

# **The micro-reserves as a tool for conservation of threatened plants in Europe**

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The effort to make this work is dedicated *in memoriam* to 'Capi' Trillo, keeper of the botanical and zoological treasures of the Columbretes Islands Nature Reserve (Castellon, Valencian Community) who died in 1998, and to Jean Paul Galland, main French officer on plant conservation, who died in 1996.

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## Preface

The Valencian Plant Micro-reserve is an official designation to protect plant species and their habitats established by the Decree 218/1994, passed by the Valencian Community's Council of Government (Consell de la Generalitat Valenciana).

The physical works of the plant micro-reserves network have been co-financed from 1994 to 1998 by the European Union through a LIFE-Reglement grant to the regional government of the Valencian Community; prior to 1994, some preparatory works were also granted by the EAGGF<sup>1</sup>-Guidance funds, in the first Valencian Community's Operative Programme of the EU's<sup>2</sup> Regional Development Planning<sup>3</sup>. The idea to create a plant micro-reserves network was proposed in 1992 by the Valencian Community's Government to the EU's Committee of the Mediterranean Riverine Regions.

The project to establish the plant micro-reserves network was approved in 1992 and 1994 by the Spanish MAB-UNESCO<sup>4</sup> Committee, forming a part of the national net of MAB's technical works.

The project to begin the study and establish a future pan-European network of plant micro-reserves and similar protected areas, was approved in June 1996 by the Planta Europa Steering Committee at the meeting in the Krivoklasto Biosphere Reserve, Czech Republic.

The author of this report has been specifically authorised by the Valencian Community's Department of Public Administration to compile this report for the Council of Europe, in concordance with the Spanish laws on compatibility of work done by public officers.

## Abstract

The plant micro-reserves are specific designations to protect small areas (smaller than 20 ha), that have been legally established in the Valencian Community (Spain). On the contrary to most European designation to protect plant habitats, the concept of micro-reserve is built on the basis of a voluntary but non-reversible contribution of the land property, both public and private (by means of grant-contracts), with the goal of creating a whole network of micro-areas to contain populations of all rare, endemic or threatened plants, wild plant communities, botanical classic sites and useful areas for plant conservation; in its conception, the micro-reserves legal framework does not consider the protection as a goal, but as a tool, because the importance of each micro-reserve lies in its contribution to the network as a whole, more than in its singularity or its outstanding value. So, the micro-reserves can be indiscriminately established on previously protected or non-protected areas, including highly protected sites (i.e. on prior integral reserves). Since 1992, a programme to set up a network of these areas to protect wild plants, has been ongoing in the Valencian Community, and more than 150 zones have been established and are on their way to being legally declared protected areas.

An analysis of the status of small protected areas useful for *in situ* plant conservation in Europe shows that there are important networks of these sites, mainly under the denomination of nature reserves or natural monuments, towards the North, Centre and the East of the continent; the

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<sup>1</sup> European Agricultural Guidance and Guarantee Fund (=FEOGA funds)

<sup>2</sup> EU: European Union

<sup>3</sup> Also called PRD, Plan of Regional Development. It usually contains funds from EAGFF, ERDF (European Regional Development Fund = FEDER), ESF (European Social Fund = FSE) and FIFG (Fishing Guideline Financial Instrument).

<sup>4</sup> MAB = MaB = "Man and Biosphere" programme.

Mediterranean areas can be considered as deficient, but some regions go on with useful particular initiatives (Marche in Italy, Valencian Community in Spain, etc.). These deficiencies are extensive in the Mediterranean riverine countries of Northern Africa, in the Middle East and in the formerly sovietic Asian republics. An initial approximation of the number of small useful areas in the whole of Europe and its geographically related nations, shows that there are probably close to 30.000 protected zones, but there is no current initiative to create a big pan-European network of small reserves for wild plants. The future role that the Council of Europe can play to start the creation of such an impressive network, could be decisive.

The comparison between Valencia's micro-reserves and the most representative cases of networks of small protected areas useful for plants - especially the SSSIs from Great Britain, and the nature reserves and natural monuments from the Czech and Slovak model - shows that there are clear differences in their approaches, due to the pursued aims and to the legal and conceptual frameworks. However, all these models could be used simultaneously to protect important plant areas in Europe.



## Introduction

### Protected areas in Europe and plant micro-reserves

Europe is the continent with the most assorted protected areas. The genuine combination of developed economic regimes and a large history of conservation activities, yields an impressive result: there are close to 20.000 protected areas<sup>5</sup>. Countries situated in the ‘geographical’ Europe (including the European parts of Turkey, Russian Federation and Kazakhstan) show an extreme variation in their protection regimes, designations, policies and surface areas. Europe has, at the same time, some countries that have no protected natural areas (i.e. Andorra and Holy See), and some of the most protected of the world. The smallest sites, such as some Nature Monuments, only have a few squared meters; in comparison, there are some National Parks with close to 300.000 hectares – i.e., Almuehtal (Germany) or Kaldoiavi (Finland) –and then there is the impressive ‘Yugyd Va’ National Park (1.891.701 ha, Komi Republic, Russian Federation) that crowns the borders between Europe and Asia at the Ural Mountains. In the cases of extreme protection régimes (strict reserves, integral reserves or similar areas), differences are also marked, from less than 1 ha to the 721.000 ha of the ‘Pechoro-Ilytchsky’ Zapovednik (Komi Republic, Russian Federation). The largest areas under protection within Europe are two of the Norwegian Nature Reserves in the Svalbard Islands: North-East Svalbard (3.487.867 ha) and Soraust Svalbard (1.418.652 ha)<sup>6</sup>.

Paradoxically, most of the largest areas under protection by the European countries, are placed outside of the geographical boundaries of the old Europe; this is the case with the Greenland National Park (97.200.000 ha, the biggest protected area in the Northern Hemisphere), that belongs to Denmark. Asian territories of the Russian Federation also enclose some of the largest strictly protected areas of the whole World, such as the Zapovedniks Altaisky (8.812.386 ha), Baikalsky (6.599.196), Great Arctic (4.169.222 ha) or Komandorsky (3.648.679).

European models for protected areas vary from traditional systems with a few but very large areas (i.e., Russian Federation and occidental republics of the former USSR) to complex combinations dominated by thousands of protected micro-territories (for instance, Czech Republic or United Kingdom). Apparently, the national surface area and the traditional régimes of ownership have no great importance, and the patterns of protected areas and their management can show strong differences between neighbouring countries, or to be relatively similar among separate ones.

Traditionally, European culture has tended to magnify the importance of animals and their habitats, impressive landscapes or the centenary relationships between man and nature; most protected areas in Europe have been designated in order to guarantee a long-term conservation, with or without a compatible economical use of these natural or cultural elements. An important part of these protected territories contains rare, endemic or threatened plants, or outstanding types of vegetation, but they are not often the main element that motivates the decision to protect these sites. However, there are also protected areas specifically designated in order to conserve botanic treasures. As the reader will see in this report, some European countries or regions have specific designations to protect important plant areas.

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<sup>5</sup> This account is referred to the areas listed in the main worldwide database, maintained by the WCMC, that usually does not enclose reference on protected areas at the sub-regional level. If those levels could be considered, mainly for the Central and Eastern European countries, the global number could rise to more than 40.000 zones.

<sup>6</sup> There are no agreed opinions about the inclusion of Svalbard and Jan Mayen Islands into the European physical borders, because they are in the undefined “Arctic” continent

Usually, the number and quality of protected elements – plants, animals, vegetation, landscapes, and so on – increase when protected surface area grows; so, concrete reserves for plants, invertebrates, fossils, rocks, etc., usually have a small area designated. At this moment, no reports have been drafted to analyse the distribution and characteristics of the small protected areas to conserve wild plants in Europe.

Since 1992, the Valencian Community – also named region of Valencia, situated in the Eastern part of Spain – has developed a project in order to create a network of small areas to conserve rare, endemic and threatened plants. A new designation ('plant micro-reserve') has been legally defined, and more than 150 new protected areas have been established. The aims of plant conservation, and also the legal tools used, are significantly different to previous or traditional ones in Spanish and European legislation, so the micro-reserves project has opened a new scope on plant protection and has attracted the interest of European botanists. The technical and legal models used to make the Valencian plant micro-reserves network can be exported to other territories; in this way, the conclusions of the two general assemblies of Planta Europa conferences, held in Hyères (September 1995) and Uppsala (June 1998), comment on the importance of setting up networks of micro-reserves or similar designations to protect important plant micro-habitats. In the intermediate meeting of Planta Europa, held in Krivoklasto Biosphere Reserve (Czech Republic) in June 1996, the Steering Committee of that international organisation passed the creation of a work team, in order to study and propose possibilities to create a big pan-European network of small protected areas for wild plants, starting from the idea of the plant micro-reserves network in the Valencian Community.

During the past, Planta Europe's Uppsala conference, the Environment Conservation and Management and Regional Planning Division of the Council of Europe expressed its interest to get a complete report on the Valencian micro-reserves project, the overview of the pan-European panorama on small protected areas useful for plant conservation, and the comparison with the most notable similar models existing in Europe. The present report is aimed at providing an introduction and explanation about these topics.

### **Structure of this report**

The report has been divided into four main sections:

- The Valencian micro-reserves.
- The European panorama on small protected areas.
- Some notable national cases of networks to protect small areas.
- Discussion and conclusions.

Additional chapters on bibliographic references and annexes are added at the end of the report.

### **Area of study**

The report is focused on European countries, including the Euro-Asiatic ones (Russian Federation, Kazakhstan and Turkey), and the Euro-Asiatic and Euro-African insular nations such as Cyprus or Malta. European physical borders have been artificially placed on an imaginary line that divides the Black Sea, the Caucasus range, Ural river<sup>7</sup>, and Ural mountains. Due to the closest relationships (cultural, economics, etc.) with Europe, some parts of the draft are extended to the riverine countries of the Mediterranean Sea in the Middle East and the North of Africa.

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<sup>7</sup> i.e., Uralsk is considered as a European city, but Gurjev is an Asiatic one.

## **Materials and methods**

The data to compile this report have been obtained through the following channels:

- Published data (on paper, video or on magnetic supports);
- Web pages, Internet public files;
- Big data banks of protected areas, and specially through the courtesy of the WCMC (World Conservation Monitoring Centre, London);
- Information provided by the national or regional authorities, NGOs and research centres, listed into the chapter of acknowledgments.

Main abbreviations used along the report text are the followings:

CEE: Central and Eastern Europe.

CoE: Council of Europe.

EU: European Union.

FYR: Former Yugoslav Republic.

IPA: Important Plant Area.

IUCN: International Union for Nature Conservation (The World Conservation Union).

MAB: Man and Biosphere programme of the UNESCO.

RSPB: Royal Society for Protection of Birds (UK).

SAC: Special Area for Conservation (EU's Habitats Directive 92/43/CEE).

SPA: Special Protected Area (EU's Birds Directive 79/409/CEE).

SPE: Servicio de Protección de Especies (regional Wildlife Service, Valencian Community, Spain)

SSSIs: Sites of Special Scientific Interest (UK).

UK: United Kingdom of Great Britain and Northern Ireland.

UNEP: United Nations Environmental Programme.

USSR: Union of Soviet Socialist Republics.

WCMC: World Conservation Monitoring Centre.

**Section one:  
the plant micro-reserves network  
of the Valencian community**

## Introduction

This section is aimed at explaining the genesis and concepts behind the plant micro-reserves network that are being developed in the Valencian Community (formerly region of Valencia, Spain), including its legal, technical and scientific basis. It deals with a process that was initially proposed in 1991; until now, a wide group of reports have been published to explain and popularise these concepts and increase public knowledge. Genesis and development of the micro-reserves designation has been explained by Laguna (1995 a, 1996 a and c, 1997 b, 1998 a and b, and in press c, in Spanish; 1997 a and in press a, in English), and analysed by Padilla & Ramón (1997), Domínguez & Sáinz (1997) – both in Spanish – and Akeroyd (1998, in English). Its concrete application to the conservation of some specific habitats or plant groups can be seen in Laguna (1995b, in English, for halophytic vegetation; in press b, in French, for steppic flora). Its use as a main element into the public planification on nature conservation in the Valencian Community can also be found in Laguna (1991, 1994 and 1998, all in Spanish) and in Alcanda & al. (1995, in Spanish) An explanatory video of two units –30 minutes each item, in a unique tape– has been edited (Laguna, 1997) with both versions in English and Spanish.

