihood ratio test of rho=0:        chi2(1) =   3.702 (0.054)
Lagrange multiplier test of rho=0:     chi2(1) =   3.925 (0.048)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 20:
initial:       log likelihood = -45.464261
rescale:       log likelihood = -45.464261
rescale eq:    log likelihood = -45.464261
Iteration 0:   log likelihood = -45.464261
Iteration 1:   log likelihood = -44.194125
Iteration 2:   log likelihood = -43.901079
Iteration 3:   log likelihood = -43.900258
Iteration 4:   log likelihood = -43.900258

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.506
                                                    Squared corr.    =     0.524
Log likelihood = -43.900258                         Sigma            =      0.68
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics      .4755626    .194704     2.44   0.015     .0939498    .8571754
z_lgm-ice         -.0829572   .1391499    -0.60   0.551     -.355686    .1897716
z_relief-index      .2633822   .1425011     1.85   0.065    -.0159148    .5426791
z_distance-index    .3802299   .1658592     2.29   0.022     .0551518    .7053079
constant          -.0194306   .1058404    -0.18   0.854    -.2268739    .1880128
------------------------------------------------------------------------------
             rho    .2359625   .1364427     1.73   0.084    -.0314602    .5033852
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   2.991 (0.084)
Likelihood ratio test of rho=0:        chi2(1) =   2.804 (0.094)
Lagrange multiplier test of rho=0:     chi2(1) =   3.122 (0.077)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 21:
initial:       log likelihood = -47.082774
rescale:       log likelihood = -47.082774
rescale eq:    log likelihood = -47.082774
Iteration 0:   log likelihood = -47.082774
Iteration 1:   log likelihood = -45.614094
Iteration 2:   log likelihood = -44.756245
Iteration 3:   log likelihood = -44.749858
Iteration 4:   log likelihood = -44.749857

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.480
                                                    Squared corr.    =     0.509
Log likelihood = -44.749857                         Sigma            =      0.69
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics      |
z_non-endemics      .5028562   .2193283     2.29   0.022     .0729806    .9327318
z_lgm-ice         -.1561186   .1785868    -0.87   0.382    -.5061424    .1939051
z_vegetation-index  .2950468   .2299171     1.28   0.199    -.1555825     .745676
z_distance-index    .5528489   .1559838     3.54   0.000     .2471262    .8585716
constant           -.024261   .1074057    -0.23   0.821    -.2347723    .1862502
------------------------------------------------------------------------------
             rho    .2946233   .1345171     2.19   0.029     .0309746    .5582721
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   4.797 (0.029)
Likelihood ratio test of rho=0:        chi2(1) =   4.342 (0.037)
Lagrange multiplier test of rho=0:     chi2(1) =   4.568 (0.033)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 22:
initial:       log likelihood =  -49.89364
rescale:       log likelihood =  -49.89364
rescale eq:    log likelihood =  -49.89364
Iteration 0:   log likelihood =  -49.89364
Iteration 1:   log likelihood = -49.113243
Iteration 2:   log likelihood = -46.581041
Iteration 3:   log likelihood = -46.548976
Iteration 4:   log likelihood = -46.548894
Iteration 5:   log likelihood = -46.548894

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs   =        42
                                                    Variance ratio  =     0.421
                                                    Squared corr.   =     0.478
Log likelihood = -46.548894                         Sigma           =      0.72
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P> z      [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics      .3209782   .1946083     1.65   0.099     -.060447    .7024033
z_sgm-ice         -.4088039   .1686503    -2.42   0.015    -.7393524  -.0782555
z_vegetation-index   .173491   .2132246     0.81   0.416    -.2444216   .5914036
z_shape-index     -.3224773   .1313208    -2.46   0.014    -.5798614  -.0650932
constant          -.0313954   .1109665    -0.28   0.777    -.2488857   .1860949
------------------------------------------------------------------------------
             rho    .3812625   .1393716     2.74   0.006     .1080991    .6544258
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   7.483 (0.006)
Likelihood ratio test of rho=0:        chi2(1) =   6.366 (0.012)
Lagrange multiplier test of rho=0:     chi2(1) =   5.861 (0.015)
Acceptable range for rho: -1.084 < rho < 1.000


Model 23:
initial:       log likelihood = -49.858332
rescale:       log likelihood = -49.858332
rescale eq:    log likelihood = -49.858332
Iteration 0:   log likelihood = -49.858332
Iteration 1:   log likelihood = -48.863403
Iteration 2:   log likelihood =  -46.59592
Iteration 3:   log likelihood = -46.572467
Iteration 4:   log likelihood = -46.572397
Iteration 5:   log likelihood = -46.572397

Spatial lag model                                   Number of obs   =        42
                                                    Variance ratio  =     0.421
                                                    Squared corr.   =     0.477
Log likelihood = -46.572397                         Sigma           =      0.72
------------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P> z      [95% Conf. Interval]
------------------------------------------------------------------------------
z_local-endemics
z_non-endemics      .3190674   .1953743     1.63   0.102    -.0638592     .701994
z_tgm-ice         -.4244666   .1759719    -2.41   0.016    -.7693653    -.079568
z_vegetation-index  .2128291   .2243651     0.95   0.343    -.2269184    .6525766
z_shape-index     -.3111205     .13061    -2.38   0.017    -.5671113  -.0551297
constant          -.0311639   .1110739    -0.28   0.779    -.2488648    .1865369
------------------------------------------------------------------------------
             rho    .3784515   .1398218     2.71   0.007     .1044058    .6524972
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   7.326 (0.007)
Likelihood ratio test of rho=0:        chi2(1) =   6.248 (0.012)
Lagrange multiplier test of rho=0:     chi2(1) =   5.534 (0.019)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 24:
initial:       log likelihood = -51.347247
rescale:       log likelihood = -51.347247
rescale eq:    log likelihood = -51.347247
Iteration 0:   log likelihood = -51.347247
Iteration 1:   log likelihood = -50.643084
Iteration 2:   log likelihood = -47.881564
Iteration 3:   log likelihood = -47.840704
Iteration 4:   log likelihood = -47.840637
Iteration 5:   log likelihood = -47.840637

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs   =        42
                                                    Variance ratio  =     0.381
                                                    Squared corr.   =     0.448
Log likelihood = -47.840637                         Sigma           =      0.74
-----------------------------------------------------------------------------
z_local-endemics       Coef.   Std. Err.      z    P> z      [95% Conf. Interval]
-----------------------------------------------------------------------------
z_local-endemics
z_non-endemics      .3120584   .2224154     1.40   0.161    -.1238677    .7479845
z_lgm-ice          -.3394094   .1932041    -1.76   0.079    -.7180825    .0392637
z_vegetation-index  .1400254   .2389448     0.59   0.558    -.3282979    .6083486
z_shape-index       -.312073   .1359562    -2.30   0.022    -.5785424   -.0456037
constant           -.0327338    .114149    -0.29   0.774    -.2564618    .1909941
-----------------------------------------------------------------------------
             rho    .3975161   .1408181     2.82   0.005     .1215177    .6735145
-----------------------------------------------------------------------------
Wald test of rho=0:                     chi2(1) =   7.969 (0.005)
Likelihood ratio test of rho=0:         chi2(1) =   6.690 (0.010)
Lagrange multiplier test of rho=0:      chi2(1) =   6.125 (0.013)
Acceptable range for rho: -1.084 < rho < 1.000
```

Tab. A24: Geographically weighted regression (dependent variable: European endemics; Stata output)

```
Model 1:
initial:       log likelihood = -25.464459
rescale:       log likelihood = -25.464459
rescale eq:    log likelihood = -25.464459
Iteration 0:   log likelihood = -25.464459
Iteration 1:   log likelihood = -24.717803
Iteration 2:   log likelihood = -24.640303
Iteration 3:   log likelihood = -24.640206
Iteration 4:   log likelihood = -24.640206

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs   =        42
                                                    Variance ratio  =     0.805
                                                    Squared corr.   =     0.807
Log likelihood = -24.640206                         Sigma           =      0.43
------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .3843273   .1129717     3.40   0.001     .1629069    .6057477
z_tgm-ice          -.1366122   .0924953    -1.48   0.140    -.3178997    .0446753
z_relief-index      .4607367   .0884011     5.21   0.000     .2874737    .6339998
z_distance-index   -.1594633   .1097469    -1.45   0.146    -.3745633    .0556367
constant           -.0422875   .0760888    -0.56   0.578    -.1914187    .1068438
-----------------------------------------------------------------------------
         rho          .14619   .1252756     1.17   0.243    -.0993455    .3917256
-----------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   1.362 (0.243)
Likelihood ratio test of rho=0:        chi2(1) =   1.325 (0.250)
Lagrange multiplier test of rho=0:     chi2(1) =   1.112 (0.292)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 2:
initial:       log likelihood = -26.095343
rescale:       log likelihood = -26.095343
rescale eq:    log likelihood = -26.095343
Iteration 0:   log likelihood = -26.095343
Iteration 1:   log likelihood = -25.126255
Iteration 2:   log likelihood = -24.977102
Iteration 3:   log likelihood =    -24.977
Iteration 4:   log likelihood =    -24.977

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                    Number of obs    =        42
                                                     Variance ratio   =     0.801
                                                     Squared corr.    =     0.805
Log likelihood = -24.977                             Sigma            =      0.44
------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .3732826   .1163003     3.21   0.001     .1453381    .6012271
z_sgm-ice         -.1124417   .0919892    -1.22   0.222    -.2927372    .0678538
z_relief-index      .4617391   .0899014     5.14   0.000     .2855356    .6379427
z_distance-index  -.1480504   .1117567    -1.32   0.185    -.3670894    .0709887
constant          -.0497831   .0760495    -0.65   0.513    -.1988373     .099271
------------------------------------------------------------------------------
         rho        .1721028   .1220716     1.41   0.159    -.0671532    .4113588
------------------------------------------------------------------------------
Wald test of rho=0:                      chi2(1) =   1.988 (0.159)
Likelihood ratio test of rho=0:          chi2(1) =   1.913 (0.167)
Lagrange multiplier test of rho=0:       chi2(1) =   1.667 (0.197)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 3:
initial:       log likelihood = -27.447007
rescale:       log likelihood = -27.447007
rescale eq:    log likelihood = -27.447007
Iteration 0:   log likelihood = -27.447007
Iteration 1:   log likelihood =  -26.08051
Iteration 2:   log likelihood = -25.192681
Iteration 3:   log likelihood = -25.186378
Iteration 4:   log likelihood = -25.186377

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                    Number of obs    =        42
                                                     Variance ratio   =     0.797
                                                     Squared corr.    =     0.805
Log likelihood = -25.186377                          Sigma            =      0.44
------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .4962028    .092272     5.38   0.000     .3153531    .6770525
z_tgm-ice         -.0837894   .0807001    -1.04   0.299    -.2419588    .0743799
z_relief-index      .4003995   .0810555     4.94   0.000     .2415336    .5592654
z_shape-index     -.0803048   .0801745    -1.00   0.317    -.2374439    .0768344
constant          -.0728913    .075484    -0.97   0.334    -.2208371    .0750545
------------------------------------------------------------------------------
         rho        .2519888   .1180661     2.13   0.033     .0205835    .4833941
------------------------------------------------------------------------------
Wald test of rho=0:                      chi2(1) =   4.555 (0.033)
Likelihood ratio test of rho=0:          chi2(1) =   4.198 (0.040)
Lagrange multiplier test of rho=0:       chi2(1) =   3.526 (0.060)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 4:
initial:       log likelihood = -26.114816
rescale:       log likelihood = -26.114816
rescale eq:    log likelihood = -26.114816
Iteration 0:   log likelihood = -26.114816
Iteration 1:   log likelihood = -25.171093
Iteration 2:   log likelihood =  -25.03301
Iteration 3:   log likelihood = -25.032924
Iteration 4:   log likelihood = -25.032924

Weights matrix: Weighted  Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                    Number of obs   =        42
                                                     Variance ratio  =     0.801
                                                     Squared corr.   =     0.804
Log likelihood = -25.032924                          Sigma           =      0.44
------------------------------------------------------------------------------
                       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .4503213   .0957037     4.71   0.000     .2627456    .6378971
z_TGM-ice          -.0964691   .0834482    -1.16   0.248    -.2600245    .0670863
z_relief-index      .4178652   .0815021     5.13   0.000      .258124    .5776063
z_coastline-index  -.0967804   .0847272    -1.14   0.253    -.2628426    .0692818
constant           -.0491455   .0762535    -0.64   0.519    -.1985995    .1003086
------------------------------------------------------------------------------
         rho        .1698984   .1229431     1.38   0.167    -.0710657    .4108625
------------------------------------------------------------------------------
Wald test of rho=0:                   chi2(1) =   1.910 (0.167)
Likelihood ratio test of rho=0:       chi2(1) =   1.840 (0.175)
Lagrange multiplier test of rho=0:    chi2(1) =   1.551 (0.213)
Acceptable range for rho: -1.084 < rho < 1.000
------------------------------------------------------------------------------


Model 5:
initial:       log likelihood = -27.986333
rescale:       log likelihood = -27.986333
rescale eq:    log likelihood = -27.986333
Iteration 0:   log likelihood = -27.986333
Iteration 1:   log likelihood = -26.774029
Iteration 2:   log likelihood = -25.386832
Iteration 3:   log likelihood = -25.378399
Iteration 4:   log likelihood = -25.378395
Iteration 5:   log likelihood = -25.378395

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                    Number of obs   =        42
                                                     Variance ratio  =     0.794
                                                     Squared corr.   =     0.804
Log likelihood = -25.378395                          Sigma           =      0.44
------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .4838146   .0905681     5.34   0.000     .3063044    .6613248
z_sgm-ice          -.0664082   .0798543    -0.83   0.406    -.2229198    .0901033
z_relief-index      .4036201   .0812101     4.97   0.000     .2444512    .5627889
z_shape-index      -.0789986   .0811619    -0.97   0.330     -.238073    .0800758
constant           -.0773694   .0753326    -1.03   0.304    -.2250185    .0702798
------------------------------------------------------------------------------
         rho        .2674697   .1153961     2.32   0.020     .0412975    .4936418
------------------------------------------------------------------------------
Wald test of rho=0:                   chi2(1) =   5.372 (0.020)
Likelihood ratio test of rho=0:       chi2(1) =   4.892 (0.027)
Lagrange multiplier test of rho=0:    chi2(1) =   4.252 (0.039)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 6:
initial:       log likelihood = -26.381016
rescale:       log likelihood = -26.381016
rescale eq:    log likelihood = -26.381016
Iteration 0:   log likelihood = -26.381016
Iteration 1:   log likelihood = -25.393077
Iteration 2:   log likelihood = -25.236513
Iteration 3:   log likelihood = -25.236403
Iteration 4:   log likelihood = -25.236403

Weights matrix: Weighted  Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.798
                                                    Squared corr.    =     0.803
Log likelihood = -25.236403                         Sigma            =      0.44
------------------------------------------------------------------------------
                       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .4596272    .095029     4.84   0.000     .2733739    .6458806
z_TGM-ice         -.0924935   .0842103    -1.10   0.272    -.2575426    .0725557
z_relief-index      .4197245   .0824103     5.09   0.000     .2582033    .5812457
z_isolation-index -.0786358    .083325    -0.94   0.345    -.2419498    .0846783
constant          -.0512062   .0766309    -0.67   0.504       -.2014    .0989876
------------------------------------------------------------------------------
         rho        .1770225   .1237701     1.43   0.153    -.0655624    .4196074
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   2.046 (0.153)
Likelihood ratio test of rho=0:        chi2(1) =   1.966 (0.161)
Lagrange multiplier test of rho=0:     chi2(1) =   1.671 (0.196)
Acceptable range for rho: -1.084 < rho < 1.000


Model 7:
initial:       log likelihood = -26.755384
rescale:       log likelihood = -26.755384
rescale eq:    log likelihood = -26.755384
Iteration 0:   log likelihood = -26.755384
Iteration 1:   log likelihood = -25.590516
Iteration 2:   log likelihood = -25.316621
Iteration 3:   log likelihood = -25.315949
Iteration 4:   log likelihood = -25.315949

Weights matrix: Weighted  Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.797
                                                    Squared corr.    =     0.802
Log likelihood = -25.315949                         Sigma            =      0.44
------------------------------------------------------------------------------
                       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics       .439342   .0954945     4.60   0.000     .2521763    .6265078
z_SGM-ice         -.0710187   .0811695    -0.87   0.382    -.2301081    .0880707
z_relief-index      .4202459   .0819805     5.13   0.000     .2595671    .5809247
z_coastline-index -.0870125   .0843644    -1.03   0.302    -.2523638    .0783387
constant          -.0564598   .0760579    -0.74   0.458    -.2055305    .0926108
------------------------------------------------------------------------------
         rho        .1951845    .119104     1.64   0.101    -.0382551    .4286241
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   2.686 (0.101)
Likelihood ratio test of rho=0:        chi2(1) =   2.555 (0.110)
Lagrange multiplier test of rho=0:     chi2(1) =   2.235 (0.135)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 8:
initial:       log likelihood = -28.893929
rescale:       log likelihood = -28.893929
rescale eq:    log likelihood = -28.893929
Iteration 0:   log likelihood = -28.893929
Iteration 1:   log likelihood = -28.403368
Iteration 2:   log likelihood =  -25.76422
Iteration 3:   log likelihood = -25.717995
Iteration 4:   log likelihood = -25.717923
Iteration 5:   log likelihood = -25.717923

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.790
                                                    Squared corr.    =     0.802
Log likelihood = -25.717923                         Sigma            =      0.44
------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .4713989   .0896971     5.26   0.000     .2955958     .647202
z_lgm-ice         -.0086241   .0809595    -0.11   0.915    -.1673018    .1500536
z_relief-index      .4058912   .0818872     4.96   0.000     .2453953    .5663871
z_shape-index     -.0635871   .0822698    -0.77   0.440    -.2248329    .0976587
constant          -.0856531   .0754621    -1.14   0.256    -.2335561      .06225
------------------------------------------------------------------------------
         rho        .2961067   .1138557     2.60   0.009     .0729536    .5192598
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   6.764 (0.009)
Likelihood ratio test of rho=0:        chi2(1) =   6.028 (0.014)
Lagrange multiplier test of rho=0:     chi2(1) =   5.274 (0.022)
Acceptable range for rho: -1.084 < rho < 1.000


Model 9:
initial:       log likelihood = -26.995218
rescale:       log likelihood = -26.995218
rescale eq:    log likelihood = -26.995218
Iteration 0:   log likelihood = -26.995218
Iteration 1:   log likelihood =  -25.79911
Iteration 2:   log likelihood = -25.496167
Iteration 3:   log likelihood =  -25.49524
Iteration 4:   log likelihood =  -25.49524

Weights matrix: Weighted  Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.795
                                                    Squared corr.    =     0.801
Log likelihood = -25.49524                          Sigma            =      0.44
------------------------------------------------------------------------------
                        Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics       .4486747     .09466     4.74   0.000     .2631445    .6342049
z_SGM-ice          -.0678713    .081975    -0.83   0.408    -.2285394    .0927968
z_relief-index       .4215787   .0828921     5.09   0.000     .2591132    .5840441
z_isolation-index  -.0694852   .0830264    -0.84   0.403     -.232214    .0932436
constant           -.0582568   .0763988    -0.76   0.446    -.2079957     .091482
------------------------------------------------------------------------------
         rho         .2013968   .1199179     1.68   0.093     -.033638    .4364316
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   2.821 (0.093)
Likelihood ratio test of rho=0:        chi2(1) =   2.676 (0.102)
Lagrange multiplier test of rho=0:     chi2(1) =   2.355 (0.125)
Acceptable range for rho: -1.084 < rho < 1.000
```

Model 10:

```
initial:       log likelihood = -27.863828
rescale:       log likelihood = -27.863828
rescale eq:    log likelihood = -27.863828
Iteration 0:   log likelihood = -27.863828
Iteration 1:   log likelihood = -26.514114
Iteration 2:   log likelihood = -25.700762
Iteration 3:   log likelihood = -25.694265
Iteration 4:   log likelihood = -25.694264

Weights matrix: Weighted  Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.792
                                                    Squared corr.    =     0.800
Log likelihood = -25.694264                         Sigma            =      0.44
------------------------------------------------------------------------------
                       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .4361261   .0965069     4.52   0.000      .246976    .6252762
z_LGM-ice         -.0073204   .0806728    -0.09   0.928    -.1654362    .1507953
z_relief-index     .4187555   .0831268     5.04   0.000     .2558299    .5816811
z_coastline-index -.0670707   .0838907    -0.80   0.424    -.2314935    .0973521
constant           -.070095   .0760445    -0.92   0.357    -.2191395    .0789494
------------------------------------------------------------------------------
         rho       .2423219   .1163645     2.08   0.037     .0142517    .4703922
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   4.337 (0.037)
Likelihood ratio test of rho=0:        chi2(1) =   4.016 (0.045)
Lagrange multiplier test of rho=0:     chi2(1) =   3.546 (0.060)
Acceptable range for rho: -1.084 < rho < 1.000
```

Model 11:

```
initial:       log likelihood =  -27.37497
rescale:       log likelihood =  -27.37497
rescale eq:    log likelihood =  -27.37497
Iteration 0:   log likelihood =  -27.37497
Iteration 1:   log likelihood = -26.071615
Iteration 2:   log likelihood = -25.628011
Iteration 3:   log likelihood = -25.625149
Iteration 4:   log likelihood = -25.625147

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.793
                                                    Squared corr.    =     0.800
Log likelihood = -25.625147                         Sigma            =      0.44
------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics       .386286   .1261828     3.06   0.002     .1389723    .6335998
z_lgm-ice         -.0427241   .0979652    -0.44   0.663    -.2347325    .1492842
z_relief-index     .4512613   .0953085     4.73   0.000     .2644601    .6380626
z_distance-index  -.1049916   .1191271    -0.88   0.378    -.3384764    .1284933
constant          -.0652032   .0768269    -0.85   0.396    -.2157812    .0853749
------------------------------------------------------------------------------
         rho       .2254104   .1225059     1.84   0.066    -.0146967    .4655176
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   3.386 (0.066)
Likelihood ratio test of rho=0:        chi2(1) =   3.176 (0.075)
Lagrange multiplier test of rho=0:     chi2(1) =   2.785 (0.095)
Acceptable range for rho: -1.084 < rho < 1.000
```

Model 12:

```
initial:       log likelihood = -28.098231
rescale:       log likelihood = -28.098231
rescale eq:    log likelihood = -28.098231
Iteration 0:   log likelihood = -28.098231
Iteration 1:   log likelihood = -26.733726
Iteration 2:   log likelihood = -25.843311
Iteration 3:   log likelihood = -25.837061
Iteration 4:   log likelihood =  -25.83706

Weights matrix: Weighted  Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.790
                                                    Squared corr.    =     0.799
Log likelihood = -25.83706                          Sigma            =      0.44
------------------------------------------------------------------------------
                       Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .4456609   .0954888     4.67   0.000     .2585064    .6328154
z_LGM-ice         -.0035025   .0810763    -0.04   0.966    -.1624091     .155404
z_relief-index        .41855   .0840504     4.98   0.000     .2538142    .5832857
z_isolation-index  -.0487505   .0821545    -0.59   0.553    -.2097703    .1122693
constant          -.0720729   .0762715    -0.94   0.345    -.2215623    .0774166
------------------------------------------------------------------------------
         rho        .2491593   .1167789     2.13   0.033     .0202769    .4780417
------------------------------------------------------------------------------
Wald test of rho=0:                     chi2(1) =   4.552 (0.033)
Likelihood ratio test of rho=0:         chi2(1) =   4.199 (0.040)
Lagrange multiplier test of rho=0:      chi2(1) =   3.737 (0.053)
Acceptable range for rho: -1.084 < rho < 1.000
```

Model 13:

```
initial:       log likelihood = -36.396649
rescale:       log likelihood = -36.396649
rescale eq:    log likelihood = -36.396649
Iteration 0:   log likelihood = -36.396649
Iteration 1:   log likelihood = -32.853054
Iteration 2:   log likelihood = -32.648214
Iteration 3:   log likelihood = -32.647551
Iteration 4:   log likelihood = -32.647551

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.703
                                                    Squared corr.    =     0.729
Log likelihood = -32.647551                         Sigma            =      0.51

------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .7765663   .1015411     7.65   0.000     .5775495    .9755831
z_lgm-ice           .1220026   .1029552     1.19   0.236    -.0797858    .3237911
z_reliefarea-index  .2437016   .0985448     2.47   0.013     .0505574    .4368458
z_shape-index      -.1233404   .0976727    -1.26   0.207    -.3147755    .0680947
constant          -.1059748   .0874349    -1.21   0.225    -.2773441    .0653945
------------------------------------------------------------------------------
         rho        .3663606   .1263572     2.90   0.004      .118705    .6140162
------------------------------------------------------------------------------
Wald test of rho=0:                     chi2(1) =   8.407 (0.004)
Likelihood ratio test of rho=0:         chi2(1) =   7.175 (0.007)
Lagrange multiplier test of rho=0:      chi2(1) =   5.682 (0.017)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 14:
initial:       log likelihood = -36.379551
rescale:       log likelihood = -36.379551
rescale eq:    log likelihood = -36.379551
Iteration 0:   log likelihood = -36.379551
Iteration 1:   log likelihood = -35.278263
Iteration 2:   log likelihood = -33.361587
Iteration 3:   log likelihood = -33.345624
Iteration 4:   log likelihood = -33.345596
Iteration 5:   log likelihood = -33.345596

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs   =        42
                                                    Variance ratio  =     0.695
                                                    Squared corr.   =     0.718
Log likelihood = -33.345596                         Sigma           =      0.53
------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .7782739   .1168015     6.66   0.000     .5493472    1.007201
z_lgm-ice           .1608581   .1092481     1.47   0.141    -.0532643    .3749805
z_reliefarea-index  .1985357   .1123521     1.77   0.077    -.0216704    .4187418
z_distance-index    .0540581   .1382008     0.39   0.696    -.2168106    .3249268
constant           -.0979311   .0896142    -1.09   0.274    -.2735716    .0777095
------------------------------------------------------------------------------
         rho         .338553   .1322426     2.56   0.010     .0793623    .5977438
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   6.554 (0.010)
Likelihood ratio test of rho=0:        chi2(1) =   5.744 (0.017)
Lagrange multiplier test of rho=0:     chi2(1) =   4.756 (0.029)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 15:
initial:       log likelihood = -35.640505
rescale:       log likelihood = -35.640505
rescale eq:    log likelihood = -35.640505
Iteration 0:   log likelihood = -35.640505
Iteration 1:   log likelihood = -34.172373
Iteration 2:   log likelihood = -33.268989
Iteration 3:   log likelihood = -33.262716
Iteration 4:   log likelihood = -33.262716