## Origin of the micro-reserves idea

The Valencian Community has an outstanding concentration of endemic and relict plants (mainly from Tertiary), similar to other Eastern and South-Eastern Spanish territories (Balearic Islands, Murcia, Andalusia). With only 2.326.000 ha, it has more than 3000 vascular plant species, 350 of them endemic to the Iberian Peninsula. 60 species are exclusive endemics of the Valencian Community (Laguna, 1994b and 1998a), most of them listed as threatened plants by Walter & Gillett (1998). Some of these endemics are well known worldwide because they have exemplified the threatened Spanish flora, i.e. *Silene hifacensis* (Gómez-Campo & Malato-Béliz, 1985) or *S. diclinis* (Lucas & Synge, 1978). Several Valencian plants are considered as the main paradigms for the Spanish and the whole Mediterranean area conservation, such as *Cistus heterophyllus* subsp. *carthaginensis* that only have six wild specimens in the world (one in Valencia province, and five near Cartagena, Murcia, 250 km South) and is often considered the most threatened non-extinct plant in the Iberian Peninsula; Valencian population is being regenerated and reintroduced from the unique native specimen (Arregui & al., 1993; Akeroyd, 1998).

Because of its geographical position, the Valencian Community exhibits all the climatic gradients from the sub-Saharan arid types of the South-Eastern Spanish lands, to the sub-Mediterranean ones of Catalonia and the South of France; so, it has acted as a continuous natural refuge for Euro-Siberian and Saharo-Sindic flora, and holds an extremely rich group of relictic plants from both real chorological groups. The Valencian Community holds the unique site or some of the few Spanish refuges for some of these plants, such as *Aristolochia clematitis*, *Carex elata*, *Spartina versicolor* or *Goodyera repens* representing the European case, and *Lavatera mauritanica* subsp. *davaei* or *Anarrhinum fruticosum* for the Afro-Asiatic one.

Since 1987, the regional Wildlife Service (called in Spanish ‘Servicio de Protección de Especies’, hereafter named SPE) has financed several studies in order to know the exact distribution of the main endemic, rare or threatened plants, and the results showed that most species were found in scarce and/or non-zonal habitats (Laguna, 1994 and 1998a). For example, close to 97% of endemics regularly exist outside of forested areas or in climatic zonal vegetation. Most of the Valencian and Eastern Iberian endemics only live on rocky grounds, or on open low chamaephytic matorral (*Labiatae*-dominated communities).

The second step was to study and select the sites that showed an intense concentration of these singular plants (endemics or relictic ones). Some of the most important Valencian botanists took charge of this work during 1990 and 1991. One hundred and fifty areas (both private and public) were selected as the most important botanic Valencian sites; usually, the recommended surface area for protection was less than 4 or 5 ha. In practice, homogeneous zones of rich-endemic vegetation – mainly non-forested areas – seem regularly not to exceed 15 or 20 ha, due to the tessellated pattern of plant communities –often as a result of the intensive human activity on the Mediterranean landscape during the last 10,000 years. A reasonable agreed surface area was up to 20 ha. Anything over this amount, there was a quick loss of vegetation homogeneity, a progressive increase of trivial species – mainly because of the increase of nitrophile plants; in addition, close to 20 ha – often from 15 to 20 – seemed to be a good borderline to define in most cases, the tessella units of the natural vegetation complexes; therefore 20 ha had been taken as a minimum area to start the declaration of nature reserves, nature parks or other designations. In Spain, it seemed that to declare such complex protected areas – i.e. National Parks, Nature Reserves, etc.– forced us to follow a long line of bureaucratic procedures, which was not profitable under this surface range, except for the most outstanding cases – i.e. nature reserve of Columbretes Islands, only 17 ha, but holding some of the most important Mediterranean populations of the most endangered seabirds and lots of endemics: one lizard, 12 coleoptera, one vascular and one non-vascular plants, and more than 20 non-arthropode invertebrates.

At the end of 1991, after the discussion of the programme documents, the SPE, assessed by the scientific groups, raised the idea to create a new legal designation (the plant micro-reserve) in order to achieve two purposes simultaneously:

- to protect a selected sample of each of the main populations of the rarest, endemic or most threatened species.
- to establish a continuous monitored network in order to achieve a representation of the plant biodiversity richness, to know the long-term changes of rich-endemics or relictic plant communities, to provide germplasm to the regional wild plants official seed-bank, and to be the focal points for the ongoing active plant conservation activities (re-introductions, reinforcements, translocations, *in situ* management, etc.).

At the same time, some additional or secondary aims were proposed:

- to ensure, as much as possible, the conservation of the classical localities (*locus classicus*) for the taxa discovered or described in the Valencian Community –close to one hundred species and subspecies-, and of the *sintypus* or similar items for plant communities;
- to guarantee the conservation of the finest natural populations of wild relatives of cultivated native plants, specially the most traditional or useful in ethnobotany (medicinal, condiment, aromatic plants, and so on);
- to canalise the initiatives of NGOs and City Towns with low economical possibilities, in order to ensure the protection of small areas useful for conservation, and for low-impact educational projects.

It must be remarked that there are two simultaneous characteristics to be protected in a micro-reserve:

- its singularity, its possibility to be defined as a singular site different from other natural areas;
- its complementarity, its capacity to form a part of a network, where the individual importance decreases – to increase the importance of whole network.

If we attach more importance to the singularity, the micro-reserve will not differ from other protected areas – the main reason to declare a traditional protected area is its outstanding value, its singularity; if we consider the singularity of less importance and prefer to raise the value of the whole network, we can create a valuable and very useful structure of not-necessarily important sites – this is one of the main differences between the Valencian micro-reserves model and other schemes for protected areas. For instance, an apparently common nitrophilous vegetation – that often has some rare nitrophilous plants, perhaps of no importance to nature conservation but technically belonging to an appropriate category (rare, vulnerable, etc.) – may not deserve the creation of a Nature Reserve, but it deserves to be maintained as a protected site in the micro-reserves network, because it is contributing to the whole network with these rare plants.

### **Legal concept of a plant micro-reserve and its meaning**

A micro-reserve is a defined designation of the Valencian legal framework (Decree 218/1994, 17 October 1994, of the Valencian Government, to create and regulate the protected species designations named “plant micro-reserve”) intended to protect the wild plants and the inanimate substrates where they are living, under the following four main conditions:

- the area may not surpass 20 ha;
- there must be a significant concentration of rare, threatened or endemic plants;
- the legal proposal must be done under conditions of a voluntary contribution – see below;
- the designation order for each micro-reserve simultaneously includes the legal declaration of the protected zone, and the approval of a management plan.

It is important to remark that the micro-reserve is not based on the legal frame of a protected area – at least in the traditional sense – but on the protected species. The objects to be protected are only plants and inanimate nature, that are submitted to strict protection rules – see below – so their legal status can be roughly defined under two points of view:

- as an extreme case – strict protection – of a partially protected area;
- as a singular example – taken case-by-case – of a protected plant habitat.

The micro-reserve can be indirectly described as a delimited unit – geographically defined – of a plant association or a group of plant associations.

As the Decree 218/1994 underlines, it develops some articles where the Spanish State transfers to the Autonomous Communities the possibility to create new legal frames to protect species and their habitats.

### **On the legal frame for prohibitions and use limitations**

The Spanish and Valencian Laws on protected areas empower the regional parliaments (making Laws), governments (by means of Decrees) or environmental councillors (through Orders) to impose on the landowners all kind of obligations in order to conserve nature; if these obligations generate any economical damage, the administration must indemnify those landowners. All kinds of protected areas – National Parks, (Nature) Parks, Protected Landscapes, Natural Monuments, Nature Reserves, and any other designation made by the laws of the Autonomous Communities – enclose the implicit declaration of public general utility. That declaration means that the regional government has the legal strength, based on the Spanish Constitution, to expropriate the land invoking the conservation of nature. Therefore, if any small part of nature has an outstanding value (i.e. the unique site for a species threatened with extinction), the regional government should use an idoneous designation to strictly protect it – in this case the declaration of a Nature Reserve.

Provided that there are a large number of designations that can be used if the administration must force the protection *in extremis* of a site, the plant micro-reserves are designed on the basis of the use for the non-imperative cases. So, the micro-reserve concept was built on the idea of a voluntary contribution of the landowners – public and private, the last ones by means of an agreement or a grant-contract.

On this basis, the bans must be established on the hypothesis that those landowners will respect the protection rules – general and specific ones – and they must make it so that the rest of the population also respect them. To obtain success with this model, it must include a strong group of measures in order to ensure that only the most conservationist landowners will be interested in joining the project – see below for references to the different grant models, that especially benefit non profit-making NGOs, foundations, etc., and the penalties for landowners who do not respect the protection rules.

The main focal point of the Decree 218/1994 is the legal strength of the property rights. In this case, the will of the landowner – and the regional government in the State-owned lands – is that its property goes on with determinate rules, legally supported, to maintain a continuous and non reversible use for conservation of rare, endemic or threatened plants, and to form part of a representative network of the plant biodiversity at a regional level.

## **Forbidden activities**

In a micro-reserve, still declared or under a prior preventive régime – see references on private micro-reserves under grant supports – there exist the following prohibitions:

1. General prohibitions (for all micro-reserves): Any kind of actions that can directly or indirectly cause significant damage, partial or total destruction, extraction or picking, to plants or to any of the substrates they are living on – rocks, soils, water, etc. The main exception to this rule concerns livestock, due to the large proportion of grazing-dependent endemic plants –mainly for small heliophylous shrubs living on open xeric grasslands, steppes and so on.
2. Specific prohibitions (taking the micro-reserves one-by-one, through the action plan): Any human activity that could be considered negative for the species or plant communities that are the main object of protection in each micro-reserve. In this case, an *ad hoc* legal framework can be made for each micro-reserve. Usually, at least some basic scientific and conservationist activities must be maintained, as a contribution of the micro-reserves to the global network (i.e., periodical seed picking for the regional germplasm bank, periodical census, etc.).

Except for the cases that are forbidden because of a specific reason, harmless traditional countryside activities are allowed (trekking, walking, etc.); in practice, climbing is not usually permitted – by means of agreements with alpine and mountain clubs – except for the most traditional climbing routes (see Laguna & Ballester, 1998). Hunting is allowed. This fact favours the social acceptance of the micro-reserves, due to the fact that hunting is a very popular activity – Valencian Community has the biggest account of hunters in Spain, more than 130.000 – mainly in the economically disadvantaged mountain areas. The capture of invertebrates for any reason (scientific, educational, conservation, etc.) is not forbidden; however, due to the practice of the aforementioned Law 4/1989, collecting insects or other invertebrates is regulated by specific authorisations.

In the private micro-reserves, the grant-contracts include rules that force the landowners to respect the general and particular prohibitions, and to impose these same rules to any third person; so, the landowner must also perform the function of a micro-reserve ward.



## General site conditions to be qualified as a micro-reserve

Any area holding rare, threatened or endemic plants can be chosen to be a micro-reserve. At the same time, the Valencian administration is interested in including as many private properties as possible, as a good way of increasing the participation of the private sector, and its progressive protagonism. Unlike other European countries, Spain has a very low level of private participation in nature conservation. Therefore, there are – at least at this moment – two selective different levels, for public and private areas. The latter also include the public lands owned by the city town halls, but not declared as forests for public utility – therefore, not directly managed by the regional administration.

The legal ruling (Decree 218/1994) establishes that the micro-reserves must have a good representation of rare, endemic or threatened wild plants, but it must be clarified that the achievement of the second condition – concerning endemic species – is relatively easy to fulfil in the Valencian Community. There are around 350 endemic species – native from the Eastern part of the Iberian Peninsula and/or Balearic Islands – and a significant number of them are relatively common, at least on the sub-provincial level – the so-called ‘comarca’, similar to the ancient counties in most European regions. It is rare to find a grassland, matorral or low scrublands holding less than 30 or 35 endemics in one hectare. A few hundred of square metres can yield those 30-35 endemic species, but to raise this number up to 50, one usually needs 1000 ha or more.

## Usual procedures

The process of establishing a micro-reserve follows a mixed group of technical and legal rules, that can be described as follows:

### 1. Site election

The zones are chosen following one or more of the following systems:

- Global works, made by expert teams, on the basis of their knowledge of the botanical richness of the territory. The aforementioned works made from 1990 to 1991-92 by six of the best Valencian botanists, yielded the election of 75 public areas to create micro-reserves, and 75 private ones to promote joining the micro-reserves network among the landowners.
- Specialised contributions and advice, coming from the individual experience and field knowledge of specialists, collaborators and forest keepers.
- Maps of accumulated presence of endemics, scarce or endangered species. From 1988, the SPE have an increasing cartography on singular plants, using the 1 x 1 km UTM network for the rarest or most endangered species, and 10 x 10 km for the endemic but not very rare ones. Density maps have been in use all through 1998.
- From a selection of applications received after a public announcement of grants to set up new private micro-reserves, made up by a commission of technical specialists (up to eight botanists).

### 2. Previous work

After being elected *in abstracto* – without defined boundaries, except for the private offers – the areas must be made concrete; so, a mixed team of botanists and topographers can go to the elected site and chose a clearly defined area, developing the co-ordinates – using a GPS engine. The zones enclose homogeneous vegetation plots – one or more in the same micro-reserve – that forms a small landscape unit. At the same time, phytosociological data and a census of the main species are made.

After that, the co-ordinates are introduced into the appropriate computer programmes – usually MicroStation and ArcView for personal computers – the main geographic data is calculated – boundaries, centroid points – and a prime cartography is generated – often at 1:10.000 or 1:5.000.

### **3. Preventive landmarking**

The third step consists of landmarking with three different kinds of signals – some of them can be avoided so as not to attract excessive attention. The used landmarks have definite characteristics, established under legal rules (Order of the environmental regional councillor). The sizes of the signals and the maximal distances between successive landmarks are established, and also a certain group of exceptions – i.e. to avoid excessive aesthetic or environmental impact, to not hinder the flight of raptors (mainly, the great raptors that rise using the thermic convective air streams), and so on-. There are orientation, indicative and boundary signals.

The area can be landmarked up to one year before the declaration. In practice, this period may increase due to declaration delays, but their presence on the ground will remain legal – because the landmarks are placed by the same public or private landowner. This measure aids in preventing damaging operations on the future micro-reserve. In the case of the private granted zones, the acceptance of the grant opens a new legal status of pre-declaration of a protected area, and the landowner must comply with the same regulations as if the zone were still effectively protected by the councillor's order.

### **4. Preparation of a bill of order**

The next step consists in the preparation of two drafts:

1. a management plan, in a technical extended version (usually no more than 3 or 4 sheets, because of the small area studied), and
2. a bill of Order to declare the area – that included a reduced version of the management plan, concentrating their contents on all the limitations or reduction of rights for citizens or for certain kinds of users.

The future Order must include at least:

- an introduction, stating the legislative sources and legal procedures followed;
- a description of the features generating the interest in that area – references to the plant species and habitats, including the Corine and Natura 2000 codes;
- a list of additional forbidden actions – not the general ones, that are still cited in the framework Decree 218/1994 – specifically aimed at maintaining a good level of conservation, or to achieve the effective protection of the main species or habitats;
- a management plan, consisting of the actions that must be taken to conserve the plant or vegetation, or how to dynamise the use of the micro-reserve for active conservation. This plan must mention the time limit between successive reviews.

A first juridical examination is made by the legal department of the environmental councillor.

### **5. Public consultation**

The Decree 218/1994 establishes that at least the following persons or institutions must be consulted, and their written advice must be added to the Order proceedings:

- the Valencian Universities and/or research centres on Botany – at least for the province where the micro-reserve has been proposed;
- the City Council of the municipality where the zone is placed;
- the main conservationist groups that usually work the area – at least the locally established ones;
- the landowners, in the case of private reserves;

- the coastal and/or hydrological State authorities, if the micro-reserves are referred to the respective State-owned areas on the shoreline, rivers, lakes and public wetlands.

The allegations must be replied to, and may be rejected, and both arguments and replies must be added to the proceedings. The SPE drafts a predefinite bill of Order, that must be examined by the legal department; its advice is obligatory.

## **6. Approval of the Order**

The SPE then sends the bill of Order to the upper administrative levels (Director General, Secretary General and regional Councillor for Environment), based on the advice of the legal department, and all the aforementioned documents (technical data, arguments, etc.). The Order must be published in the official regional gazette.

## **Phases of the micro-reserves programme**

The initial plan was for the programme to be developed in several successive phases, covering the following steps:

- Phase 1: Establishment of public micro-reserves for terrestrial vascular plants, foreseen by 1998;
- Phase 2: Establishment of private micro-reserves, and an increase in the number public ones for terrestrial vascular plants; initially foreseen by 1999-2000, but this phase was started before (in 1996), because of the existence of budget savings;
- Phase 3: Extension of the model to the cryptogamic and marine zones; foreseen by 2001, but will probably begin in 1999.

A fourth phase, only in the programming of the MAB-Unesco project – see below – considers the application of the micro-reserves model to the animal kingdom, through the creation of faunistic micro-reserves for invertebrates and small vertebrates.

The primary studies for the extension of the network to the terrestrial cryptogamic flora were compiled in 1997 and 1998, under the direction of some of the most eminent Valencian specialists in Bryology and Lichenology – Prof. Drs. E. Barreno, F. Puche, V. Atienza and C. Gimeno.

## **Development of the micro-reserves programme and LIFE funds**

After its presentation to the environmental councillor, in 1991, the idea to create a plant micro-reserves network was undertaken, and the aforementioned studies were conducted by a group of six specialists – Prof. Dr. J.L. Carretero of Valencia's Polytechnical University, and five professors of the University of Valencia, Drs. G. Mateo, A. Aguilera, G. Stübing, J.B. Peris and R. Figuerola. Three years ago the same group conducted the first revision of the threatened plants' regional cartography. These botanists were divided into three groups (one for each Valencian province: Castellón, Valencia and Alicante); at least 50% of the proposed areas should be incorporated into areas able to develop a free full time management by the regional administration (State and region's owned lands, and municipal forests inscribed into the public utility catalogue). Beginning with this point, the Plant Micro-Reserve Programme was established as a main element of the regional strategy for nature conservation (Laguna, 1991), and as one of the main pillars of the plant conservation planning. From that moment, the regional administration takes charge of reserving successive annual funds, the greatest amounts possible, to establish a basic micro-reserves network before the year 2000, and promote this idea by means of the following measures:

- the presentation of the micro-reserves network as a Valencian Phare-project at the 1992 Inter-Mediterranean Conference of the Commission of the EU's Mediterranean riverine countries;

- the application to form a part of the MAB-Unesco projects; the Spanish MAB Committee approved the inclusion of the micro-reserves project into the national MAB's strategy in 1992, and reasserted this designation as a long-term project in 1994;
- the application to obtain funds from the LIFE EU's Regulation. This fund was solicited in November 1992, and approved in October 1993, to develop a part of the first phase of the micro-reserves programme between 1994 and 1996; a simultaneous increase in funds and limit-times was approved in 1994, to extend the programme to 1997, and finally to the end of 1998.

The LIFE funds have notably accelerated the development of the micro-reserves programme, but overall, have allowed the establishment of a mixed strategy of combined *ex situ* and *in situ* actions, and a combined group of supporting structural activities (research, educational and formative programmes, editions and productions of audio-visual and inter-active documentaries).

The LIFE funds support the main lines of the global regional strategy to conserve endangered wild plants, taking as a main measure the creation of the plant micro-reserves network. The global budget for the whole period 1994-98 reaches close to 11.2 million FF (1.12 million £, 1,87 million \$), paying both similar parts (50% each) the regional government (Generalitat Valenciana) and the European Commission; in addition, the regional government has paid close to 2 million FF (0.2 million £, 0.33 million \$) to develop all these measures not initially included or not co-financed by the European Commission (i.e., most of the research funds). Considering the whole sum (close to 13.2 million FF), around 60% have been used to pay for the effective creation of the micro-reserves network and their management staff, including the purchase of new public lands in important plant areas, and the compensation to private landowners –see later for specific references to this case-; the remaining 40% have been spent on developing the *ex situ* activities and equipment, to pay for scientific monitoring, and to create and distribute informative, formative and educative documents, in order to popularise the programme.

## **Degree of evolution of the micro-reserves network**

At this moment, 156 areas have been landmarked and topographed; 21 of them having special regulations concerning the private lands under official grant-contract system – see below – 14 have been officially declared micro-reserves (December 1998), and 56 ones are in the final procedure stages -their declaration Orders being expected to be published some time between March and September 1999-. The remaining 65 areas are still in the initial stages of the process – prior to the public consultations – so their declarations are not expected before September 1999. In addition, close to 30 new zones are under study, and most of them will be incorporated into the micro-reserves network during 1999.

Main data on these 156 zones in declaration are shown in Table No. 1, and their situation can be found in Figs. Nos. 1 and 2. In some cases, the surface area is being re-calculated at this moment, due to several reasons – including the increase in area of some of them after the public consultations; the cases of very small areas are often for vertical or sub-vertical slopes, rocky gorges, etc., that have minimal topographic projected area. Taking the real area is sometimes impossible –i.e., in the cases of rocky coasts by the North of Alicante, where the cliffs reach over 200 m in height-, so it must be calculated on the maps. Provided that the main co-ordinated system used is the UTM, additional problems have resulted from the overlap of the UTM sections 30 and 31, with affects on most Eastern Valencian territories in the North of Castellon and the North of Alicante.

Tables Nos. 2 and 3 show the presence and representativity of the Directive of Habitats' vegetation types (from the Directive 92/43/CEE and its enlargement through the Directive 97/62/CEE) into the plant micro-reserves network. It can be seen that the large part of these habitats are still represented into the network – mainly for some of the rarest examples such as temporary ponds, *Laurus* forests, etc.

At the moment, the established micro-reserves, rapidly on their way to being declared, hold all the Valencian terrestrial plant species listed by the Bern Convention's Appendix I: *Riella helicophylla*, *Marsilea strigosa*, *Kosteletzkia pentacarpa*, *Diploaxis ibicensis*, *Helianthemum caput-felis*, *Teucrium lepicephalum*, *Silene hifacensis* and *Sideritis incana* ssp. *glauca*. Two more extinct species, *Marsilea quadrifolia* and *M. batardae* have been produced *ex situ* from the most proximal populations and will be reintroduced under scientific criteria in a future micro-reserve, where it will be placed in a newly recovered new humid area, where representative scarce or endangered species from the Valencian aquatic habitats have been planted.

The micro-reserves network, both established or under-study areas, holds some of the most important plant areas, including whole regional samples of Mediterranean temporary ponds –one of them holds the most important Eastern Spanish populations of *Marsilea strigosa* and *Isoetes velatum*, with no other sites for these species within a radius of 300 km – the most important waterfalls holding petrifying bryophyte formations, the most impressive ancient Spanish woodland of *Quercus faginea* ssp. *valentina*, the world's only remaining plot of mature mixed *Quercus faginea-Fraxinus ornus* community, the main untouched Valencian coastal dunes, the unique huge Spanish inland dune – situated 50 km away from the coast, but with the same shoreline dune species – the best Western Mediterranean population of *Kosteletzkia pentacarpa* – and so on; at this moment, a Spanish Juniper forest plot that probably includes the oldest Spanish trees – a group of *Juniperus thurifera* formerly dated 2,000-2,500 years old – is under study.

The network of micro-reserves includes 46 absolute Valencian endemic species, 54 nearly absolute endemics and 118 widely distributed Iberian or Iberian-Balearic endemic plants. Two hundred and six rare or relictic non-endemic species of regional interest – some of them of national or European interest, as the only locality of *Anarrhinum fruticosum* on the continent – are held by the micro-reserves network. It is considered that a network of around 250 micro-reserves could hold all absolute or close to exclusive endemic plants and relictic or rare species.

It must be remarked that the plant micro-reserves are based on a planned strategy to enlarge the number of areas up to sustainable levels, compatible with the admissible budget funds. It is expected that the current budget could maintain between 300 to 500 micro-reserves, but an excessive increase of private areas could create new financial problems; therefore, for the next year, it is thought to have less funds for the incorporation of new private micro-reserves, and more funds to manage the previously declared ones. At the same time, some progressive new national and regional measures to favour private investments in nature conservation are expected by 2000-2002, mainly by means of tax exemptions, that could dynamize the creation and upkeep of new private micro-reserves or additional funds for the public network.