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs   =        42
                                                    Variance ratio  =     0.699
                                                    Squared corr.   =     0.716
Log likelihood = -33.262716                         Sigma           =      0.53
------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .7665194   .1036573     7.39   0.000     .5633548    .9696839
z_tgm-ice          -.0385355   .1047069    -0.37   0.713    -.2437571    .1666862
z_reliefarea-index  .1818674   .0999517     1.82   0.069    -.0140343     .377769
z_shape-index      -.1497577   .0987395    -1.52   0.129    -.3432837    .0437682
constant           -.0869604   .0901984    -0.96   0.335    -.2637461    .0898253
------------------------------------------------------------------------------
         rho        .3006271   .1356279     2.22   0.027     .0348013     .566453
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   4.913 (0.027)
Likelihood ratio test of rho=0:        chi2(1) =   4.432 (0.035)
Lagrange multiplier test of rho=0:     chi2(1) =   3.363 (0.067)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 16:
initial:       log likelihood =  -36.08657
rescale:       log likelihood =  -36.08657
rescale eq:    log likelihood =  -36.08657
Iteration 0:   log likelihood =  -36.08657
Iteration 1:   log likelihood = -34.778536
Iteration 2:   log likelihood = -33.338595
Iteration 3:   log likelihood =  -33.32961
Iteration 4:   log likelihood = -33.329605
Iteration 5:   log likelihood = -33.329605

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.696
                                                    Squared corr.    =     0.716
Log likelihood = -33.329605                         Sigma            =      0.53
------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .7628494   .1030715     7.40   0.000     .5608329    .9648659
z_sgm-ice          -.0046866   .1031772    -0.05   0.964    -.2069102     .197537
z_reliefarea-index  .1945117   .0994834     1.96   0.051    -.0004723    .3894956
z_shape-index      -.1459972   .0993019    -1.47   0.141    -.3406254     .048631
constant           -.0920881    .089698    -1.03   0.305     -.267893    .0837169
------------------------------------------------------------------------------
         rho        .3183536   .1317771     2.42   0.016     .0600753    .5766319
------------------------------------------------------------------------------
Wald test of rho=0:                   chi2(1) =   5.836 (0.016)
Likelihood ratio test of rho=0:       chi2(1) =   5.190 (0.023)
Lagrange multiplier test of rho=0:    chi2(1) =   4.101 (0.043)
Acceptable range for rho: -1.084 < rho < 1.000


Model 17:
initial:       log likelihood = -36.137681
rescale:       log likelihood = -36.137681
rescale eq:    log likelihood = -36.137681
Iteration 0:   log likelihood = -36.137681
Iteration 1:   log likelihood = -34.760059
Iteration 2:   log likelihood = -34.372907
Iteration 3:   log likelihood = -34.370996
Iteration 4:   log likelihood = -34.370996

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.685
                                                    Squared corr.    =     0.699
Log likelihood = -34.370996                         Sigma            =      0.54
------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .7320554   .1170645     6.25   0.000     .5026131    .9614976
z_sgm-ice           .0173213   .1111516     0.16   0.876    -.2005318    .2351744
z_reliefarea-index  .1658335   .1152554     1.44   0.150     -.060063      .39173
z_distance-index   -.0072414    .142618    -0.05   0.960    -.2867674    .2722847
constant            -.075382   .0929879    -0.81   0.418    -.2576349     .106871
------------------------------------------------------------------------------
         rho        .2605999   .1399832     1.86   0.063    -.0137621    .5349619
------------------------------------------------------------------------------
Wald test of rho=0:                   chi2(1) =   3.466 (0.063)
Likelihood ratio test of rho=0:       chi2(1) =   3.210 (0.073)
Lagrange multiplier test of rho=0:    chi2(1) =   2.588 (0.108)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 18:
initial:       log likelihood = -36.696684
rescale:       log likelihood = -36.696684
rescale eq:    log likelihood = -36.696684
Iteration 0:   log likelihood = -36.696684
Iteration 1:   log likelihood = -35.158086
Iteration 2:   log likelihood = -34.577447
Iteration 3:   log likelihood = -34.571737
Iteration 4:   log likelihood = -34.571732
Iteration 5:   log likelihood = -34.571732

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs   =        42
                                                    Variance ratio  =     0.679
                                                    Squared corr.   =     0.699
Log likelihood = -34.571732                         Sigma           =      0.54
------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .5911717   .1618968     3.65   0.000     .2738598    .9084836
z_tgm-ice         -.1441251   .1326086    -1.09   0.277    -.4040333     .115783
z_vegetation-index .2182851   .1834397     1.19   0.234    -.1412501    .5778204
z_distance-index    .1259985    .132175     0.95   0.340    -.1330596    .3850567
constant          -.0890682   .0939796    -0.95   0.343    -.2732649    .0951284
-----------------------------------------------------------------------------
         rho        .3079134   .1475619     2.09   0.037     .0186974    .5971294
-----------------------------------------------------------------------------
Wald test of rho=0:                   chi2(1) =   4.354 (0.037)
Likelihood ratio test of rho=0:       chi2(1) =   3.926 (0.048)
Lagrange multiplier test of rho=0:    chi2(1) =   2.623 (0.105)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 19:
initial:       log likelihood = -37.976108
rescale:       log likelihood = -37.976108
rescale eq:    log likelihood = -37.976108
Iteration 0:   log likelihood = -37.976108
Iteration 1:   log likelihood = -36.764364
Iteration 2:   log likelihood = -34.872787
Iteration 3:   log likelihood = -34.858431
Iteration 4:   log likelihood = -34.858408
Iteration 5:   log likelihood = -34.858408

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs   =        42
                                                    Variance ratio  =     0.669
                                                    Squared corr.   =     0.699
Log likelihood = -34.858408                         Sigma           =      0.54
-----------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .7544485   .1827098     4.13   0.000     .3963438    1.112553
z_lgm-ice           .1071083   .1370009     0.78   0.434    -.1614086    .3756251
z_vegetation-index  .0180651   .1907411     0.09   0.925    -.3557807    .3919108
z_distance-index    .1728877   .1320333     1.31   0.190    -.0858928    .4316681
constant          -.1071364   .0931135    -1.15   0.250    -.2896355    .0753626
-----------------------------------------------------------------------------
         rho        .3703764   .1411969     2.62   0.009     .0936356    .6471171
-----------------------------------------------------------------------------
Wald test of rho=0:                   chi2(1) =   6.881 (0.009)
Likelihood ratio test of rho=0:       chi2(1) =   5.912 (0.015)
Lagrange multiplier test of rho=0:    chi2(1) =   3.958 (0.047)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 20:
initial:       log likelihood = -36.546901
rescale:       log likelihood = -36.546901
rescale eq:    log likelihood = -36.546901
Iteration 0:   log likelihood = -36.546901
Iteration 1:   log likelihood = -35.059768
Iteration 2:   log likelihood = -34.446822
Iteration 3:   log likelihood = -34.440111
Iteration 4:   log likelihood = -34.440105
Iteration 5:   log likelihood = -34.440105

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.682
                                                    Squared corr.    =     0.699
Log likelihood = -34.440105                         Sigma            =      0.54
--------------------------------------------------------------------------------
z_european-endemics    Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .5942645   .1619382     3.67   0.000     .2768715    .9116576
z_tgm-ice          -.193334    .1321486    -1.46   0.143    -.4523405    .0656725
z_vegetation-index  .1555841   .1713151     0.91   0.364    -.1801873    .4913554
z_shape-index      -.1072379   .0988851    -1.08   0.278    -.3010492    .0865734
constant           -.0834425    .092866    -0.90   0.369    -.2654564    .0985715
--------------------------------------------------------------------------------
         rho        .2884651   .1395739     2.07   0.039     .0149052    .5620249
--------------------------------------------------------------------------------
Wald test of rho=0:                   chi2(1) =   4.271 (0.039)
Likelihood ratio test of rho=0:       chi2(1) =   3.890 (0.049)
Lagrange multiplier test of rho=0:    chi2(1) =   2.819 (0.093)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 21:
initial:       log likelihood =  -35.73036
rescale:       log likelihood =  -35.73036
rescale eq:    log likelihood =  -35.73036
Iteration 0:   log likelihood =  -35.73036
Iteration 1:   log likelihood = -34.557851
Iteration 2:   log likelihood = -34.354826
Iteration 3:   log likelihood = -34.354583
Iteration 4:   log likelihood = -34.354583

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs    =        42
                                                    Variance ratio   =     0.687
                                                    Squared corr.    =     0.697
Log likelihood = -34.354583                         Sigma            =      0.54
--------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .7269408   .1159534     6.27   0.000     .4996764    .9542052
z_tgm-ice          -.0270763   .1135001    -0.24   0.811    -.2495324    .1953797
z_reliefarea-index  .1570187   .1155911     1.36   0.174    -.0695356    .3835731
z_distance-index   -.0256322    .142658    -0.18   0.857    -.3052368    .2539724
constant           -.0672304   .0937361    -0.72   0.473    -.2509499    .1164891
--------------------------------------------------------------------------------
         rho        .2324196   .1447161     1.61   0.108    -.0512187    .5160578
--------------------------------------------------------------------------------
Wald test of rho=0:                   chi2(1) =   2.579 (0.108)
Likelihood ratio test of rho=0:       chi2(1) =   2.428 (0.119)
Lagrange multiplier test of rho=0:    chi2(1) =   1.860 (0.173)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 22:
initial:       log likelihood = -37.460023
rescale:       log likelihood = -37.460023
rescale eq:    log likelihood = -37.460023
Iteration 0:   log likelihood = -37.460023
Iteration 1:   log likelihood = -35.913493
Iteration 2:   log likelihood = -35.013875
Iteration 3:   log likelihood = -35.007913
Iteration 4:   log likelihood = -35.007912

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs   =        42
                                                    Variance ratio  =     0.670
                                                    Squared corr.   =     0.694
Log likelihood = -35.007912                         Sigma           =      0.55
------------------------------------------------------------------------------
z_european-endemics   Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .6267623   .1651343     3.80   0.000     .3031051    .9504196
z_sgm-ice         -.0698752   .1266171    -0.55   0.581    -.3180401    .1782897
z_vegetation-index .1564236   .1780277     0.88   0.380    -.1925043    .5053514
z_distance-index    .1363395   .1338696     1.02   0.308      -.12604     .398719
constant          -.0959797   .0943541    -1.02   0.309    -.2809103    .0889509
------------------------------------------------------------------------------
         rho        .3318069   .1459789     2.27   0.023     .0456935    .6179202
------------------------------------------------------------------------------
Wald test of rho=0:                     chi2(1) =   5.166 (0.023)
Likelihood ratio test of rho=0:         chi2(1) =   4.581 (0.032)
Lagrange multiplier test of rho=0:      chi2(1) =   3.088 (0.079)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 23:
initial:       log likelihood = -37.360987
rescale:       log likelihood = -37.360987
rescale eq:    log likelihood = -37.360987
Iteration 0:   log likelihood = -37.360987
Iteration 1:   log likelihood = -35.867986
Iteration 2:   log likelihood = -35.000403
Iteration 3:   log likelihood = -34.994115
Iteration 4:   log likelihood = -34.994114

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs   =        42
                                                    Variance ratio  =     0.672
                                                    Squared corr.   =     0.692
Log likelihood = -34.994114                         Sigma           =      0.55
------------------------------------------------------------------------------
z_european-endemics    Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .6207667   .1651149     3.76   0.000     .2971474     .944386
z_sgm-ice         -.1273488   .1271278    -1.00   0.316    -.3765147    .1218172
z_vegetation-index .0931157   .1663291     0.56   0.576    -.2328834    .4191148
z_shape-index     -.1039061   .1009589    -1.03   0.303    -.3017819    .0939698
constant           -.088909   .0936235    -0.95   0.342    -.2724076    .0945897
------------------------------------------------------------------------------
         rho        .3073631   .1387948     2.21   0.027     .0353304    .5793959
------------------------------------------------------------------------------
Wald test of rho=0:                     chi2(1) =   4.904 (0.027)
Likelihood ratio test of rho=0:         chi2(1) =   4.410 (0.036)
Lagrange multiplier test of rho=0:      chi2(1) =   3.223 (0.073)
Acceptable range for rho: -1.084 < rho < 1.000
```

```
Model 24:
initial:       log likelihood = -38.016101
rescale:       log likelihood = -38.016101
rescale eq:    log likelihood = -38.016101
Iteration 0:   log likelihood = -38.016101
Iteration 1:   log likelihood = -36.535968
Iteration 2:   log likelihood = -35.449329
Iteration 3:   log likelihood = -35.443255
Iteration 4:   log likelihood = -35.443255

Weights matrix:Weighted   Type: Imported (non-binary)    Row-standardized: Yes

Spatial lag model                                   Number of obs   =        42
                                                    Variance ratio  =     0.664
                                                    Squared corr.   =     0.687
Log likelihood = -35.443255                         Sigma           =      0.55
------------------------------------------------------------------------------
z_european-endemics    Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
z_european-endemics
z_non-endemics      .7242999    .185016     3.91   0.000     .3616751    1.086925
z_lgm-ice           .0443383   .1425464     0.31   0.756    -.2350476    .3237241
z_vegetation-index  -.0522633   .1849815    -0.28   0.778    -.4148203    .3102938
z_shape-index      -.0719824   .1032302    -0.70   0.486    -.2743099    .1303451
constant           -.093167   .0942706    -0.99   0.323     -.277934       .0916
------------------------------------------------------------------------------
         rho        .3220835   .1383743     2.33   0.020     .0508749    .5932922
------------------------------------------------------------------------------
Wald test of rho=0:                    chi2(1) =   5.418 (0.020)
Likelihood ratio test of rho=0:        chi2(1) =   4.822 (0.028)
Lagrange multiplier test of rho=0:     chi2(1) =   3.430 (0.064)
Acceptable range for rho: -1.084 < rho < 1.000
```

Profiles of all 42 study regions

Albania (Al)

Area:	28,657	km^2
Borderline:	613	km
Coastline:	342	km
Perimeter:	955	km
Elevation min:	0	m
Elevation max:	2,764	m
Soil index:	10	
Vegetation index:	7	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	3	%
Total species (N):	3,031	
Bykov´s Index:	-5.49	

Most endemic-rich plant families (European endemics):
Asteraceae (122), Caryophyllacaeae (69), Fabaceae (52), Scrophulariaceae (48), Brassicaceae (46), Apiaceae (40), Campanulaceae (33), Poaceae (31), Rosaceae (25)

	total	**without habitat designation**		**total**	**without habitat designation**
Local endemics	22	9	**European endemics**	725	214
species groups	22			0	
species	632			21	
subspecies	71			1	
		absolutely confined to			**absolutely confined to**
freshwater habitats	0	0	freshwater habitats	15	5
bogs, mires, fens	0	0	bogs, mires, fens	6	2
coastal and saline habitats	0	0	coastal and saline habitats	8	6
ruderal habitats, cropland	0	0	ruderal habitats, cropland	51	9
grassland	3	2	grassland	212	62
rock and scree habitats	11	10	rock and scree habitats	302	166
shrub- and heathland	0	0	shrub- and heathland	128	16
forest	0	0	forest	100	25

Austria (Au)

Area:	84,128	km^2
Borderline:	1,890	km
Coastline:	0	km
Perimeter:	1,890	km
Elevation min:	115	m
Elevation max:	3,798	m
Soil index:	10	
Vegetation index:	8	
SGM ice:	49	%
LGM ice:	41	%
TGM ice:	50	%
Total species (N):	2,950	
Bykov´s Index:	-7.06	

Most endemic-rich plant families (European endemics):
Asteraceae (184); Rosaceae (69); Poaceae (63); Brassicaceae (57); Caryophyllaceae (43); Scrophulariaceae (42); Ranunculaceae (39); Fabaceae (34); Apiaceae (28); Campanulaceae (28)

	total	**without habitat designation**
Local endemics	25	1
species groups	0	
species	21	
subspecies	4	
		absolutely confined
freshwater habitats	4	0
bogs, mires, fens	0	0
coastal and saline habitats	0	0
ruderal habitats, cropland	0	0
grassland	20	5
rock and scree habitats	14	3
shrub- and heathland	6	0
forest	6	0

	total	**without habitat designation**
European endemics	858	114
	62	
	693	
	103	
		absolutely confined
freshwater habitats	82	10
bogs, mires, fens	25	3
coastal and saline habitats	11	4
ruderal habitats, cropland	40	12
grassland	438	101
rock and scree habitats	359	117
shrub- and heathland	210	16
forest	201	36

Azores Archipelago (Az)

Area:	2,569	km^2
Borderline:	0	km
Coastline:	610	km
Perimeter:	610	km
Elevation min:	0	m
Elevation max:	2,351	m
Soil index:	1	
Vegetation index:	4	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	0	%
Total species (N):	843	
Bykov´s Index:	3.29	

Most endemic-rich plant families (European endemics):
Poaceae (8); Asteraceae (7);Scrophulariaceae (5); Aspleniaceae (4); Caryophyllaceae (4); Ericaceae (4); Apiaceae (3); Cyperaceae (3); Fabaceae (3); Hypericaceae (3)

	total	without habitat designation
Local endemics	46	2
species groups	0	
species	44	
subspecies	2	
		absolutely confined
freshwater habitats	4	2
bogs, mires, fens	2	0
coastal and saline habitats	12	2
ruderal habitats, cropland	3	0
grassland	7	1
rock and scree habitats	23	5
shrub- and heathland	15	0
forest	18	3

	total	without habitat designation
European endemics	87	2
	0	
	83	
	4	
		absolutely confined
freshwater habitats	6	2
bogs, mires, fens	5	1
coastal and saline habitats	22	6
ruderal habitats, cropland	9	2
grassland	16	1
rock and scree habitats	41	7
shrub- and heathland	29	0
forest	39	8

Belgium with Luxembourg (Be)

Area:	33,235	km^2
Borderline:	981	km
Coastline:	83	km
Perimeter:	1,074	km
Elevation min:	0	m
Elevation max:	694	m
Soil index:	9	
Vegetation index:	5	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	0	%
Total species (N):	1,800	
Bykov´s Index:	-39.61	

Most endemic-rich plant families (European endemics):
Poaceae (23); Asteraceae (20); Scrophulariaceae (14); Brassicaceae (12)Ranunculaceae (12); Rosaceae (11); Cyperaceae (10); Apiaceae(9); Boraginaceae (6); Campanulaceae (6)

	total	**without habitat designation**		**total**	**without habitat designation**
Local endemics	1	0	**European endemics**	198	14
species groups	0			4	
species	1			159	
subspecies	0			36	
		absolutely confined			**absolutely confined**
freshwater habitats	0	0	freshwater habitats	22	7
bogs, mires, fens	0	0	bogs, mires, fens	18	3
coastal and saline habitats	0	0	coastal and saline habitats	26	15
ruderal habitats, cropland	1	0	ruderal habitats, cropland	31	8
grassland	0	0	grassland	89	25
rock and scree habitats	1	0	rock and scree habitats	36	4
shrub- and heathland	0	0	shrub- and heathland	57	3
forest	0	0	forest	65	14

Balearic Islands (BI)

Area:	5,100	km^2
Borderline:	0	km
Coastline:	550	km
Perimeter:	550	km
Elevation min:	0	m
Elevation max:	1,445	m
Soil index:	3	
Vegetation index:	3	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	0	%
Total species (N):	1,516	
Bykov´s Index:	1.69	

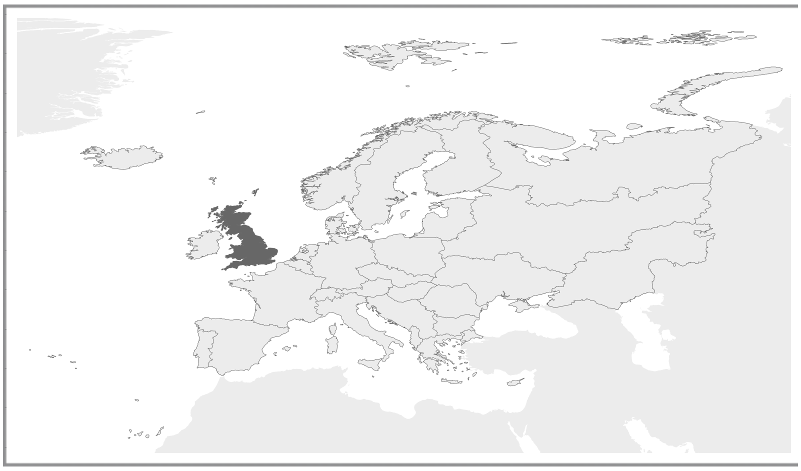
Most endemic-rich plant families (European endemics):
Lamiaceae (12); Scrophulariaceae (12); Asteraceae (11); Fabaceae (10); Plumbaginaceae (10); Apiaceae (8); Poaceae (6); Ranunculaceae (6); Boraginaceae (5); Brassicaceae (5)

	total	without habitat designation
Local endemics	55	8
species groups		0
species		45
subspecies		10
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	1	1
coastal and saline habitats	13	7
ruderal habitats, cropland	2	0
grassland	3	0
rock and scree habitats	35	23
shrub- and heathland	8	1
forest	5	1

	total	without habitat designation
European endemics	140	27
	1	
	111	
	27	
		absolutely confined
freshwater habitats	3	2
bogs, mires, fens	1	1
coastal and saline habitats	32	21
ruderal habitats, cropland	18	8
grassland	15	2
rock and scree habitats	56	35
shrub- and heathland	26	3
forest	12	2

Britain (Br)

Area:	230,709	km^2
Borderline:	0	km
Coastline:	8,605	km
Perimeter:	8,605	km
Elevation min:	0	m
Elevation max:	1,344	m
Soil index:	9	
Vegetation index:	7	
SGM ice:	66	%
LGM ice:	57	%
TGM ice:	82	%
Total species (N):	1,400	
Bykov´s Index:	-4.88	



Most endemic-rich plant families (European endemics):
Asteraceae (40), Scrophulariaceae (28), Poaceae (21), Rosaceae (15), Brassicaceae (15), Orchidaceae (11), Apiaceae (11), Ranunculaceae (10), Fabaceae (9), Caryophyllaceae (9)

	total	**without habitat designation**
Local endemics	25	3
species groups	0	
species	17	
subspecies	8	
		absolutely confined
freshwater habitats	1	0
bogs, mires, fens	1	0
coastal and saline habitats	9	7
ruderal habitats, cropland	3	3
grassland	6	2
rock and scree habitats	5	3
shrub- and heathland	3	2
forest	0	0

	total	**without habitat designation**
European endemics	291	38
	25	
	213	
	53	
		absolutely confined
freshwater habitats	29	7
bogs, mires, fens	26	5
coastal and saline habitats	62	36
ruderal habitats, cropland	36	12
grassland	107	21
rock and scree habitats	55	10
shrub- and heathland	69	5
forest	75	19

Bulgaria (Bu)

Area:	111,024	km^2
Borderline:	1,561	km
Coastline:	285	km
Perimeter:	1,846	km
Elevation min:	0	m
Elevation max:	2,925	m
Soil index:	8	
Vegetation index:	8	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	0	%
Total species (N):	3,580	
Bykov´s Index:	-4.33	

Most endemic-rich plant families (European endemics):
Asteraceae (125); Caryophyllaceae (55); Scrophulariaceae (52); Fabaceae (45); Poaceae (41); Brassicaceae (38); Apiaceae (36); Rosaceae (34); Campanulaceae (31); Ranunculaceae (20)

	total	**without habitat designation**		**total**	
Local endemics	56	13	**European endemics**	707	199
species groups	0			17	
species	43			586	
subspecies	13			105	
		absolutely confined			**absolutely confined**
freshwater habitats	1	0	freshwater habitats	27	5
bogs, mires, fens	2	0	bogs, mires, fens	9	2
coastal and saline habitats	2	2	coastal and saline habitats	12	8
ruderal habitats, cropland	5	1	ruderal habitats, cropland	43	8
grassland	25	2	grassland	269	61
rock and scree habitats	29	14	rock and scree habitats	272	111
shrub- and heathland	5	0	shrub- and heathland	129	9
forest	4	1	forest	122	32

Canary Islands (Ca)

Area:	7,556	km^2
Borderline:	0	km
Coastline:	990	km
Perimeter:	990	km
Elevation min:	0	m
Elevation max:	3,718	m
Soil index:	5	
Vegetation index:	6	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	0	%
Total species (N):	2,000	
Bykov´s Index:	10.68	

Most endemic-rich plant families (European endemics):