## **The expansion of private participation**

The plant micro-reserves network can be used as a good tool to dynamize the participation of private landowners and NGOs in the task of nature conservation. Most Spanish NGOs have been characterised by their continuous criticism of the public authorities, but these extremist views make people run in the other direction. Paradoxically, ecology is a popular issue, but at the same time no one wants to become a militant member of the ecological movement. Therefore, most of these groups have too few members, and enter into a chronic problem of a lack of funds for developing active conservation. Most people working for ecological NGOs usually only develop studies on birds and rarely on other natural features, so their capabilities for the management of plant habitats are minimal. In addition, national and regional laws on nature conservation rarely provides possibilities for the development of private initiatives to

conserve wild plants, and the tax exemptions for patronage are still very low (20-30% and only through investing in nationally inscribed foundations). In addition, the large conservationist NGOs are rarely interested in plant conservation – they mostly work towards bird conservation – or deal with ‘light’ non-engaged NGOs that only develop a few very popular actions – for eg. popular forest plantations.

As a result of their principles and purposes, the micro-reserves could be used to dynamize the private participation, and expand the possibilities were necessary. For this reason, the two following kinds of funds are publicly called for:

- the micro-reserve owners should receive an official title of collaborator with the micro-reserve network, and
- they should have a priority right to receive, free of cost, any book, video or publication on nature conservation published by the regional environmental administration.

### Grants for the incorporation of new areas to the micro-reserves network

There are two possibilities:

1. To indemnify, the incorporation of new private areas to the micro-reserves network, owned by private persons or by the city councils, with two economic limits:

- a fixed price for each vegetation type, from 40.000 PTA/ha (approx. 160 £/ha., 1,600 FF/ha, 265 \$/ha, 240 €/ha) for rocky grounds, to 300.000 PTA/ha for wetlands (approx. 1,200 £/ha, 12,000 FF/ha, 2,000 \$/ha, 1,800 €/ha). These prices may be increased for several technical reasons (because of the site wilderness, content of protected species, monumental trees, etc.). The cost of the grant results from the multiplication of the fixed price for each vegetation represented, by its surface area, so it cannot be negotiated.
- the maximum grant available to one person is usually fixed at 1,000,000 PTA (approx. 4,000 £, 40,000 FF, 6,650 \$, 6,010 €).

Each future micro-reserve can only be indemnified once. However, the landowner having a micro-reserve may apply for a similar grant for another area in a different year. Some of the technical expenses for the preparation of the application can also be given a grant – i.e. botanical and topographical studies made by professionals.

To receive a grant, the public or private landowner must accept to adhere to some very strict conditions, that include to respect and to force third persons to observe all the regulations, prohibitions and use limitations established for the micro-reserves; these regulations are enforced on the landowner at all time, and these duties must be included in a public title deed. The landowner also has the obligation to declare the special site condition to any new purchaser, and these duties must be maintained in the next title deeds. Spanish law does not permit the writing down of these kinds of duty in the land registry, but they are enough to obtain some tributary exemptions, at least at local level.

The landowner cannot break the contract after the declaration of a micro-reserve. If at any moment he/she should have to break it, before or after the declaration, the administration has the right to begin penalty procedures due to the breach of the contract conditions. The grant Orders provide that in these cases the landowner must give back the received grant with updated interest. This condition is expressly accepted under signature by the landowner when he/she applies for the grant. The application can be considered a public document, in the case of any civil procedure brought to a court of Law. In practice, all these processes can be avoided if the landowner breaks the contract conditions before the effective declaration of the micro-reserve – typically one or two years before the official approval of the grant.

2. To aid NGOs, foundations and universities in the purchase of lands for conversion into micro-reserves:
  - Costs can not go over the aforementioned prices for each vegetation type. If they are inferior, the administration will only pay the effective cost – additional expenses of public inscription can also be funded, but not through taxes or other obligatory legal contributions. The whole grant can worth up to 3.000.000 PTA (approx. 12,000 £, 120,000 FF, 20,000 \$, 18,030 €), and the person who received the grant can apply for new ones – obviously for newly proposed micro-reserves – the following years.

In both cases, 1 and 2, the conditions of the grant-contract are similar, and the breach of the contract conditions does not imply the extinction of the legal framework of micro-reserve. To apply for a contract, certain documents must be shown and the following conditions met:

- the legal property and a full legal status of the land (correctly inscribed and with a title deed). In the case of funds to purchase new lands, a pre-contract must be added, with the signatures of the future purchaser – who applies for the grant – and vendor;
- the site must be classified a natural area with special protection or a rural area in the local territorial planning, so it cannot be subject to any type of urbanisation; the local authority must also declare that any civil project (dams, roads, bridges, etc.) are not planned on this site, and that no new similar projects have been requested or applied for by the local sector;
- a botanical report, compiled by a specialist – biologists or other legally recognised professionals – must show the presence of a significant concentration of rare, endemic or threatened species.

All kind of grants are paid *a posteriori*, so the expenses – in the case of landowners – or the price of the land – in the case of NGOs, foundations or universities – can only be refunded when the effective inscription in a new title deed has been made. The landowners have the duty to landmark the future micro-reserve, using the official signals given to them by the SPE, and they also have the right to set up their own signalling systems.

During 1996 and 1997, 17 private micro-reserves have been created using these methods.

### Grants for conservation investments

There is a second way of obtaining grants, consisting of economical support to pay 100% of conservation investments made by the owners of future or declared micro-reserves, up to 3,000,000 PTA a year (approx. 12,000 £, 120,000 FF, 20,000 \$, 18,030 €). If the grant is not fully passed, the landowner has only the duty to invest up to the approved amount. Three kinds of work can be realised with the grant:

- to draft the management plan –only up to 100.000 PTA (approx. 400 £, 4,000 FF, 660 \$, 600 €), without need of invoices-, or investment plans.
- to develop own works, without the need of invoices. The prices of most operations for this kind of activity are taken from the general grant Orders published by the agricultural or forestry administration;
- to develop any other typeof activity qualified as an investment, payment being made after the presentation of the invoices by third persons or enterprises to the micro-reserves owner – current expenses such as the keeping, not applied scientific research, publications, etc., cannot be paid.

## Keeping and watching the micro-reserves

The micro-reserves, at this moment, can easily be watched by official forest wardens – Forestry Service and SPE. Private micro-reserves are kept by their landowners, and they can solicit the collaboration of public powers.

Most micro-reserves have had no problems up to the present day – despite their not being officially declared. The only areas where important problems have been detected are the coastal zones, due to the limited capacity of guarding the areas and the more intense human activities. In addition, the Valencian coast is one of the most important tourist areas in Spain – the city of Benidorm alone, with less than 50,000 residents, hosts more than 1,000,000 visitors a year – so acts of vandalism against landmarks and other equipment for conservation are frequent. However, most areas have no problems, and the local people – especially in mountain areas – are recognising the micro-reserves as a possible new tool for inclusion in their health eco-development offers and projects. Close to 50% of the private micro-reserves have been solicited by the city councils, and some of them are in decisive collaboration with the regional administration in order to establish future local micro-reserves networks (i.e., Puebla de San Miguel, Sinarcas).

On the other hand, during 1998 some new activities have begun in order to employ the action of volunteers in nature conservation – usually organised by NGOs – to help watch over and work in the micro-reserves network, mainly in the coastal regions. It is expected that this popular movement will yield important results during the following years, and that its success will be increasingly more important for the micro-reserves network.

## The micro-reserves within the global regional strategy to conserve wild plants

It must be stated that the micro-reserves were not established to be maintained without human intervention. From the time they are selected, they enter a select group of regional areas with the aim to develop active conservation of wild plants, so they are priority sites for the setting up of coordinated projects for the whole network, and function mainly for the picking of seeds to furnish the regional germplasm bank of endangered or endemic flora – held by the Botanic Garden of Valencia – to develop genetic and population studies on threatened plants – i.e. work done by teams of Prof. Drs. I. Mateu, J.A. Rosselló or F. González with several endemic species using RAPDs (*Limonium dufourii*, *L. cavanillesii*) or isoenzymathic techniques (*Chaenorrhinum tenellum*, *Silene hifacensis*, *S. diclinis*, *Petrocoptis pardoii*, etc.) – to try experimental re-introductions (i.e., *Cistus carthaginensis*, *Silene hifacensis*) or reinforcements (*Antirrhinum valentinum*, *A. pertegasii*, *Kosteletzkia pentacarpa*, *Limonium dufourii*, *L. rigualii*, *Petrocoptis pardoii*, *Salix tarraconensis*, etc.).

A wide range of documents, including 16 posters, 12 leaflets, four booklets, four books, one CD-ROM and two videos, form part of the intense formative pack that has been compiled since 1994 in order to educate the future generations, and to increase the global knowledge on wild plants and their conservation amongst possible collaborators (teachers, ecologists, landowners, etc.). These documents are specifically designed to reinforce the relationship between people and plants, commenting on some notable features such as the Latin plant names dedicated to specific townships, mountains or districts (i.e., *Biscutella valentina* or *Arenaria valentina* for the whole Valencian Community, *Limonium santapolense* for the city of Santa Pola, *Centaurea mariolensis* for the Mariola Mountains, etc.); more than 50 species, most of them endemics, hold toponimic names. In a similar way, these documents also consider the great importance of ethnobotany, and mainly the traditional use of some herbs (medicinal, liquors, dyeing, etc.).



Every year, somewhere between 30 to 45 official forest wardens receive formative training on plant conservation and micro-reserves, and since 1997, a team of eight specialists (mainly botanists) have been working for the SPE at the provincial and central headquarters. In the last five years, more than 30 conferences and presentations on the micro-reserves have been given in many varied places, from small villages to the most important European congresses on plant conservation. In 1996, during the inter-congresses meeting in Krivoklaat (Czech Republic) the participants and the Steering Committee of Planta Europa, the pan-European platform of research centres, administrations and NGOs for conservation of wild plants, approved the idea of initiating a study for the future establishment of a European network of small reserves for plants. This is the second most important project for Planta Europa – the first one, made by the WCMC and Plantlife, deals with the determination of the Important Plant Areas in Europe.

At this moment, it is evident that the popular knowledge on wild plants in the Valencian Community is rapidly increasing, and that most local authorities have changed their traditional views on the priority called ‘non productive’ lands – that are often the most important for the conservation of rare plants. For the Valencian Community and its people, micro-reserves and plant conservation have become one and the same word, with a quick increase in numbers of these protected sites, accompanied by the challenges of meeting future goals – i.e. the progressive transfer of the management capacity of the local powers.