Asteraceae (134); Crassulaceae (66); Lamiaceae (55); Fabaceae (52); Brassicaceae (30); Boraginaceae (25); Caryophyllaceae (23); Apiaceae (17); Plumbaginaceae (16); Liliaceae (14)

	total	without habitat designation		total	without habitat designation
Local endemics	540	51	**European endemics**	606	55
species groups	0			0	
species	519			581	
subspecies	21			25	
		absolutely confined			**absolutely confined**
freshwater habitats	1	1	freshwater habitats	4	2
bogs, mires, fens	0	0	bogs, mires, fens	0	0
coastal and saline habitats	44	17	coastal and saline habitats	53	20
ruderal habitats, cropland	22	6	ruderal habitats, cropland	29	7
grassland	0	0	grassland	3	0
rock and scree habitats	385	162	rock and scree habitats	415	167
shrub- and heathland	237	20	shrub- and heathland	265	21
forest	96	37	forest	134	50

Corsica (Co)

Area:	8,780	km^2
Borderline:	0	km
Coastline:	532	km
Perimeter:	532	km
Elevation min:	0	m
Elevation max:	2,707	m
Soil index:	4	
Vegetation index:	5	
SGM ice:	0	%
LGM ice:	11	%
TGM ice:	11	%
Total species (N):	2,500	
Bykov´s Index:	-1.76	

Most endemic-rich plant families (European endemics):
Asteraceae (41); Ranunculaceae (19); Poaceae (16); Brassicaceae (15); Caryophyllaceae (15); Lamiaceae (14); Apiaceae (11); Scrophulariaceae (11); Liliaceae (10); Boraginaceae (9)

	total	without habitat designation		total	without habitat designation
Local endemics	37	6	**European endemics**	271	52
species groups	0			15	
species	31			214	
subspecies	6			42	
		absolutely confined			**absolutely confined**
freshwater habitats	5	1	freshwater habitats	24	6
bogs, mires, fens	1	0	bogs, mires, fens	7	0
coastal and saline habitats	2	2	coastal and saline habitats	29	16
ruderal habitats, cropland	1	0	ruderal habitats, cropland	23	7
grassland	10	1	grassland	65	14
rock and scree habitats	21	13	rock and scree habitats	110	51
shrub- and heathland	5	1	shrub- and heathland	57	8
forest	1	0	forest	46	13

Crete (Cr)

Area:	8,508	km^2
Borderline:	0	km
Coastline:	813	km
Perimeter:	813	km
Elevation min:	0	m
Elevation max:	2,456	m
Soil index:	5	
Vegetation index:	5	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	0	%
Total species (N):	1,877	
Bykov´s Index:	3.08	

Most endemic-rich plant families (European endemics):
Asteraceae (46); Caryophyllaceae (26); Brassicaceae (21); Lamiaceae (21); Liliaceae (18); Fabaceae (15); Campanulaceae (13); Rubiaceae (11); Apiaceae (7); Boraginaceae (7)

	total	**without habitat designation**		**total**	**without habitat designation**
Local endemics	152	17	**European endemics**	248	28
species groups	0			2	
species	133			220	
subspecies	19			26	
		absolutely confined			**absolutely confined**
freshwater habitats	8	0	freshwater habitats	9	0
bogs, mires, fens	2	0	bogs, mires, fens	2	0
coastal and saline habitats	11	4	coastal and saline habitats	21	7
ruderal habitats, cropland	5	1	ruderal habitats, cropland	35	8
grassland	5	1	grassland	15	3
rock and scree habitats	114	70	rock and scree habitats	170	97
shrub- and heathland	45	5	shrub- and heathland	73	8
forest	19	1	forest	27	1

Cyprus (Cy)

Area:	9,138	km²
Borderline:	0	km
Coastline:	587	km
Perimeter:	587	km
Elevation min:	0	m
Elevation max:	1,951	m
Soil index:	5	
Vegetation index:	5	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	0	%
Total species (N):	2,000	
Bykov´s Index:	2.00	

Most endemic-rich plant families (European endemics):
Lamiaceae (16); Asteraceae (15); Liliaceae (11); Caryophyllaceae (10); Brassicaceae (8); Crassulaceae (6); Fabaceae (6); Boraginaceae (4); Iridaceae (4); Apiaceae (3)

	total	without habitat designation		total	without habitat designation
Local endemics	108	4	**European endemics**	112	5
species groups	0			0	
species	94			97	
subspecies	14			15	
		absolutely confined			**absolutely confined**
freshwater habitats	12	1	freshwater habitats	12	3
bogs, mires, fens	0	0	bogs, mires, fens	0	0
coastal and saline habitats	6	2	coastal and saline habitats	7	3
ruderal habitats, cropland	28	2	ruderal habitats, cropland	29	6
grassland	7	0	grassland	8	0
rock and scree habitats	59	13	rock and scree habitats	61	30
shrub- and heathland	43	3	shrub- and heathland	43	8
forest	26	0	forest	26	3

Czech Republic & Slovakia (Cz)

Area:	127,692	km²
Borderline:	2,358	km
Coastline:	0	km
Perimeter:	2,358	km
Elevation min:	49	m
Elevation max:	2,655	m
Soil index:	11	
Vegetation index:	7	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	3	%
Total species (N):	3,300	
Bykov´s Index:	-34.28	

Most endemic-rich plant families (European endemics):
Asteraceae (127); Rosaceae (44); Poaceae (40); Brassicaceae (33); Scrophulariaceae (27); Caryophyllaceae (26); Ranunculaceae (26); Fabaceae (25); Apiaceae (15); Rubiaceae (15)

	total	without habitat designation		total	without habitat designation
Local endemics	6	3	**European endemics**	556	83
species groups	0			40	
species	5			439	
subspecies	1			77	
		absolutely confined			**absolutely confined**
freshwater habitats	0	0	freshwater habitats	51	4
bogs, mires, fens	0	0	bogs, mires, fens	20	5
coastal and saline habitats	0	0	coastal and saline habitats	16	3
ruderal habitats, cropland	0	0	ruderal habitats, cropland	45	12
grassland	1	1	grassland	294	67
rock and scree habitats	2	2	rock and scree habitats	167	37
shrub- and heathland	0	0	shrub- and heathland	151	6
forest	0	0	forest	171	29

Denmark (Da)

Area:	42,714	km^2
Borderline:	56	km
Coastline:	3,614	km
Perimeter:	3,670	km
Elevation min:	-7	m
Elevation max:	173	m
Soil index:	7	
Vegetation index:	5	
SGM ice:	100	%
LGM ice:	75	%
TGM ice:	100	%
Total species (N):	1.450	
Bykov´s Index:	-35.04	

Most endemic-rich plant families (European endemics):
Asteraceae (19); Poaceae (13); Scrophulariaceae (12); Rosaceae (10); Ranunculaceae (9); Brassicaceae (8); Orchidaceae (7); Fabaceae (5); Rubiaceae (5); Cyperaceae (5)

	total	without habitat designation
Local endemics	1	0
species groups	0	
species	1	
subspecies	0	
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	0	0
coastal and saline habitats	1	1
ruderal habitats, cropland	0	0
grassland	0	0
rock and scree habitats	0	0
shrub- and heathland	0	0
forest	0	0

	total	without habitat designation
European endemics	145	6
	8	
	104	
	33	
		absolutely confined
freshwater habitats	19	6
bogs, mires, fens	14	2
coastal and saline habitats	33	17
ruderal habitats, cropland	23	5
grassland	64	11
rock and scree habitats	20	2
shrub- and heathland	42	1
forest	53	12

Faero (Fa)

Area:	1,484	km^2
Borderline:	0	km
Coastline:	427	km
Perimeter:	427	km
Elevation min:	0	m
Elevation max:	882	m
Soil index:	1	
Vegetation index:	1	
SGM ice:	100	%
LGM ice:	100	%
TGM ice:	100	%
Total species (N):	262	
Bykov´s Index:	-1.81	

Most endemic-rich plant families (European endemics):
Asteraceae (6); Scrophulariaceae (6); Poaceae (5); Rosaceae (5); Callitrichaceae (3); Cyperaceae (3); Orchidaceae (3); Boraginaceae (2); Liliaceae (2); Onagraceae (2); Rubiaceae (2); Saxifragaceae (2)

	total	without habitat designation
Local endemics	1	1
species groups	0	
species	1	
subspecies	0	
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	0	0
coastal and saline habitats	0	0
ruderal habitats, cropland	0	0
grassland	0	0
rock and scree habitats	0	0
shrub- and heathland	0	0
forest	0	0

	total	without habitat designation
European endemics	47	9
	4	
	31	
	12	
		absolutely confined
freshwater habitats	7	3
bogs, mires, fens	6	2
coastal and saline habitats	9	4
ruderal habitats, cropland	4	2
grassland	18	1
rock and scree habitats	7	0
shrub- and heathland	9	1
forest	6	2

Finland (Fe)

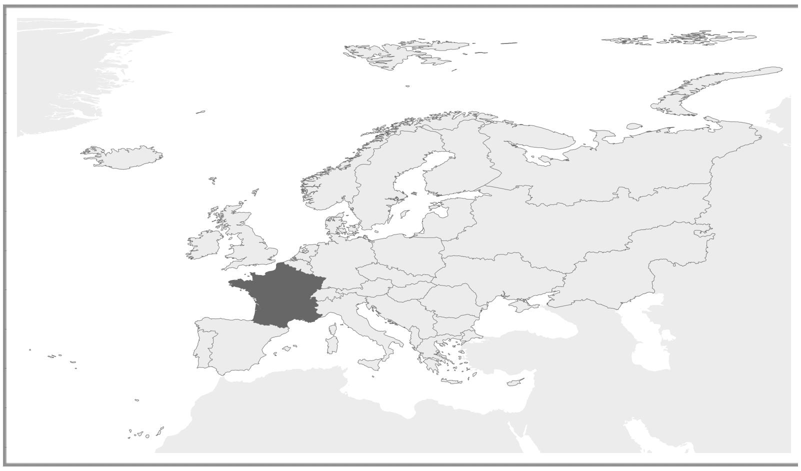
Area:	335,313	km^2
Borderline:	2,339	km
Coastline:	2,470	km
Perimeter:	4,809	km
Elevation min:	0	m
Elevation max:	1,328	m
Soil index:	5	
Vegetation index:	10	
SGM ice:	100	%
LGM ice:	100	%
TGM ice:	100	%
Total species (N):	1.100	
Bykov´s Index:	-114.65	

Most endemic-rich plant families (European endemics):
Asteraceae (17); Scrophulariaceae (11); Poaceae (11); Rosaceae (11); Cyperaceae (8); Caryophyllaceae (6); Orchidaceae (5); Ranunculaceae (4); Primulaceae (3); Fabaceae (3)

	total	without habitat designation		total	without habitat designation
Local endemics	0	0	**European endemics**	114	12
species groups	0			10	
species	0			76	
subspecies	0			28	
		absolutely confined			**absolutely confined**
freshwater habitats	0	0	freshwater habitats	10	2
bogs, mires, fens	0	0	bogs, mires, fens	13	2
coastal and saline habitats	0	0	coastal and saline habitats	22	12
ruderal habitats, cropland	0	0	ruderal habitats, cropland	17	3
grassland	0	0	grassland	60	5
rock and scree habitats	0	0	rock and scree habitats	18	2
shrub- and heathland	0	0	shrub- and heathland	30	1
forest	0	0	forest	37	4

France (Ga)

Area:	539,527	km^2
Borderline:	2,137	km
Coastline:	3,318	km
Perimeter:	5,455	km
Elevation min:	-2	m
Elevation max:	4,807	m
Soil index:	10	
Vegetation index:	10	
SGM ice:	7	%
LGM ice:	5	%
TGM ice:	9	%
Total species (N):	4,500	
Bykov´s Index:	-5.96	

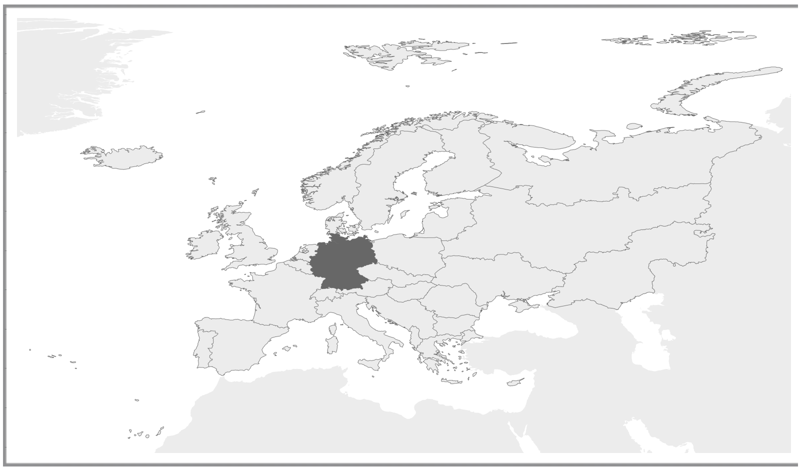


Most endemic-rich plant families (European endemics):
Asteraceae (271); Poaceae (105); Brassicaceae (86); Rosaceae (79); Fabaceae (67); Scrophulariaceae (65); Caryophyllaceae (62); Apiaceae (54); Ranunculaceae (53); Campanulaceae (41)

	total	without habitat designation		total	without habitat designation
Local endemics	93	28	**European endemics**	1,384	259
species groups	2			103	
species	75			1,110	
subspecies	16			171	
		absolutely confined			**absolutely confined**
freshwater habitats	4	3	freshwater habitats	107	28
bogs, mires, fens	1	0	bogs, mires, fens	37	5
coastal and saline habitats	7	5	coastal and saline habitats	81	50
ruderal habitats, cropland	5	3	ruderal habitats, cropland	95	36
grassland	13	7	grassland	508	149
rock and scree habitats	40	31	rock and scree habitats	542	251
shrub- and heathland	8	2	shrub- and heathland	269	33
forest	5	0	forest	220	42

Germany (Ge)

Area:	357,251	km^2
Borderline:	2,761	km
Coastline:	1,944	km
Perimeter:	4,705	km
Elevation min:	-4	m
Elevation max:	2,963	m
Soil index:	11	
Vegetation index:	9	
SGM ice:	50	%
LGM ice:	18	%
TGM ice:	53	%
Total species (N):	3,350	
Bykov´s Index:	-39.72	



Most endemic-rich plant families (European endemics):
Asteraceae (127); Rosaceae (59); Poaceae (55); Brassicaceae (30); Ranunculaceae (30); Scrophulariaceae (29); Cyperaceae (22); Caryophyllaceae (20); Fabaceae (20); Apiaceae (18)

	total	**without habitat designation**
Local endemics	8	0
species groups	0	
species	4	
subspecies	4	
		absolutely confined
freshwater habitats	4	3
bogs, mires, fens	1	0
coastal and saline habitats	1	1
ruderal habitats, cropland	0	0
grassland	2	2
rock and scree habitats	1	0
shrub- and heathland	0	0
forest	1	0

	total	**without habitat designation**
European endemics	645	60
	47	
	505	
	93	
		absolutely confined
freshwater habitats	78	15
bogs, mires, fens	35	4
coastal and saline habitats	38	21
ruderal habitats, cropland	49	13
grassland	322	78
rock and scree habitats	224	67
shrub- and heathland	153	8
forest	171	35

Greece (Gr)

Area:	121,564	km²
Borderline:	941	km
Coastline:	5,997	km
Perimeter:	6,938	km
Elevation min:	0	m
Elevation max:	2,919	m
Soil index:	6,938	
Vegetation index:	10	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	0	%
Total species (N):	5,000	
Bykov´s Index:	1.18	

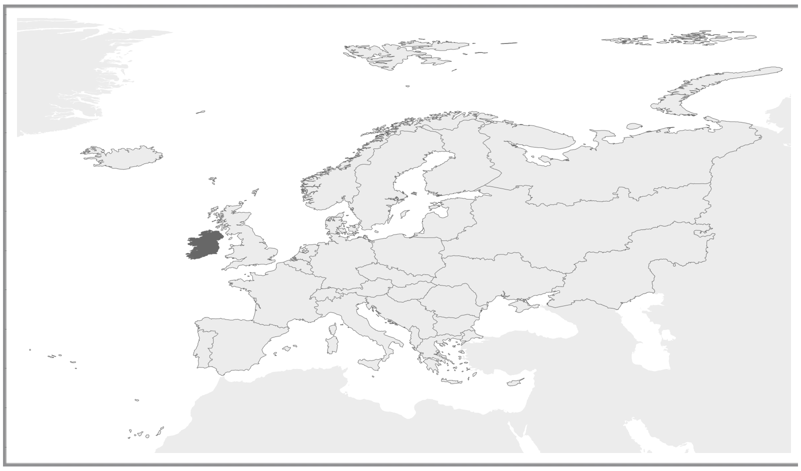
Most endemic-rich plant families (European endemics):
Asteraceae (186); Caryophyllaceae (112); Brassicaceae (77); Scrophulariaceae (71); Lamiaceae (60); Poaceae (58); Fabaceae (56); Campanulaceae (54); Liliaceae (48); Apiaceae (42)

	total	without habitat designation
Local endemics	5	1
species groups	0	
species	4	
subspecies	1	
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	0	0
coastal and saline habitats	0	0
ruderal habitats, cropland	0	0
grassland	2	0
rock and scree habitats	2	1
shrub- and heathland	0	0
forest	2	1

	total	without habitat designation
European endemics	321	63
	9	
	257	
	55	
		absolutely confined
freshwater habitats	14	1
bogs, mires, fens	10	3
coastal and saline habitats	11	7
ruderal habitats, cropland	38	10
grassland	145	33
rock and scree habitats	70	13
shrub- and heathland	88	3
forest	117	26

Ireland (Hb)

Area:	83,924	km^2
Borderline:	0	km
Coastline:	2,816	km
Perimeter:	2,816	km
Elevation min:	0	m
Elevation max:	1,041	m
Soil index:	10	
Vegetation index:	8	
SGM ice:	99	%
LGM ice:	78	%
TGM ice:	100	%
Total species (N):	1,000	
Bykov´s Index:	-62.17	



Most endemic-rich plant families (European endemics):
Scrophulariaceae (16) Asteraceae (15); Poaceae (10); Orchidaceae (8); Rosaceae (7); Brassicaceae (6); Ranunculaceae (6); Cyperaceae (5); Ericaceae (5); Saxifragaceae (5)

	total	without habitat designation
Local endemics	0	0
species groups	0	
species	0	
subspecies	0	
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	0	0
coastal and saline habitats	0	0
ruderal habitats, cropland	0	0
grassland	0	0
rock and scree habitats	0	0
shrub- and heathland	0	0
forest	0	0

	total	without habitat designation
European endemics	141	21
	10	
	95	
	36	
		absolutely confined
freshwater habitats	21	7
bogs, mires, fens	21	4
coastal and saline habitats	34	21
ruderal habitats, cropland	13	4
grassland	45	5
rock and scree habitats	23	2
shrub- and heathland	34	2
forest	28	5

Switzerland (He)

Area:	41,493	km^2
Borderline:	1,394	km
Coastline:	0	km
Perimeter:	1,394	km
Elevation min:	194	m
Elevation max:	4,634	m
Soil index:	10	
Vegetation index:	8	
SGM ice:	99	%
LGM ice:	80	%
TGM ice:	99	%
Total species (N):	2,471	
Bykov´s Index:	-13.13	

Most endemic-rich plant families (European endemics):
Asteraceae (173); Rosaceae (73); Poaceae (47); Brassicaceae (40); Scrophulariaceae (39); Caryophyllaceae (31); Ranunculaceae (31); Fabaceae (27); Apiaceae (24); Primulaceae (19)

	total	without habitat designation
Local endemics	8	5
species groups	0	
species	7	
subspecies	1	
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	0	0
coastal and saline habitats	0	0
ruderal habitats, cropland	0	0
grassland	1	0
rock and scree habitats	2	2
shrub- and heathland	1	0
forest	0	0

	total	without habitat designation
European endemics	741	114
	74	
	589	
	78	
		absolutely confined
freshwater habitats	72	11
bogs, mires, fens	23	2
coastal and saline habitats	8	1
ruderal habitats, cropland	45	9
grassland	360	99
rock and scree habitats	295	101
shrub- and heathland	166	16
forest	159	

The Netherlands (Ho)

Area:	35,549	km^2
Borderline:	762	km
Coastline:	1,449	km
Perimeter:	2,211	km
Elevation min:	-7	m
Elevation max:	322	m
Soil index:	7	
Vegetation index:	5	
SGM ice:	59	%
LGM ice:	0	%
TGM ice:	59	%
Total species (N):	1,221	
Bykov´s Index:	-55.1	

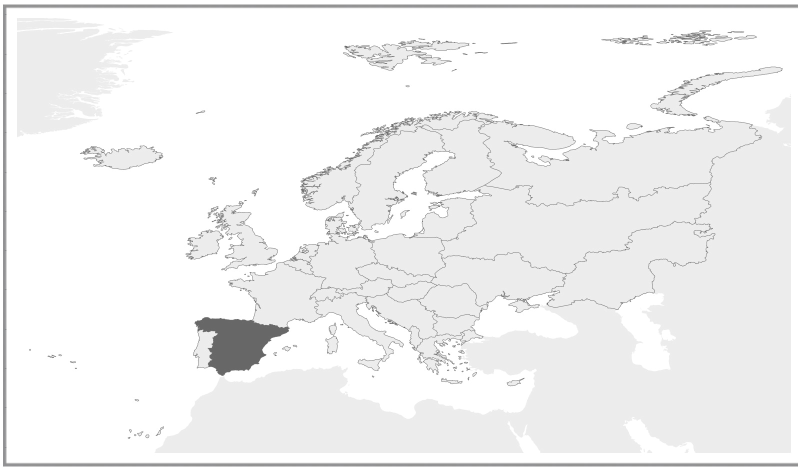
Most endemic-rich plant families (European endemics):
Asteraceae (17); Poaceae (13); Ranunculaceae (10); Scrophulariaceae (10); Brassicaceae (8); Cyperaceae (8); Rosaceae (8); Liliaceae (6); Boraginaceae (5); Lamiaceae (5)

	total	without habitat designation
Local endemics	0	0
species groups	0	
species	0	
subspecies	0	
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	0	0
coastal and saline habitats	0	0
ruderal habitats, cropland	0	0
grassland	0	0
rock and scree habitats	0	0
shrub- and heathland	0	0
forest	0	0

	total	without habitat designation
European endemics	148	9
	4	
	111	
	33	
		absolutely confined
freshwater habitats	16	5
bogs, mires, fens	14	2
coastal and saline habitats	30	19
ruderal habitats, cropland	27	7
grassland	62	13
rock and scree habitats	20	2
shrub- and heathland	41	1
forest	49	11

Spain mainland (Hs)

Area:	494,053	km²
Borderline:	1,529	km
Coastline:	2,726	km
Perimeter:	4,055	km
Elevation min:	0	m
Elevation max:	3,478	m
Soil index:	12	
Vegetation index:	10	
SGM ice:	0	%
LGM ice:	2	%
TGM ice:	2	%
Total species (N):	5,000	
Bykov´s Index:	-1.08	



Most endemic-rich plant families (European endemics):
Asteraceae (262); Scrophulariaceae (132); Brassicaceae (121); Fagaceae (109); Caryophyllaceae (96); Poaceae (86); Lamiaceae (82); Apiaceae (55); Plumbaginaceae (49), Ranunculaceae (49)

	total	without habitat designation		total	without habitat designation
Local endemics	555	151	**European endemics**	1,581	336
species groups	7			49	
species	467			1317	
subspecies	81			215	
		absolutely confined			**absolutely confined**
freshwater habitats	12	6	freshwater habitats	103	28
bogs, mires, fens	3	1	bogs, mires, fens	35	6
coastal and saline habitats	45	23	coastal and saline habitats	132	76
ruderal habitats, cropland	47	21	ruderal habitats, cropland	155	55
grassland	67	17	grassland	388	89
rock and scree habitats	253	185	rock and scree habitats	630	343
shrub- and heathland	94	34	shrub- and heathland	352	71
forest	22	7	forest	182	32

Hungary (Hu)

Area:	93,002	km^2
Borderline:	1,559	km
Coastline:	0	km
Perimeter:	1,559	km
Elevation min:	78	m
Elevation max:	1,014	m
Soil index:	13	
Vegetation index:	8	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	0	%
Total species (N):	2,411	
Bykov´s Index:	-25.96	

Most endemic-rich plant families (European endemics):
Asteraceae (64); Fabaceae (24); Brassicaceae (20); Rosaceae (20); Poaceae (18); Caryophyllaceae (17); Liliaceae (13); Ranunculaceae (13); Scrophulariaceae (12); Apiaceae (11)

	total	**without habitat designation**
Local endemics	5	1
species groups	0	
species	4	
subspecies	1	
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	0	0
coastal and saline habitats	0	0
ruderal habitats, cropland	0	0
grassland	2	0
rock and scree habitats	2	1
shrub- and heathland	0	0
forest	2	1

	total	**without habitat designation**
European endemics	321	63
	9	
	257	
	55	
		absolutely confined
freshwater habitats	14	1
bogs, mires, fens	10	3
coastal and saline habitats	11	7
ruderal habitats, cropland	38	10
grassland	145	33
rock and scree habitats	70	13
shrub- and heathland	88	3
forest	117	26

Iceland (Is)

Area:	102,962	km^2
Borderline:	0	km
Coastline:	3,637	km
Perimeter:	3,637	km
Elevation min:	0	m
Elevation max:	2,119	m
Soil index:	7	
Vegetation index:	6	
SGM ice:	100	%
LGM ice:	100	%
TGM ice:	100	%
Total species (N):	377	
Bykov´s Index:	-5.06	

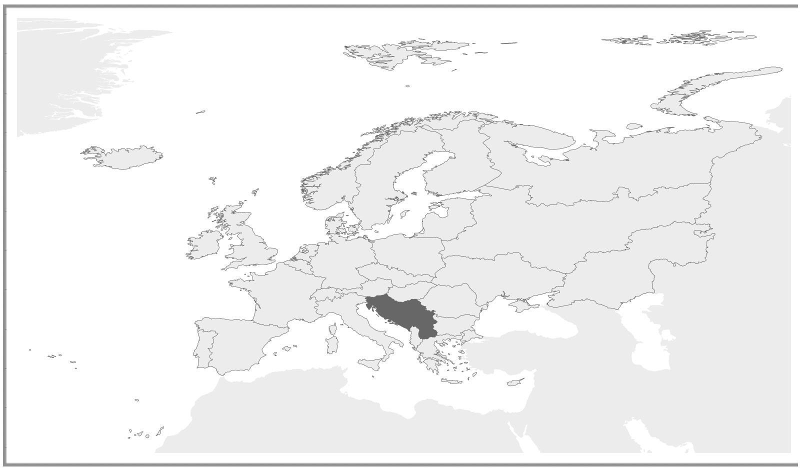
Most endemic-rich plant families (European endemics):
Asteraceae (13); Poaceae (8); Scrophulariaceae (5); Rosaceae (4); Caryophyllaceae (3); Cyperaceae (3); Onagraceae (3); Saxifragaceae (3); Boraginaceae (2)

	total	without habitat designation
Local endemics	4	2
species groups	0	
species	1	
subspecies	3	
		absolutely confined
freshwater habitats	1	1
bogs, mires, fens	1	0
coastal and saline habitats	0	0
ruderal habitats, cropland	0	0
grassland	1	0
rock and scree habitats	0	0
shrub- and heathland	0	0
forest	1	0

	total	without habitat designation
European endemics	56	12
	12	
	29	
	15	
		absolutely confined
freshwater habitats	8	4
bogs, mires, fens	4	1
coastal and saline habitats	9	4
ruderal habitats, cropland	6	2
grassland	22	1
rock and scree habitats	12	2
shrub- and heathland	11	0
forest	9	4

Italy mainland (It)

Area:	250,631	km²
Borderline:	1,421	km
Coastline:	3,261	km
Perimeter:	4,682	km
Elevation min:	0	m
Elevation max:	4,748	m
Soil index:	11	
Vegetation index:	10	
SGM ice:	20	%
LGM ice:	15	%
TGM ice:	21	%
Total species (N):	5,200	
Bykov´s Index:	-2.84	



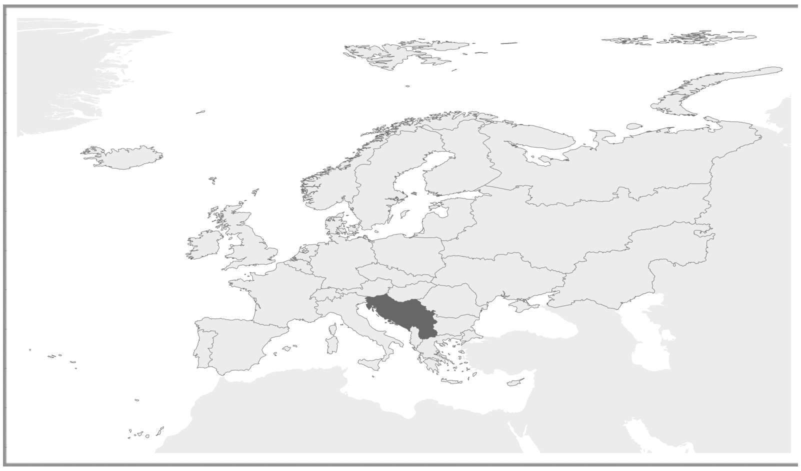
Most endemic-rich plant families (European endemics):
Asteraceae (295); Brassicaceae (91); Scrophulariaceae (87); Poaceae (86); Caryophyllaceae (84); Fabaceae (67); Rosaceae (66); Apiaceae (64); Campanulaceae (56); Ranunculaceae (54)

	total	without habitat designation
Local endemics	170	54
species groups	0	
species	145	
subspecies	25	
		absolutely confined
freshwater habitats	3	2
bogs, mires, fens	2	0