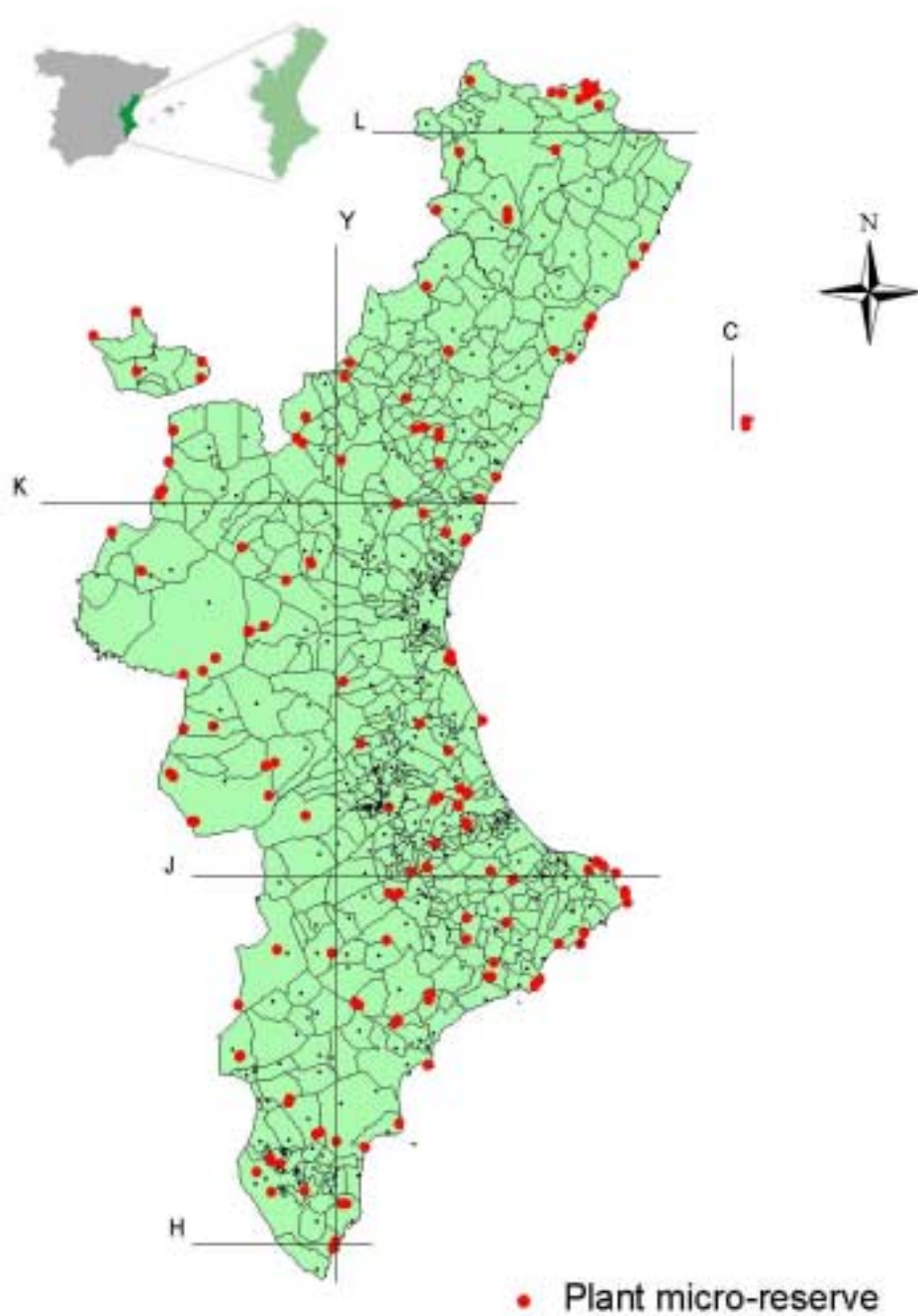


Fig. No. 1. Distribution of the Valencian network of plant micro-reserves, overprinted on the administrative regional map, with township boundaries and situation of the main cities – small black points. Horizontal and vertical lines represent the 100 x 100 km UTM squares, section 30S. On the upper left corner, situation of the Valencian Community in the map of Spain.

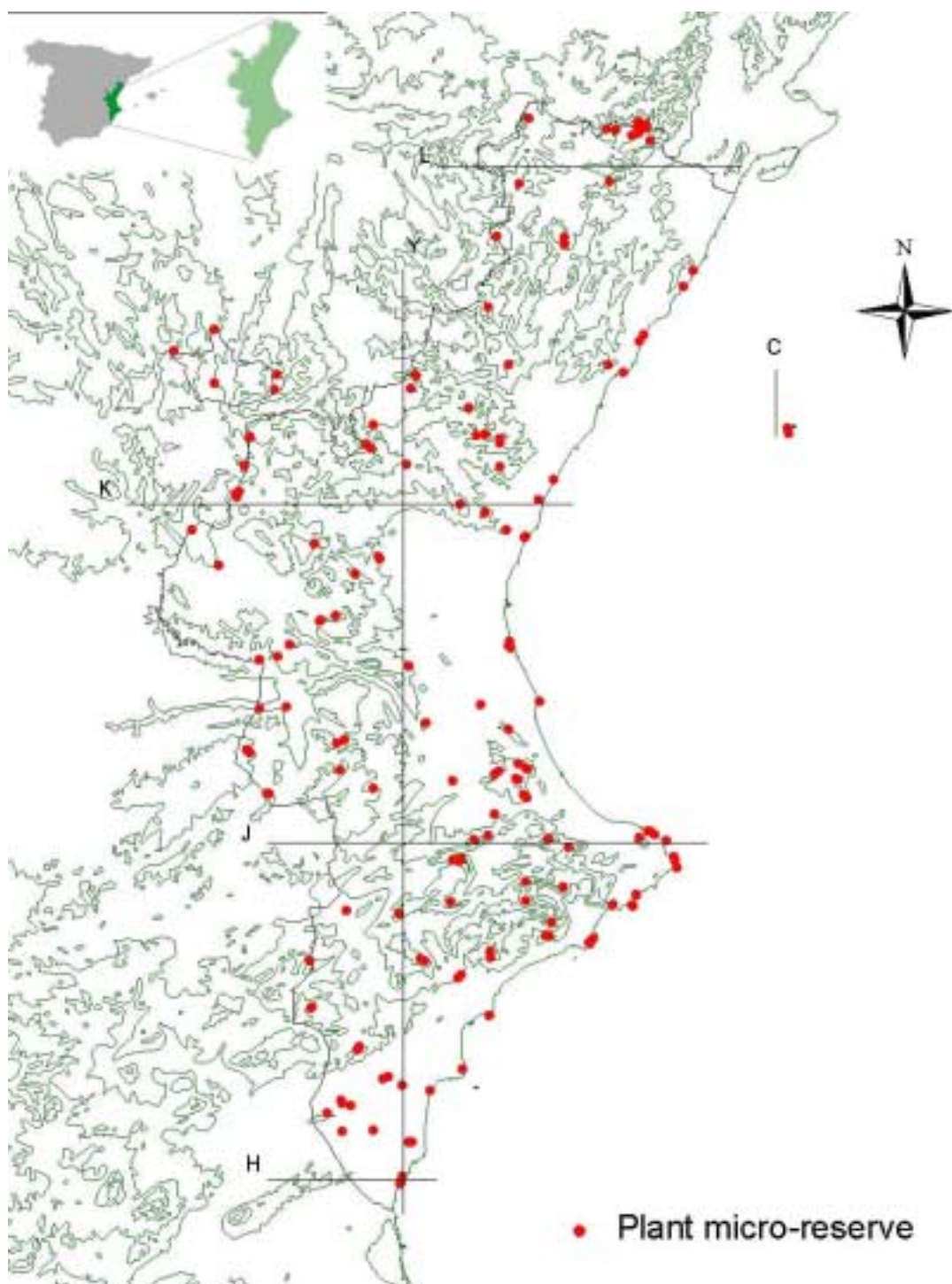


Fig. No. 2. Distribution of the Valencian network of plant micro-reserves, overprinted on the physical regional map.

## Tab. No. 1 List of Valencian Plant Micro-reserves, updated December 1998

Province: A: Alicante; C: Castellón; V: Valencia

Phase: T: Landmarked, topographed and with a draft of management plan; D: In declaration, it has passed the public consultation; T1: Similar to T, but its régime is similar to a declared micro-reserve because the grant-contract accepted by the ownership establishes this effective framework; P: Declared by means of an Order of the regional Councillor for Environment (December 1998).

Owner: P1: The regional government owns or freely manages the land; P2: The City Town owns the land and has a grant-contract with the regional government to establish and manage the micro-reserve; P3: similar to P2, but the owner is a private person (physical or juridical, including NGOs). In the cases of P1: c: owned by the State authority on coasts; h: owned for the State authority on hydraulic resources.

Surface: No references to the area ( - ) means that it deals with vertical slopes and rocky falls, where the projected surface area is often less than 1,000 sq. metres. In some cases, re-measuring operations are being undertaken at this moment and no definitive data are available (u.r., all them close to 1.00 ha).

Main species included: EE: Absolutely or close exclusive endemic; E: wide Iberian Peninsula's (including Iberian-Balearic) endemic; T: important relictic flora from Tertiary or early Quaternary; R: Very rare species at regional level; V: Mainly protected for whole vegetation complex

lc: classic site, where the plant was picked for the first time, reference-population for taxonomist; U: Unique world site (whole world population is in the micro-reserve); M: Most part of regional population is in the site (extended for world population in the EE species); \*: Protected by the Bern Convention, Appendix I.

Micro-reserve	Municipality	Province	Phase	Owner	Surface (ha)	Main species
Molí Mató	Agres	A	T	P1	3.992	Phillytis scolopendrium (extinct, T), Saxifraga corsica ssp. cossoniana (EE)
Recingle	Agres	A	T	P1	2.000	Centaurea mariolensis (EE), Armeria alliacea (EE), Sternbergia colchiciflora (T)
Tejera de Agres	Agres	A	D	P1	8.587	V (Taxus baccata forests), Sorbus aria (T), Centaurea mariolensis (EE), Salvia blancoana ssp. mariolensis (EE), Jasione foliosa ssp. foliosa (E)
Sierra Carrascal de Alcoi	Alcoi	A	D	P1	1.197	(Quercus faginea-Fraxinus ornus forests, U), Dianthus hispanicus ssp. contestanus (EE), Iberis carnososa ssp. hegelmaieri (EE), Polygonatum odoratum (T)
Peñas del Arabí-A	Alfaz del Pi	A	T	P1c	7.297	Juniperus macrocarpa (R), Linaria arabiana (EE, lc.), Corema album (T)
Peñas del Arabí-B2	Alfaz del Pi	A	T	P1c	4.106	Juniperus macrocarpa (R), Corema album (T), Sideritis chamaedryfolia (EE)
Bec de l'Àguila-B	Alicante	A	D	P1c	0.617	Artemisia lucentica (E), Teucrium murcicum (E)
Cabo de las Huertas	Alicante	A	D	P1c	1.232	Limonium furfuraceum (EE), L. x lucentinum (EE), Senecio auricula (T)
Sierra Serrella-A	Benasau	A	T	P1	u.r.	Centaurea mariolensis (EE), Salvia blancoana ssp. mariolensis (EE)
Cabezo Redondo	Benejúzar	A	T	P1	u.r.	Satureja obovata ssp. canescens (E), Sideritis murgetana ssp. littoralis (EE)
Alto del Benicadell	Beniarrés	A	T	P1	1.688	Centaurea mariolensis (EE), Saxifraga longifolia (T), Erodium saxatile (EE)
Peñas del Arabí-B1	Benidorm	A	T	P1c	0.752	Silene hifacensis (EE*)
Cala Bassetes	Benissa	A	D	P1c	0.480	Helianthemum caput-felis (T*), Thymra capitata (T)
Cala Fustera	Benissa	A	D	P1	0.116	Helianthemum caput-felis (T*), Teucrium homotrichum (E)
Sierra de Benissa-A	Benissa	A	T1	P3	5.800	Teucrium homotrichum (E), Thymus