coastal and saline habitats	6	6
ruderal habitats, cropland	4	1
grassland	32	7
rock and scree habitats	83	63
shrub- and heathland	12	2
forest	9	5

	total	without habitat designation
European endemics	1,473	302
	81	
	1205	
	187	
		absolutely confined
freshwater habitats	82	16
bogs, mires, fens	30	4
coastal and saline habitats	42	23
ruderal habitats, cropland	94	31
grassland	543	153
rock and scree habitats	636	313
shrub- and heathland	253	31
forest	233	57

Former Yugoslavia (Ju)

Area:	255,252	km^2
Borderline:	2,271	km
Coastline:	2,019	km
Perimeter:	4,29	km
Elevation min:	0	m
Elevation max:	2,864	m
Soil index:	12	
Vegetation index:	10	
SGM ice:	1	%
LGM ice:	1	%
TGM ice:	1	%
Total species (N):	4,100	
Bykov´s Index:	-2.43	



Most endemic-rich plant families (European endemics):
Asteraceae (274); Caryophyllaceae (119); Poaceae (98) Scrophulariaceae (88); Fabaceae (87); Brassicaceae (85); Apiaceae (70); Campanulaceae (65); Rosaceae (62); Ranunculaceae (49)

	total	**without habitat designation**
Local endemics	158	61
species groups	4	
species	135	
subspecies	19	
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	0	0
coastal and saline habitats	9	8
ruderal habitats, cropland	7	1
grassland	23	11
rock and scree habitats	69	58
shrub- and heathland	3	1
forest	5	4

	total	**without habitat designation**
European endemics	1479	397
	58	
	1244	
	177	
		absolutely confined
freshwater habitats	58	9
bogs, mires, fens	24	5
coastal and saline habitats	35	22
ruderal habitats, cropland	87	18
grassland	519	154
rock and scree habitats	573	293
shrub- and heathland	246	24
forest	232	59

Portugal (Lu)

Area:	88,573	km²
Borderline:	985	km
Coastline:	941	km
Perimeter:	1,926	km
Elevation min:	0	m
Elevation max:	1,991	m
Soil index:	9	
Vegetation index:	6	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	0	%
Total species (N):	3,000	
Bykov´s Index:	-2.57	

Most endemic-rich plant families (European endemics):
Asteraceae (66); Scrophulariaceae (44);Poaceae (33); Fabaceae (31); Caryophyllaceae (30); Lamiaceae (25); Brassicaceae (24); Apiaceae (22); Plumbaginaceae (21); Liliaceae (19)

	total	without habitat designation		total	without habitat designation
Local endemics	73	17	**European endemics**	489	102
species groups	0			5	
species	63			415	
subspecies	10			69	
		absolutely confined			**absolutely confined**
freshwater habitats	3	0	freshwater habitats	48	16
bogs, mires, fens	0	0	bogs, mires, fens	17	3
coastal and saline habitats	13	10	coastal and saline habitats	67	38
ruderal habitats, cropland	9	6	ruderal habitats, cropland	75	31
grassland	9	3	grassland	96	18
rock and scree habitats	15	8	rock and scree habitats	120	42
shrub- and heathland	19	11	shrub- and heathland	148	33
forest	6	2	forest	74	11

Madeira (Ma)

Area:	774	km²
Borderline:	0	km
Coastline:	124	km
Perimeter:	124	km
Elevation min:	0	m
Elevation max:	1,862	m
Soil index:	1	
Vegetation index:	5	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	0	%
Total species (N):	1,204	
Bykov´s Index:	1.036	

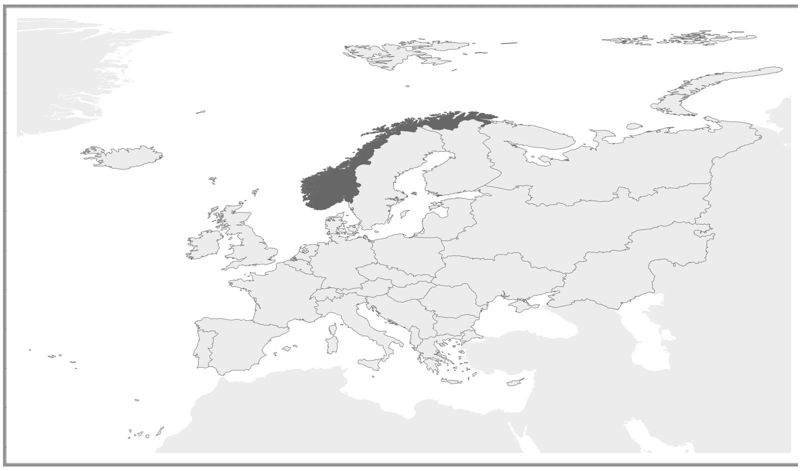
Most endemic-rich plant families (European endemics):
Asteraceae (29); Fabaceae (14); Brassicaceae (11); Lamiaceae (11); Crassulaceae (9); Poaceae (9); Rosaceae (9); Apiaceae (7); Scrophulariaceae (7); Liliaceae (6)

	total	**without habitat designation**
Local endemics	134	7
species groups	0	
species	123	
subspecies	11	
		absolutely confined
freshwater habitats	12	0
bogs, mires, fens	1	0
coastal and saline habitats	33	13
ruderal habitats, cropland	10	3
grassland	4	0
rock and scree habitats	83	35
shrub- and heathland	21	2
forest	41	14

	total	**without habitat designation**
European endemics	207	9
	0	
	193	
	14	
		absolutely confined
freshwater habitats	16	0
bogs, mires, fens	2	0
coastal and saline habitats	45	17
ruderal habitats, cropland	18	4
grassland	9	0
rock and scree habitats	118	40
shrub- and heathland	52	3
forest	85	29

Norway (No)

Area:	320,915	km^2
Borderline:	2,42	km
Coastline:	15,852	km
Perimeter:	18,272	km
Elevation min:	0	m
Elevation max:	2,469	m
Soil index:	7	
Vegetation index:	9	
SGM ice:	100	%
LGM ice:	100	%
TGM ice:	100	%
Total species (N):	1,700	
Bykov´s Index:	-58.1	



Most endemic-rich plant families (European endemics):
Asteraceae (36); Rosaceae (17); Scrophulariaceae (15); Poaceae (11); Cyperaceae (9); Orchidaceae (9); Brassicaceae (6); Papaveraceae (5); Ranunculaceae (5); Saxifragaceae (5)

	total	**without habitat designation**
Local endemics	2	1
species groups	0	
species	2	
subspecies	0	
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	0	0
coastal and saline habitats	0	0
ruderal habitats, cropland	0	0
grassland	1	1
rock and scree habitats	0	0
shrub- and heathland	0	0
forest	0	0

	total	**without habitat designation**
European endemics	181	23
	25	
	118	
	38	
		absolutely confined
freshwater habitats	23	3
bogs, mires, fens	20	4
coastal and saline habitats	27	15
ruderal habitats, cropland	24	5
grassland	77	10
rock and scree habitats	38	8
shrub- and heathland	49	2
forest	51	10

Poland (Po)

Area:	311,695	km²
Borderline:	2,270	km
Coastline:	638	km
Perimeter:	2,908	km
Elevation min:	-2	m
Elevation max:	2,499	m
Soil index:	10	
Vegetation index:	7	
SGM ice:	81	%
LGM ice:	38	%
TGM ice:	95	%
Total species (N):	2,374	
Bykov´s Index:	-6.002	

Most endemic-rich plant families (European endemics):
Asteraceae (75); Rosaceae (38); Poaceae (34); Scrophulariaceae (28); Brassicaceae (23); Ranunculaceae (20); Caryophyllaceae (19); Fabaceae (15); Cyperaceae (13); Apiaceae (12)

	total	**without habitat designation**
Local endemics	3	2
species groups	0	
species	3	
subspecies	0	
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	0	0
coastal and saline habitats	0	0
ruderal habitats, cropland	0	0
grassland	0	0
rock and scree habitats	1	1
shrub- and heathland	0	0
forest	0	0

	total	**without habitat designation**
European endemics	412	40
	20	
	327	
	65	
		absolutely confined
freshwater habitats	42	5
bogs, mires, fens	18	2
coastal and saline habitats	18	7
ruderal habitats, cropland	39	11
grassland	222	46
rock and scree habitats	134	31
shrub- and heathland	111	3
forest	133	26

Romania (Rm)

Area:	237,396	km²
Borderline:	2,231	km
Coastline:	362	km
Perimeter:	2,593	km
Elevation min:	0	m
Elevation max:	2,544	m
Soil index:	12	
Vegetation index:	10	
SGM ice:	0	%
LGM ice:	1	%
TGM ice:	1	%
Total species (N):	3,400	
Bykov´s Index:	-677	

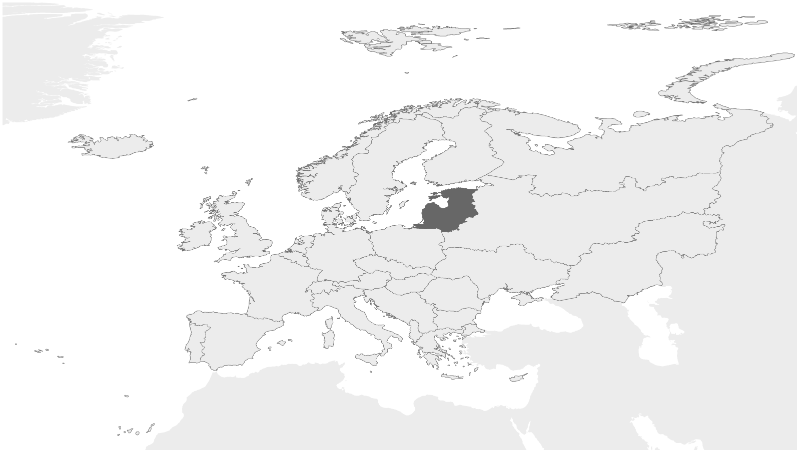
Most endemic-rich plant families (European endemics):
Asteraceae (148); Caryophyllaceae (51); Poaceae (51); Fabaceae (41); Scrophulariaceae (39); Brassicaceae (38); Rosaceae (30); Apiaceae (28); Campanulaceae (27); Ranunculaceae (26)

	total	without habitat designation
Local endemics	45	22
species groups	0	
species	38	
subspecies	7	
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	0	0
coastal and saline habitats	1	1
ruderal habitats, cropland	1	0
grassland	9	5
rock and scree habitats	15	11
shrub- and heathland	0	0
forest	3	1

	total	without habitat designation
European endemics	700	164
	30	
	557	
	113	
		absolutely confined
freshwater habitats	40	6
bogs, mires, fens	17	3
coastal and saline habitats	17	8
ruderal habitats, cropland	47	9
grassland	311	72
rock and scree habitats	235	75
shrub- and heathland	146	6
forest	170	34

Russia Baltic division (Rs (B))

Area:	189,125	km^2
Borderline:	1,325	km
Coastline:	2,308	km
Perimeter:	3,633	km
Elevation min:	0	m
Elevation max:	318	m
Soil index:	10	
Vegetation index:	8	
SGM ice:	1	%
LGM ice:	0,99	%
TGM ice:	1	%
Total species (N):	2,000	
Bykov´s Index:	-8.418	



Most endemic-rich plant families (European endemics):
Asteraceae (14); Rosaceae (12); Scrophulariaceae (10); Cyperaceae (9); Poaceae (9); Ranunculaceae (7); Brassicaceae (6); Caryophyllaceae (6); Fabaceae (5); Liliaceae (4)

	total	**without habitat designation**
Local endemics	1	0
species groups	0	
species	0	
subspecies	1	
		absolutely confined
freshwater habitats	1	0
bogs, mires, fens	0	0
coastal and saline habitats	0	0
ruderal habitats, cropland	0	0
grassland	1	0
rock and scree habitats	1	0
shrub- and heathland	0	0
forest	0	0

	total	**without habitat designation**
European endemics	118	9
	5	
	92	
	21	
		absolutely confined
freshwater habitats	12	2
bogs, mires, fens	11	2
coastal and saline habitats	20	10
ruderal habitats, cropland	21	5
grassland	59	6
rock and scree habitats	18	1
shrub- and heathland	32	1
forest	43	10

Russia Central division (Rs (C))

Area:	1,625,765	km^2
Borderline:	8,705	km
Coastline:	1,330	km
Perimeter:	10,035	km
Elevation min:	0	m
Elevation max:	1,750	m
Soil index:	11	
Vegetation index:	12	
SGM ice:	46	%
LGM ice:	17	%
TGM ice:	76	%
Total species (N):	3,000	
Bykov´s Index:	-4.025	

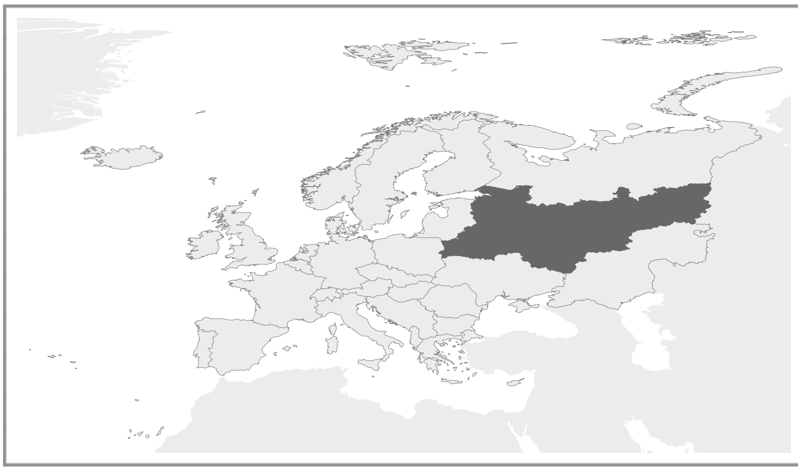
Most endemic-rich plant families (European endemics):
Asteraceae (33); Rosaceae (17); Caryophyllaceae (13); Poaceae (13); Scrophulariaceae (12); Ranunculaceae (10); Fabaceae (9); Brassicaceae (7); Cyperaceae (7); Rubiaceae (7)

	total	without habitat designation
Local endemics	13	9
species groups	0	
species	11	
subspecies	2	
		absolutely confined
freshwater habitats	1	0
bogs, mires, fens	0	0
coastal and saline habitats	0	0
ruderal habitats, cropland	0	0
grassland	1	0
rock and scree habitats	0	0
shrub- and heathland	2	0
forest	2	2

	total	without habitat designation
European endemics	190	37
species groups	3	
species	160	
subspecies	27	
		absolutely confined
freshwater habitats	14	1
bogs, mires, fens	8	1
coastal and saline habitats	10	5
ruderal habitats, cropland	32	6
grassland	83	12
rock and scree habitats	39	7
shrub- and heathland	59	4
forest	69	11

Russia Southeastern division (Rs (E))

Area:	953,366	km^2
Borderline:	2,575	km
Coastline:	5,079	km
Perimeter:	7,654	km
Elevation min:	0	m
Elevation max:	1,640	m
Soil index:	11	