						piperella (EE)
Sierra de Benissa-B	Benissa	A	T1	P3	1.500	Thymus piperella (EE), Teucrium homotrichum (E)
El Reconco	Biar	A	D	P1	14.517	Salvia blancoana ssp. mariolensis (EE), Genista mugronensis ssp. mugronensis (EE)
Sierra del Cabeçó d'Or-A	Busot	A	D	P1	1.895	Scabiosa saxatilis ssp. saxatilis (EE), Dianthus broteri ssp. valentinus (E)
Sierra del Cabeçó d'Or-B	Busot	A	D	P1	4.199	Scabiosa saxatilis ssp. saxatilis (EE), Teucrium buxifolium ssp. rivasi (EE)
El Mascarat	Calpe	A	D	P1	1.235	Teucrium hifacense (EE), Hippocrepis valentina (EE), Centaurea rouyi (EE)
Peñón de Ifach-A	Calpe	A	D	P1	0.308	Silene hifacensis (EE*, lc, re-introd.), Thymus webbiana (EE), Teucrium hifacense (EE, lc.), Asperula paui ssp. dianensis (EE)
Peñón de Ifach-B	Calpe	A	D	P1	1.719	Silene hifacensis (EE*, re-introd.), Kundmannia sicula (R, M), Centaurea rouyi (EE)
Barranco de Enmedio	Callosa de Segura	A	T	P1	10.933	Sideritis glauca (EE*), Periploca angustifolia (T*, M), Centaurea saxicola (EE)
Sierra de Callosa de Segura-A	Callosa de Segura	A	D	P1	2.561	Sideritis glauca (EE*), Centaurea saxicola (EE), Thymus hyemalis (E)
Sierra de Callosa de Segura-B	Callosa de Segura	A	D	P1	5.149	Genista valentina ssp. murcica (E), Dianthus broteri ssp. valentinus (E)
Sierra Serrella-B	Confrides	A	T	P1	12.775	Cirsium valentinum (EE), Sarcocapnos saetabensis (EE), Centaurea mariolensis (EE)
Umbría de Aitana	Confrides	A	T	P1	7.317	Saxifraga longifolia (T, M), Taxus baccata (T), Euphorbia nevadensis (E*)
El Codo	Crevillente	A	T	P1	9.706	Riella helicophylla (R*), Halocnemum strobilaceum (T)
El Derramador	Crevillente	A	T	P1	1.024	Limonium caesium (EE), L. delicatulum (E)
Sierra de Crevillente-A	Crevillente	A	D	P1	4.336	Teucrium buxifolium ssp. buxifolium (EE), Rhamnus lycioides ssp. borgiae (E)
Sierra de Crevillente-B	Crevillente	A	D	P1	1.082	Sideritis leucantha ssp. leucantha (EE), Erucastrum virgatum ssp. baeticum (E)
Cova de l' Aigua-Montgó	Denia	A	D	P1	4.362	Carduncellus dianius (EE), Scabiosa saxatilis (EE), Dianthus hisp. fontqueri (EE)
Les Rotes-A	Denia	A	D	P1c	0.111	Limonium rigualii (EE)
Les Rotes-B	Denia	A	D	P1c	0.569	Limonium rigualii (EE), L. scopulorum (EE)
Les Rotes-C	Denia	A	D	P1c	0.663	Limonium scopulorum (EE), L. rigualii (EE)
Charca sur de El Hondo	Elche	A	T	P1	19.825	Limonium furfuraceum (EE), L. cossonianum (E), Cynomorium coccineum (R)
Assagador	Finestrat	A	T	P1	1.014	Teucrium lepicephalum (EE*), Thymus moroderi (EE)
Puig Campana	Finestrat	A	T	P1	19.734	Saxifraga longifolia (T), Biscutella montana (EE), Teucrium hifacense (EE)
Tossal dels Corbs	Finestrat	A	T	P1	2.635	Teucrium lepicephalum (EE*), Thymus moroderi (EE), Astragalus hispanicus (E)
Sierra de la Xortà	Guadalest	A	D	P1	2.092	Saxifraga longifolia (T), Taxus baccata (T), Daphne oleoides ssp. hispanica (E)
Laguna salada de La Mata	Guardamar del Segura	A	T	P1	u.r.	Limonium parvibracteatum (EE), L. furfuraceum (EE), Cynomorium coccineum (R)
Cabo de la Nao	Jávea	A	D	P1c	0.418	Hippocrepis valentina (EE), Scabiosa saxatilis (EE), Teucrium hifacense (EE)
Cabo de San Antonio	Jávea	A	D	P1c	2.996	Carduncellus dianius (EE), Centaurea rouyi (EE), Scabiosa saxatilis (EE)
Cabo de San Martín	Jávea	A	D	P1c	1.670	Cheirolophus lagunae (EE, lc), Limonium rigualii (EE), L. scopulorum (EE)
Playa del Portichol	Jávea	A	D	P1c	0.841	Cheirolophus lagunae (EE), Diplotaxis ibicensis (EE*), Limonium rigualii (EE)
Bec de l'Àguila-A	Muchamiel	A	D	P1	1.134	Vella lucentina (EE, lc), Sideritis leucantha ssp. leucantha (EE)
Barranco de la Zenia	Orihuela	A	D	P1h	0.195	Helianthemum caput-felis (T*), Sideritis murgetana ssp. littoralis (EE)
Cabo Roig	Orihuela	A	D	P1c	0.933	Helianthemum caput-felis (T*), Astragalus

						lusitanicus (R)
Monte Hurchillo	Orihuela	A	D	P1	4.493	<i>Centaurea lagascae</i> (T), <i>Sideritis murgetana</i> ssp. <i>murgetana</i> (E)
Rincón de Bonanza	Orihuela	A	D	P1	11.064	<i>Sideritis glauca</i> (EE*), <i>Centaurea saxicola</i> (EE), <i>Satureja obovata canescens</i> (E)
Arenal de Petrel-A	Petrel	A	T	P1	1.765	<i>Helianthemum arenarium</i> (EE, U, lc)
Arenal de Petrel-B	Petrel	A	T	P1	0.959	<i>Linaria depauperata</i> ssp. <i>hegelmaieri</i> (EE), <i>Linaria arabiniana</i> (EE)
Cabezo de la Sal-A	Pinoso	A	D	P1	0.500	<i>Limonium thiniense</i> (E), <i>Teucrium libanitis</i> (EE)
Cabezo de la Sal-B	Pinoso	A	D	P1	0.783	<i>Teucrium libanitis</i> (EE), <i>Coris monspelliensis</i> ssp. <i>rivasiana</i> (E)
Cap de Santa Pola	Santa Pola	A	T	P1	-	<i>Teucrium buxifolium</i> ssp. <i>rivasii</i> (EE), <i>Clematis cirrhosa</i> (T)
Dunas del Pinet	Santa Pola	A	T	P1	u.r.	<i>Limonium parvibracteatum</i> (EE), <i>L. santapolense</i> (EE), <i>L. delicatulum</i> (E)
Sierra del Maigmo-A	Tibi	A	D	P1	1.957	<i>Cytisus reverchonii</i> (E), <i>Centaurea spachii</i> (E), <i>Iberis carmosa hegelmaieri</i> (EE)
Sierra del Maigmo-B	Tibi	A	D	P1	6.559	<i>Biscutella lucentina</i> (EE), <i>Teucrium buxifolium</i> ssp. <i>buxifolium</i> (EE)
Laguna salada de Torrevieja	Torrevieja	A	T	P1	u.r.	<i>Limonium parvibracteatum</i> (EE), <i>L. furfuraceum</i> (EE), <i>L. caesium</i> (EE)
Barranc de l'Infern	Vall d'Ebo	A	T	P1	7.076	<i>Laurus nobilis</i> (T), <i>Biscutella montana</i> (EE), <i>Hippocrepis valentina</i> (EE)
Lomas del Xap	Vall de Gallinera	A	T	P1	4.403	<i>Centaurea segariensis</i> (EE), <i>Arenaria valentina</i> (EE), <i>Biscutella montana</i> (EE)
Los Cabecicos	Villena	A	D	P1	2.393	<i>Teucrium libanitis</i> (EE), <i>Limonium supinum</i> (E)
Sierra de Salinas	Villena	A	D	P1	0.848	<i>Centaurea antennata</i> v. <i>meridionales</i> (EE), <i>Sarcocapnos saetabensis</i> (EE)
Olmeda de Villena	Villena	A	T1	P3	0.033	<i>Ulmus minor</i> (unique regional population without graphiosis)
Pico de Espadán	Alcudia de Veo	C	D	P1	1.021	<i>Minuartia valentina</i> (EE), <i>Centaurea pau</i> (EE)
Barranco de Agua Negra	Algimia de Almonacid	C	T1	P3	8.140	<i>Dianthus multiaffinis</i> (EE), <i>Hypericum androsaemum</i> (R), <i>Centaurea pau</i> (EE)
Playa de Almenara	Almenara	C	T	P1c	1.721	<i>Silene cambessedesii</i> (EE, M), <i>Otanthus maritimus</i> (R)
Sabinar de Altur	Altura	C	T	P1	10.213	V (Termophyllous populations of <i>Juniperus thurifera</i> ), <i>Teucrium angustissimum</i> (EE), <i>Centaurea pinae</i> (E), <i>Odontites viscosus</i> ssp. <i>australis</i> (E)
Barranc dels Horts	Ares del Maestre	C	T1	P3	0.941	V (Residual <i>Quercus faginea</i> aged forest, M), <i>Paeonia officinalis</i> ssp. <i>microcarpa</i> (R)
Font dels Horts	Ares del Maestre	C	T1	P3	0.963	<i>Hieracium laniferum</i> (E), <i>Chaenorhinum organifolium</i> ssp. <i>crassifolium</i> (E)
Mas Vell	Ares del Maestre	C	T1	P3	3.182	<i>Senecio lagascanus</i> (E, M), <i>Centaurea pinae</i> (E)
Agulles de Santa Àgueda	Benicásim	C	P	P1	0.055	<i>Crassula campestris</i> (R), <i>Biscutella carolipauana</i> (EE), <i>B. calduchii</i> (R)
Playa de las Ruinas	Cabanes	C	T	P1c	1.000	<i>Aristolochia clematidis</i> (T, M), <i>Otanthus maritimus</i> (R)
Torre de la Sal	Cabanes	C	T	P1c	u.r.	<i>Juniperus oxycedrus</i> ssp. <i>macrocarpa</i> (R), <i>Cistus crispus</i> (R)
Isla Ferrera	Castellón de la Plana	C	P	P1	1.564	V (Residual <i>Columbretes</i> island climax <i>Chamaerops humilis-Pistacia lentiscus</i> )
Isla Foradada	Castellón de la Plana	C	P	P1	1.648	<i>Medicago citrina</i> (EE, M), <i>Lobularia maritima</i> ssp. <i>columbretensis</i> (EE)
Cresta del Turmell	Chert	C	T	P1	-	<i>Thymus willkommii</i> (EE), <i>Arenaria conimbricensis</i> ssp. <i>viridis</i> (EE), <i>Knautia rupicola</i> (EE), <i>Lonicera pyrenaica</i> (T), <i>Valeriana tripteris</i> (R)
El Bovalar	Cinctorres	C	P	P1	3.753	V ( <i>Quercus rotundifolia</i> subhumide forests), <i>Ilex aquifolium</i> (T)
Estrecho del Cascajar	El Toro	C	T	P1	10.725	<i>Ilex aquifolium</i> (T), <i>Hieracium loscosianum</i> (E), <i>H. aragonense</i> (E)
Barranc de Fonillet	Eslida	C	T	P1	5.671	<i>Centaurea pau</i> (EE), <i>Hypericum androsaemum</i> (R), <i>Minuartia valentina</i> (EE)
Umbría del Oret	Eslida	C	T	P1	4.851	<i>Centaurea pau</i> (EE), <i>Minuartia valentina</i> (EE), <i>Helianthemum organifolium</i> ssp. <i>molle</i> (EE), <i>Jasione crispa</i> ssp. <i>sessiliflora</i>

						(E), <i>Linaria repens</i> ssp. <i>blanca</i> (E)
Olmeda de Fuente la Reina	Fuente la Reina	C	P	P1h	0.138	<i>Scrophularia sciophila</i> (E), <i>Prunus mahaleb</i> (R), <i>Campanula trachelium</i> (R)
Playa de Moncófar	Moncófar	C	T	P1	1.312	<i>Silene cambessedesii</i> (EE), <i>Crucianella maritima</i> (R), <i>Echinophora spinosa</i> (R)
Torre de la Colomera	Oropesa	C	P	P1	0.810	<i>Leucojum valentinum</i> (EE), <i>Erodium sanguis-christi</i> ssp. <i>sanguis-christi</i> (EE)
Torre Badún	Peñíscola	C	T	P1c	0.343	<i>Limonium cavanillesii</i> (EE, U)
Cala Argilaga	Peñíscola	C	T	P1c	1.267	<i>Erodium sanguis-christi</i> (EE), <i>Centaurea saguntina</i> (EE)
Umbría de Santa Bárbara	Pina de Montalgrao	C	P	P1	4.864	V ( <i>Quercus pyrenaica</i> forests), <i>Centaurea sancta-barbarae</i> (EE)
Cova dels Rossegadors	Pobla de Benifassar	C	T	P1	1.248	<i>Hieracium laniferum</i> (E), <i>Biscutella fontqueri</i> (EE), <i>Sorbus aria</i> (T)
Font de la Ombría	Pobla de Benifassar	C	P	P1	0.351	<i>Pinguicula dertosensis</i> (EE)
Mas del Peraire	Pobla de Benifassar	C	P1	P3	7.582	<i>Antirrhinum pertegasii</i> (EE), <i>Salix tarraconensis</i> (EE), <i>Pinguicula dertosensis</i> (EE), <i>Arenaria conimbricensis</i> ssp. <i>viridis</i> (EE), <i>Pyrola chlorantha</i> (R)
Pinar Pla	Pobla de Benifassar	C	T1	P3	14.728	<i>Knautia rupicola</i> (EE), <i>Biscutella fontqueri</i> (EE)
Pouet de Fèlix	Pobla de Benifassar	C	P	P1	1.192	<i>Salix tarraconensis</i> (EE, M), <i>Ilex aquifolium</i> (T), <i>Valeriana tripteris</i> (R)
Punta de Solà d'En Brull	Pobla de Benifassar	C	P	P1	2.122	<i>Antirrhinum pertegasii</i> (EE), <i>Arceuthobium oxycedri</i> (R), <i>Hieracium laniferum</i> (E)
Racó del Presseguer	Pobla de Benifassar	C	T	P1	1.734	<i>Pinguicula dertosensis</i> (EE), <i>Chaenorhinum organifolium</i> ssp. <i>cadevallii</i> (E), <i>Hypericum caprifolium</i> (E), <i>Ilex aquifolium</i> (T), <i>Sorbus aria</i> (T)
Salt de Robert	Pobla de Benifassar	C	P	P1	0.850	<i>Antirrhinum pertegasii</i> (EE, M), <i>Sanicula europaea</i> (R), <i>Primula acaulis</i> (R)
Tossal de Mitjavila	Pobla de Benifassar	C	P	P1	3.576	<i>Armeria fontqueri</i> (EE, M), <i>Euphorbia amygdaloides</i> (R), <i>Knautia rupicola</i> (EE)
El Resinero	Sacañet	C	T	P1	4.821	<i>Dianthus turoloensis</i> (E), <i>Thymus godayanus</i> (EE), <i>Arabis serpyllifolia</i> (R)
Balsa de la Dehesa	Soneja	C	T1	P2	10.800	<i>Polygonum amphibium</i> (R, M), <i>Lavandula pedunculata</i> (E), <i>Paronychia cymosa</i> (R)
El Tajar	Torralba del Pinar	C	P	P1	8.603	<i>Ilex aquifolium</i> (T), <i>Taxus baccata</i> (T), <i>Minuartia valentina</i> (EE)
La Palomita	Villafranca del Cid	C	T	P1	3.182	<i>Goodyera repens</i> (T, M), <i>Tilia platyphyllos</i> (T), <i>Hieracium lawsonii</i> (R), <i>Pyrola chlorantha</i> (R, M), <i>Cephalanthera damasonium</i> (R), <i>C. rubra</i> (R)
Barranc de la Pegunta	Vistabella del Maestrazgo	C	P	P1	11.045	<i>Galanthus nivalis</i> (R,M), <i>Hieracium valentinum</i> (E), <i>Ilex aquifolium</i> (T)
La Balma	Zorita del Maestrazgo	C	T	P1	2.000	<i>Petrocoptis pardoii</i> (EE, M), <i>Biscutella fontqueri</i> (EE)
Río Bohigues	Ademuz	V	T	P1h	20.000	<i>Lonicera periclymenum hispanica</i> (R), <i>L. xylostium</i> (T), <i>Clematis recta</i> (T)
Puerto de Tous	Alcira	V	D	P1	0.466	<i>Urginea undulata</i> ssp. <i>caeculi</i> (EE), <i>Centaurea spachii</i> (EE), <i>Phlomis crinita</i> (EE)
Chopera de Algemesí	Algemesí	V	T	P1h	3.738	V (Riparian <i>Populus alba</i> termophilous forests), <i>Lonicera biflora</i> (R)
El Cabezo-A	Aras de Alpuente	V	D	P1	17.070	V (Riparian <i>Salix alba</i> - <i>Populus alba</i> gallery forests), <i>Salix x rubens</i> (R)
El Cabezo-B	Aras de Alpuente	V	D	P1	15.742	V (long-term experimental untouched <i>Pinus halepensis</i> forest)
Fuente del Puntalejo	Ayora	v	D	P1	0.639	<i>Echium saetabense</i> (EE), <i>Allium molly</i> (R), <i>Orchis elata sesquipetalis</i> (R)
La Hunde y Palomeras-A	Ayora	V	D	P1	0.427	<i>Narcissus radinganorum</i> (EE, M), <i>Erica erigena</i> (R)
La Hunde y Palomeras-B	Ayora	V	D	P1	2.067	<i>Linaria cavanillesii</i> (E), <i>Globularia repens</i> ssp. <i>borjae</i> (E)
La Hunde y Palomeras-C	Ayora	V	D	P1	1.172	<i>Genista mugronensis</i> (EE), <i>Teucrium gnaphalodes</i> (E)
Sabinar de Meca	Ayora	V	T1	P3	10.053	V ( <i>Juniperus phoenicea</i> forest), <i>Rhamnus lycioides</i> ssp. <i>borgiae</i> (E)
La Penyeta de l'Heura	Bélgida	V	D	P1	1.396	<i>Biscutella montana</i> (EE), <i>Dianthus hispanicus</i> ssp. <i>contestanus</i> (EE)

Peñas del Benicadell	Beniatjar	V	T	P1	1.843	Centaurea mariolensis (EE), Erodium saxatile (EE), Biscutella montana (EE)
Rincón del Jinete	Bicorp	V	D	P1	0.904	Cirsium valentinum (EE), Euphorbia isatidifolia (E), Dictamnus hispanicus (E)
El Fresnal	Buñol	V	T	P1	0.796	V (Viburnum tinus-Fraxinus ornus forests), Cytisus heterochrous (E)
Umbría de la Fuente de Roser	Buñol	V	D	P1	7.861	Trisetum cavanillesianum (EE), Teucrium thymifolium (E)
El Molón	Camporrobles	V	T1	P2	3.000	Phillytis scolopendrium (R)
Barranco de Barraix	Castelló de Rugat	V	T1	P3	0.703	V (Unique regional population of <i>Quercus humilis</i> = <i>Q. pubescens</i> , T)
Cruz de los Tres Reinos	Castielfabib	V	D	P1	1.506	Thymus borgiae (E, M), Artemisia assoana (E), Reseda barrelieri (E)
El Rodeno	Castielfabib	V	D	P1	2.606	Biscutella atropurpurea (E), Halimium umbellatum ssp. viscosum (R, M)
Río Ebrón	Castielfabib	V	T	P1h	1.090	Ligustrum vulgare (R), Peucedanum hispanicum (E), Cornus sanguinea (R)
Cañada Honda	Caudete de las Fuentes	V	T1	P3	1.095	Juniperus oxycedrus ssp. badia (R), Satureja intricata gracilis (E)
Pico de Ropé	Chera	V	D	P1	4.742	Taxus baccata (R), Saxifraga latepetiolata (E), Urginea undulata caeculi (EE)
Umbría de Carrasquillas	Chiva	V	D	P1	0.581	V ( <i>Quercus rotundifolia</i> - <i>Hacer granatense</i> forest), Silene mellifera (E)
Cabo de Cullera	Cullera	V	D	P1c	1.913	Limonium dufourii (EE, Unique world population on cliffs)
Los Altos	Enguera	V	T	P1	1.046	Sideritis sericea (EE), S. tragoriganum (E), Satureja intricata gracilis (E)
Puntal de l'Abella	Estivella	V	D	P1	0.920	Dianthus multiaffinis (EE), D. x carolipau (EE), Centaurea antennata (E)
Barranco de las Macheras	Jalance	V	D	P1	1.575	Cistus creticus (R, M), Lonicera splendida (E), Globularia valentina (E)
Castillo de Jalance	Jalance	V	T	P1	0.415	Limonium sucranicum (EE, M), Ononis tridentata v. edentula (EE)
Castillo de Játiva	Játiva	V	D	P2	3.376	Silene diclinis (EE), Sarcocapnos saetabensis (EE, lc), Saxifraga corsica ssp. cossoniana (EE), Biscutella stenophylla (E), Satureja obovata (E)
Cabecera del Barranc de Borrell	Luchent	V	T	P1	u.r.	V ( <i>Quercus suber</i> forests on calcareous soils), Cephalanthera longifolia (R)
Pedralba-A	Pedralba	V	T	P1	0.127	Garidella nigellastrum (R, M)
Pedralba-B	Pedralba	V	T	P1	0.091	Garidella nigellastrum (R)
Bassa del Surar	Pinet	V	T	P1	u.r.	V ( <i>Quercus suber</i> forests on calcareous soil), Dictamnus hispanicus (E)
Barranco Jorge	Puebla de San Miguel	V	T	P1	11.977	Taxus baccata (T), Ribes uva-crispa (T, M), Saxifraga cuneata ssp. paniculata (E)
Pico Calderón	Puebla de San Miguel	V	D	P1	4.026	Androsace vitaliana assoana (E, M), Thymus godayanus (EE), Galium idubedae (E), Ribes alpinum (R), Biscutella turolensis (E), Dianthus turolensis (E)
Pla de Morà	Quatretonda	V	T	P1	5.533	Silene diclinis (EE), Dianthus hispanicus ssp. fontqueri (EE)
Umbría del Buixcarró	Quatretonda	V	T	P1	3.269	Antirrhinum valentinum (EE), Biscutella montana (EE)
Loma Coca	Real de Montroy	V	D	P1	1.558	Verbascum fontqueri (EE, M), Sideritis incana edetana (EE), Urginea undulata caeculi (EE), Sideritis tragoriganum (E), Thymus x josephi-angeli (EE)
Casa de Puchero-Muela del Gato	Requena	V	T1	P3	5.258	V ( <i>Quercus rotundifolia</i> dry continental forests)
Finca Luz Serena	Requena	V	D	P3	2.991	V ( <i>Pinus halepensis</i> forests), Globularia valentina (E), Thymus piperella (EE)
Rambla de las Salinas	Requena	V	D	P1	1.689	Limonium cofrentanum (EE), L. lobetanicum (EE), Moricandia moricandioides (E)
Cova de les Rates	Rótova	V	T1	P3	4.583	Sarcocapnos saetabensis (EE), Thymus piperella (EE)
El Picayo	Sagunto	V	D	P1	0.262	Dianthus multiaffinis (EE), Helianthemum organifolium ssp. glabratum (EE)
Marjal del Moro-A	Sagunto	V	D	P1	1.845	Limonium dufourii (EE, M), Iris xiphium (R)
Marjal del Moro-B	Sagunto	V	D	P1	2.319	Limonium dufourii (EE)



Barranco del Saragatillo	Serra	V	D	P1	9.868	V ( <i>Quercus suber</i> forests), <i>Urginea undulata caeculi</i> (EE), <i>Dianthus multiaffinis</i> (EE), <i>Centaurea saguntina</i> (EE)
Pico de la Nevera	Siete Aguas	V	T	P1	19.255	<i>Thymus granatensis micranthus</i> (E), <i>Linum appresum</i> (E), <i>Campanula viciosoi</i> (EE)
Las Hoyuelas	Sinarcas	V	T1	P3	1.110	V ( <i>Quercus faginea</i> subhumide forests with <i>Jugals nigra</i> ). <i>Equisetum telmateja</i> (R)
Lavajo de Arriba	Sinarcas	V	T1	P2	1.000	<i>Marsilea strigosa</i> (R, M), <i>Isoetes velata</i> (R, M), <i>Preslia cervina</i> (R), <i>Littorella uniflora</i> (R, M), <i>Baldellia ranunculoides</i> (R, M), <i>Damasonium polyspermum</i> (R, M)
Lavajo de Abajo	Sinarcas	V	T1	P2	0.275	<i>Marsilea strigosa</i> (R), <i>Preslia cervina</i> (R), <i>Damasonium polyspermum</i> (R)
Alts de la Drova	Xeresa	V	D	P1	2.132	<i>Arenaria aggregata</i> ssp. <i>pseudoarmeriastrum</i> (EE), <i>Anthyllis onobrychioides</i> (E), <i>Phlomis crinita</i> (EE), <i>Dianthus hispanicus</i> ssp. <i>fontqueri</i> (EE)
Cima del Montdúver	Xeresa	V	D	P1	0.948	<i>Arenaria aggregata</i> ssp. <i>pseudoarmeriastrum</i> (EE, M, lc), <i>Armeria alliacea</i> (EE, lc), <i>Phlomis crinita crinita</i> (EE, prob. lc), <i>Scabiosa saxatilis saxatilis</i> (EE, prob. lc)
Caroche	Teresa de Cofrentes	V	D	P1	0.684	<i>Campanula viciosoi</i> (EE, lc), <i>Chanorhinum tenellum</i> (EE), <i>Sideritis sericea</i> (EE), <i>Sarcocapnos saetabensis</i> (EE), <i>Saxifraga latepetiolata</i> (E), <i>Teucrium thymifolium</i> (E)
El Picarcho	Tuéjar	V	D	P1	7.767	<i>Quercus pyrenaica</i> (R), <i>Festuca paniculata pau</i> (E), <i>Peucedanum officinale</i> ssp. <i>stenocarpum</i> (E), <i>Urginea undulata vaeculi</i> (EE), <i>Rubus canescens</i> (R)
La Malladeta	Valencia	V	T1	P2	1.000	<i>Spartina versicolor</i> (R, M), <i>Iris xiphium</i> (R), <i>Centaurea dracunculifolia</i> (E)
Montañar del Puchol	Valencia	V	T1	P2	5.203	V (untouched dune vegetation), <i>Otanthus maritimum</i> (R)
Petillet del Fang	Valencia	V	T1	P2	u.r.	<i>Kosteletzkya pentacarpa</i> (R, M), <i>Scutellaria galericulata</i> (R, M)