Vegetation index:	13	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	6	%
Total species (N):	4,000	
Bykov´s Index:	-4.104	



Most endemic-rich plant families (European endemics):
Asteraceae (20); Caryophyllaceae (14); Fabaceae (12); Brassicaceae (10); Poaceae (10); Scrophulariaceae (7); Ranunculaceae (6); Apiaceae (5); Rosaceae (4); Liliaceae (3)

	total	**without habitat designation**
Local endemics	14	8
species groups	0	
species	13	
subspecies	1	
		absolutely confined
freshwater habitats	1	1
bogs, mires, fens	0	0
coastal and saline habitats	0	0
ruderal habitats, cropland	0	0
grassland	4	3
rock and scree habitats	2	1
shrub- and heathland	0	0
forest	0	0

	total	**without habitat designation**
European endemics	113	40
	1	
	95	
	17	
		absolutely confined
freshwater habitats	9	3
bogs, mires, fens	1	0
coastal and saline habitats	3	1
ruderal habitats, cropland	18	6
grassland	39	9
rock and scree habitats	24	6
shrub- and heathland	21	1
forest	22	3

Russia Crimean division (Rs (K))

Area:	25,831	km^2
Borderline:	17	km
Coastline:	1,287	km
Perimeter:	1,304	km
Elevation min:	0	m
Elevation max:	1,545	m
Soil index:	7	
Vegetation index:	8	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	0	%
Total species (N):	2,000	
Bykov´s Index:	-123	

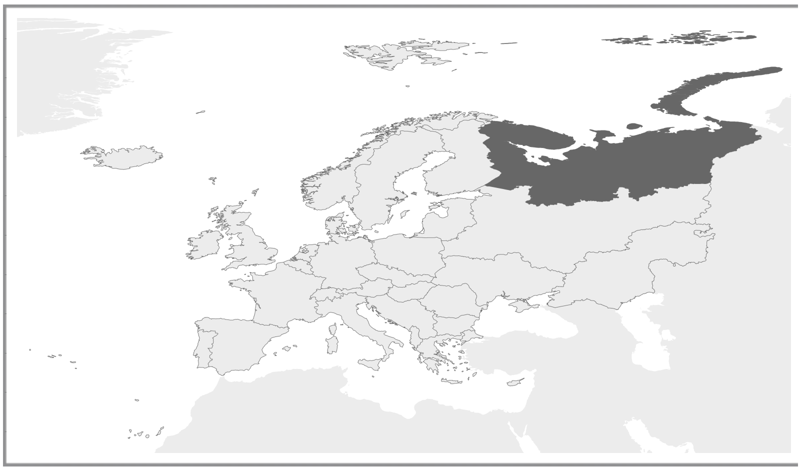
Most endemic-rich plant families (European endemics):
Asteraceae (18); Rosaceae (14); Caryophyllaceae (13); Fabaceae (11); Poaceae (10); Apiaceae (8); Brassicaceae (8); Liliaceae (7); Lamiaceae (6); Rubiaceae (5)

	total	without habitat designation
Local endemics	64	17
species groups	0	
species	48	
subspecies	16	
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	0	0
coastal and saline habitats	5	4
ruderal habitats, cropland	4	0
grassland	15	4
rock and scree habitats	28	18
shrub- and heathland	5	2
forest	11	3

	total	without habitat designation
European endemics	131	42
	0	
	104	
	27	
		absolutely confined
freshwater habitats	2	1
bogs, mires, fens	0	0
coastal and saline habitats	8	6
ruderal habitats, cropland	15	3
grassland	34	6
rock and scree habitats	49	25
shrub- and heathland	20	2
forest	23	5

Russia Northern division (Rs (N))

Area:	1,463,824	km²
Borderline:	4,605	km
Coastline:	16,836	km
Perimeter:	21,441	km
Elevation min:	0	m
Elevation max:	1,894	m
Soil index:	10	
Vegetation index:	11	
SGM ice:	97	%
LGM ice:	40	%
TGM ice:	100	%
Total species (N):	2,000	
Bykov´s Index:	-7.224	



Most endemic-rich plant families (European endemics):
Rosaceae (14); Asteraceae (12); Scrophulariaceae (9); Poaceae (7); Cyperaceae (6); Caryophyllaceae (4); Fabaceae (4); Orchidaceae (4); Onagraceae (3); Brassicaceae (2)

	total	without habitat designation
Local endemics	34	12
species groups	0	
species	18	
subspecies	16	
		absolutely confined
freshwater habitats	6	3
bogs, mires, fens	0	0
coastal and saline habitats	7	7
ruderal habitats, cropland	0	0
grassland	5	1
rock and scree habitats	7	6
shrub- and heathland	1	0
forest	2	0

	total	without habitat designation
European endemics	456	100
	16	
	362	
	78	
		absolutely confined
freshwater habitats	40	10
bogs, mires, fens	12	1
coastal and saline habitats	18	15
ruderal habitats, cropland	30	7
grassland	213	44
rock and scree habitats	122	24
shrub- and heathland	111	5
forest	133	25

Russia Southwestern division (Rs (W))

Area:	605,414	km^2
Borderline:	3,675	km
Coastline:	1,527	km
Perimeter:	5,202	km
Elevation min:	0	m
Elevation max:	2,061	m
Soil index:	11	
Vegetation index:	10	
SGM ice:	24	%
LGM ice:	0	%
TGM ice:	24	%
Total species (N):	5,000	
Bykov´s Index:	-1.856	

Most endemic-rich plant families (European endemics):
Asteraceae (105); Caryophyllaceae (34); Poaceae (34); Scrophulariaceae (28); Fabaceae (26); Ranunculaceae (22); Rosaceae (19); Liliaceae (17); Rubiaceae (17); Brassicaceae (14)

	total	without habitat designation
Local endemics	34	12
species groups	0	
species	18	
subspecies	16	
		absolutely confined
freshwater habitats	6	3
bogs, mires, fens	0	0
coastal and saline habitats	7	7
ruderal habitats, cropland	0	0
grassland	5	1
rock and scree habitats	7	6
shrub- and heathland	1	0
forest	2	0

	total	without habitat designation
European endemics	456	100
	16	
	362	
	78	
		absolutely confined
freshwater habitats	40	10
bogs, mires, fens	12	1
coastal and saline habitats	18	15
ruderal habitats, cropland	30	7
grassland	213	44
rock and scree habitats	122	24
shrub- and heathland	111	5
forest	133	25

Sardinia

Area:	24,099	km²
Borderline:	0	km
Coastline:	838	km
Perimeter:	838	km
Elevation min:	0	m
Elevation max:	1,834	m
Soil index:	7	
Vegetation index:	5	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	0	%
Total species (N):	2,100	
Bykov´s Index:	-283	

Most endemic-rich plant families (European endemics):
Asteraceae (30); Ranunculaceae (13); Caryophyllaceae (11); Lamiaceae (11); Plumbaginaceae (10); Apiaceae (9); Fabaceae (9); Poaceae (9); Scrophulariaceae (8); Brassicaceae (7)

	total	without habitat designation		total	without habitat designation
Local endemics	28	6	**European endemics**	200	42
species groups	0			5	
species	25			164	
subspecies	3			31	
		absolutely confined			**absolutely confined**
freshwater habitats	0	0	freshwater habitats	14	5
bogs, mires, fens	1	1	bogs, mires, fens	3	1
coastal and saline habitats	5	5	coastal and saline habitats	33	21
ruderal habitats, cropland	1	0	ruderal habitats, cropland	25	10
grassland	1	0	grassland	30	7
rock and scree habitats	15	13	rock and scree habitats	76	42
shrub- and heathland	2	1	shrub- and heathland	37	6
forest	0	0	forest	23	5

Svalbard (Sb)

Area:	62,912	km^2
Borderline:	0	km
Coastline:	5,414	km
Perimeter:	5,414	km
Elevation min:	0	m
Elevation max:	2,277	m
Soil index:	1	
Vegetation index:	3	
SGM ice:	100	%
LGM ice:	100	%
TGM ice:	100	%
Total species (N):	200	
Bykov´s Index:	-372	

Most endemic-rich plant families (European endemics):

\- - - - - -

	total	without habitat designation
Local endemics	2	0
species groups	0	
species	2	
subspecies	0	
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	1	1
coastal and saline habitats	1	1
ruderal habitats, cropland	0	0
grassland	0	0
rock and scree habitats	0	0
shrub- and heathland	0	0
forest	0	0

	total	without habitat designation
European endemics	7	1
	0	
	7	
	0	
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	1	1
coastal and saline habitats	1	1
ruderal habitats, cropland	1	1
grassland	2	1
rock and scree habitats	1	0
shrub- and heathland	0	0
forest	1	1

Sicily

Area:	25,726	km²
Borderline:	0	km
Coastline:	920	km
Perimeter:	920	km
Elevation min:	0	m
Elevation max:	3,323	m
Soil index:	7	
Vegetation index:	5	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	0	%
Total species (N):	2,500	
Bykov´s Index:	-167	

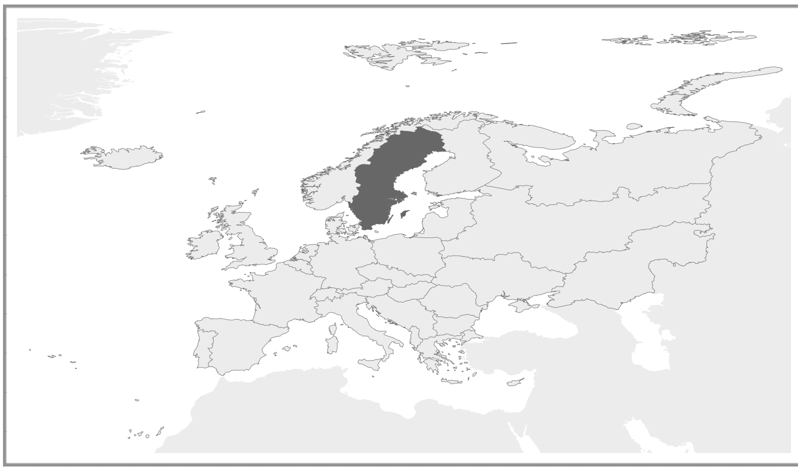
Most endemic-rich plant families (European endemics):
Asteraceae (41); Brassicaceae (19); Fabaceae (15); Apiaceae (13); Lamiaceae (13); Caryophyllaceae (12); Plumbaginaceae (12); Boraginaceae (9); Poaceae (9); Ranunculaceae (8)

	total	**without habitat designation**
Local endemics	59	18
species groups	0	
species	45	
subspecies	14	
		absolutely confined
freshwater habitats	1	0
bogs, mires, fens	0	0
coastal and saline habitats	12	10
ruderal habitats, cropland	3	3
grassland	6	3
rock and scree habitats	20	19
shrub- and heathland	0	0
forest	3	2

	total	**without habitat designation**
European endemics	233	64
	1	
	178	
	54	
		absolutely confined
freshwater habitats	11	4
bogs, mires, fens	2	0
coastal and saline habitats	34	25
ruderal habitats, cropland	26	11
grassland	33	17
rock and scree habitats	71	48
shrub- and heathland	24	6
forest	33	11

Sweden (Su)

Area:	446,070	km^2
Borderline:	2,052	km
Coastline:	4,867	km
Perimeter:	6,919	km
Elevation min:	-2	m
Elevation max:	2,111	m
Soil index:	6	
Vegetation index:	10	
SGM ice:	100	%
LGM ice:	100	%
TGM ice:	100	%
Total species (N):	1,720	
Bykov´s Index:	-3.324	



Most endemic-rich plant families (European endemics):
Asteraceae (30); Rosaceae (18); Scrophulariaceae (14); Ranunculaceae (13); Poaceae (12); Brassicaceae (9) Cyperaceae (9); Caryophyllaceae (8); Orchidaceae (7); Fabaceae (6)

	total	without habitat designation
Local endemics	5	1
species groups	0	
species	3	
subspecies	2	
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	0	0
coastal and saline habitats	0	0
ruderal habitats, cropland	0	0
grassland	3	0
rock and scree habitats	4	1
shrub- and heathland	0	0
forest	0	0

	total	without habitat designation
European endemics	194	22
	18	
	136	
	40	
		absolutely confined
freshwater habitats	26	6
bogs, mires, fens	18	4
coastal and saline habitats	31	17
ruderal habitats, cropland	22	3
grassland	86	10
rock and scree habitats	44	10
shrub- and heathland	52	1
forest	61	11

European Turkey (Tu)

Area:	23,877	km^2
Borderline:	331	km
Coastline:	748	km
Perimeter:	1,079	km
Elevation min:	0	m
Elevation max:	1,000	m
Soil index:	4	
Vegetation index:	5	
SGM ice:	0	%
LGM ice:	0	%
TGM ice:	0	%
Total species (N):	2,500	
Bykov´s Index:	-1.945	

Most endemic-rich plant families (European endemics):
Asteraceae (13); Fabaceae (9); Scrophulariaceae (9); Liliaceae (7); Caryophyllaceae (6); Brassicaceae (5); Lamiaceae (4); Apiaceae (3); Campanulaceae (3); Poaceae (3)

	total	**without habitat designation**
Local endemics	4	2
species groups	0	
species	4	
subspecies	0	
		absolutely confined
freshwater habitats	0	0
bogs, mires, fens	0	0
coastal and saline habitats	0	0
ruderal habitats, cropland	0	0
grassland	0	0
rock and scree habitats	2	2
shrub- and heathland	0	0
forest	0	0

	total	**without habitat designation**
European endemics	85	22
	1	
	70	
	14	
		absolutely confined
freshwater habitats	4	1
bogs, mires, fens	1	0
coastal and saline habitats	5	3
ruderal habitats, cropland	14	3
grassland	29	5
rock and scree habitats	25	9
shrub- and heathland	17	2
forest	21	5