**Tab. No. 2. Presence of the different vegetation types (following Natura 2000 nomenclature) in the micro-reserve network by April 1998 (on 141 areas)**

Data only obtained from the main vegetation types presents in each micro-reserves, not from all types present

\*Priority habitat at annex I of the Directive 92/43/CEE

Habitat type (Natura 2000 Code)	Nr	%
COASTAL AND HALOPHYTIC HABITATS	28	
19.8		
Vegetation sea cliffs with endemic Limonium spp. (1240)	12	
8.5		
Iberian halo-nitrophilous scrubs (1430)	2	
1.4		
*Salt steppes (1510)	7	
4.9		
*Gypsum steppes (1520)	7	
4.9		
COASTAL SAND DUNES AND CONTINENTAL DUNES	5	
3.5		
*Dune juniper thickets (2250)	4	
2.8		
*Wooded dunes with pine (2270)	1	
0.7		
FRESHWATER HABITATS	4	
2.8		
Hard oligo-mesotrophic waters with bentic vegetation of Chara (3140)	1	
0.7		
Natural eutrophic lakes with Magnopotamion or Hydrocharition (3150)	1	
0.7		
*Mediterranean temporary ponds (3170)	2	
1.4		
TEMPERATE HEATH AND SCRUB (RELICTIC)	8	
5.6		
Dry heaths (4030)	1	
0.7		
Endemic oro-Mediterranean heaths with gorse (4090)	7	
4.9		
SCLEROPHYLLOUS SCRUB, MATORRAL	19	
13.4		
Juniper formations (5210)	1	
0.7		
*Matorral with Zyziphus (5220)	1	
0.7		

*Matorral with <i>Laurus nobilis</i> (5230)	1
0.7	
Thermo-Mediterranean and pre-steppe brush (5330)	16
11.3	
<b>NATURAL AND SEMI-NATURAL GRASSLANDS</b>	<b>18</b>
12.7	
*Important orchid sites on Festuco-Brometalia (6210)	4
2.8	
*Pseudo-steppe with grasses and annuals (6220)	14
9.9	
<b>RAISED BOGS AND MIRES AND FENS</b>	<b>5</b>
3.5	
*Calcareous fens with <i>Cladium mariscus</i> (7210)	2
1.4	
*Petrifying springs with tufa formation (7220)	3
2.1	
<b>ROCKY HABITATS AND CAVES</b>	<b>26</b>
18.4	
Calcareous chasmophytic vegetation on rocky slopes (8210)	23
16.3	
Silicicolous chasmophytic vegetation on rocky slopes (8220)	2
1.4	
Caves not open to the public (8310)	1
0.7	
<b>FORESTS</b>	<b>28</b>
19.9	
Fraxinus woods (91B0)	1
0.7	
Riverine galleries (92A0)	4
2.8	
Oak woods with <i>Quercus pyrenaica</i> (9230)	2
1.4	
<i>Quercus faginea</i> woods (9240)	3
2.1	
<i>Quercus suber</i> forests (9330)	3
2.1	
<i>Quercus gr. ilex</i> forests (9340)	4
2.8	
*Mediterranean pine forests with endemic black pines (9530)	3
2.1	
Mediterranean pine forests with endemic Mesogean pines (9540)	4
2.8	
*Endemic Mediterranean forests with <i>Juniperus</i> spp. (9560)	2
1.4	
* <i>Taxus baccata</i> woods (9580)	2
1.4	

**Tab. No. 3. Presence and representativity in the micro-reserves network (April 1998) of the recorded regional habitats of the Directive 97/62/CEE's annex I**

P: +: Still present in the network (at least as a non dominant vegetation)

M: +: Present as the dominant or most important vegetation in 1 or more micro-reserves; ++: 50% or more Valencian representation of this habitat is still included in the network.

P and M: - : not represented habitat.

op: On project (first works in order to include it at the network have been started)

<u>HABITATS PRESENT IN VALENCIAN COMMUNITY</u>	<u>P</u>	<u>M</u>
<b>COASTAL AND HALOPHYTIC HABITATS</b>		
1110 Sandbanks wich are slighly covered by sea water	-	-
*1120 Posidonia beds	-	-
1130 Estuaries	-	op
*1150 Lagoons	+	-
1160 Large shallow inlets and bays	-	-
1170 Reefs	-	-
1210 Annual vegetation on drift lines	+	-
1220 Perennial vegetation on stony banks	+	-
1240 Vegetation sea cliffs of the Mediterranean coasts with endemic <i>Limonia</i>	+	+
1410 Mediterranean salt meadows	+	-
1420 Mediterranean halophilous scrubs	+	-
1430 Iberian halo-nitrophilous scrubs	+	+
1510 Mediterranean salt steppes	+	+
1520 Iberian gypsum steppes	+	+
<b>COASTAL SAND DUNES AND CONTINENTAL DUNES</b>		
2210 <i>Crucianellion</i> fixed beach dunes	+	-
2230 <i>Malcolmietalia</i> dune grasslands	+	-
2240 <i>Brachypodietalia</i> dune grasslands	+	-
*2250 Dune juniper thickets	+	+
2260 Dune sclerophyllous shrubs	+	-
*2270 Wooded dunes with <i>Pinus</i>	+	+
<b>FRESHWATER HABITATS</b>		
3140 Hard oligo-mesotrophic waters with bentic vegetation of <i>Chara</i>	+	+
3150 Natural eutrophic lakes with <i>Magnopotamion</i> or <i>Hycrocharition</i>	+	+
3160 Distrophic lakes	op	.
*3160 Mediterranean temporary ponds	+	++
3250 Constant flowing Mediterranean rivers with <i>Glaucium flavum</i>	+	.
3280 Constantly flowing Mediterranean rivers	+	.
3290 Intermittently flowing Mediterranean rivers	+	.
<b>TEMPERATE HEATHS AND SCRUBS</b>		
4030 Dry heaths	+	+
4090 Endemic oro-Mediterranean heaths with gorse	+	+
<b>SCLEROPHYLLOUS SCRUB</b>		
5110 Stable <i>Buxus sempervirens</i> formations on calcareous rock slopes	+	.
5210 Juniper formations	+	+
*5220 Matorral with <i>Zyziphus</i> (imperfectly represented)	+	+
*5230 Matorral with <i>Laurus nobilis</i>	+	++
5320 Low formations of euphorbia close too cliffs	++	.
5330 Thermo-Mediterranean and pre.desert scrub	+	+

NATURAL AND SEMI-NATURAL GRASSLANDS FORMATIONS		
*6110 Karstic calcareous grasslands	+	.
6160 Siliceous <i>Festuca indigesta</i> Iberian grasslands	+	.
*6210 Important orchid sites, on semi-natural dry grasslands	+	+
*6220 Pseudo-steppe with grasses and annuals	+	+
6420 Mediterranean tall-herb and rush meadows	+	.
6430 Eutrophic tall herbs	+	.
RAISED BOGS AND MIRES AND FENS		
*7210 Calcareous fens with <i>Cladium mariscus</i>	+	+
*7220 Petrifying springs with tufa formation	+	+
ROCKY HABITATS AND CAVES		
8130 Western Mediterranean and termophile scree	+	.
8210 Calcareous chasmophytic vegetation on rocky slopes	+	+
8220 Silicicolous chasmophytic vegetation on rocky slopes	+	+
8230 Pioneer vegetation on rock surfaces	+	.
8310 Caves not open to the public	+	+
8320 Fields of lava and natural excavation	+	.
8330 Submerged or partially submerged sea caves	+	.
FORESTS		
*9180 <i>Tilio-Acerion</i> ravine forests (imperfectly represented)	op	op
91B0 <i>Fraxinus angustifolia</i> woods (included <i>F. ornus</i> forests)	+	+
9230 Oak woods with <i>Quercus pyrenaica</i>	+	+
9240 <i>Quercus faginea</i> woods	+	+
92A0 <i>Salix alba</i> and <i>Populus alba</i> galleries	+	+
92D0 Thermo-Mediterranean riparian galleries	+	+
9330 <i>Quercus suber</i> forests	+	+
9340 <i>Quercus ilex</i> and <i>Q. rotundifolia</i> forests	+	+
*9370 Palm groves of <i>Phoenix</i> (naturalized from ancient plantations)	.	.
9380 Forests of <i>Ilex aquifolium</i>	+	.
*9530 Mediterranean pine forests with endemic black pines	+	+
9540 Mediterranean pine forests with endemic Mesogean pines	+	+
*9560 Endemic Mediterranean forests with <i>Juniperus</i>	+	+
*9570 <i>Tetraclinis articulata</i> forests (imperfectly represented, semi-natural)	op	.
*9580 <i>Taxus baccata</i> woods	+	+
TOTAL	56	33
% (on 65)	86.1	50.8
TOTAL FOR PRIORITARY HABITATS		
	14	12
% (on 18)	77.8	66.7

**Section two:  
an overview on the  
small protected areas in Europe**

## **Introduction**

This section deals with the legal designations used for the protection of important plant areas in Europe and other geographically related countries (former USSR in Asia, Middle East, riverine Mediterranean nations in North of Africa), and with their use providing protection for small zones with botanical interest. Good introductions on law designations around the world and a European overview can be found in IUCN (1992), de Klemm (1990, 1992, 1996a and b, and 1997), de Klemm and Shine (1993) and Shine (1996, 1997).

## **Categories of protected areas**

Data on protected areas are available from several easily accessible sources (books, databases in the Internet); people can find a great deal of data – especially on large protected areas, over 1,000 ha. Table No. 4 shows an abstract of basic information, obtained from the IUCN (1998) and the WCMC Protected Areas Databases. Seemingly, with these data one can draw up a map on the distribution and richness of protected areas in Europe; however, there are some reasons for proceeding warily – see the following chapter.

Discussing “Protected Areas” is not possible without a common vocabulary. A “protected area” can also be an historical monument, or a rich-archaeological closed zone, etc. The main international databases available, such as the WCMC web pages, make use of the IUCN’s categories of protected areas, formerly described by the IUCN (1973 and 1978). The last version of this classification (IUCN, 1994c and 1998) accepts six main types or categories (I to VI) – see tab. No. 5. Other attempts to classify the different kinds of protected areas (e.g. CEC, 1979) have fallen into disuse.

WCMC databases provide the main source of information for the compilation of the UNEP’s lists on protected areas edited by the IUCN; these databases often use other additional categories explained by the IUCN (1994c) that are not currently included in the UNEP’s official lists (e.g., IUCN, 1998). The foremost additional type is the so-shortened ‘UA’, kept for those areas where some activities are forbidden, but may be allowed under special authorisation or official permission. There also exist categories VII to X: Natural biotic area or anthropological reserve (VII), Multiple use management area or managed resource (VIII), Biosphere Reserve (IX) and World Heritage Site (X); the two last categories are only used if the same sites are not classified into the aforementioned I to VI.

**Tab. No. 4: Main data on large protected areas (more than 1,000 ha) for Europe, ex-USSR Asiatic republics and riverine Mediterranean States of the Middle East and North Africa.**

Country national	Area surface sq. km	No. of protected areas			Protected surface sq. km	%
		1,000 or >1000 ha	<1000 ha	Total		
Albania	28,750	29	19	48	843	2.9
Andorra	465	0	0	0	0	0.0
Armenia	29,800	4	1	5	2,134	7.2
Austria	83,855	178	517	695	24,512	29.2
Azerbaijan	86,600	29	5	34	4,776	5.5
Belarus	207,600	57	25	82	8,754	4.2
Belgium	30,520	4	66	70	859	2.8
Bosnia and Herzegovina	51,129	5	13	18	267	0.5
Bulgaria	110,910	49	78	127	4,998	4.5
Croatia	56,538	27	150	177	3,964	7.0
Cyprus	9,250	4	6	10	781	8.4
Czech Republic	78,864	44	1,746	1,790	12,776	16.2
Denmark	43,075	40	180	220	13,796	32.0
Estonia	45,100	53	167	220	5,364	11.9
Finland	337,030	127	133	260	18,667	5.5
France	543,965	129	303	432	55,605	10.2
Georgia	69,700	16	2	18	1,953	2.8
Germany, F.R.	356,840	525	873	1,398	96,193	27.0
Greece	131,985	27	51	78	3,188	2.4
Hungary	93,030	54	132	186	6,490	7.0
Iceland	102,820	26	53	79	9,805	9.5
Ireland	68,895	15	57	72	653	0.9
Italy	301,245	170	252	422	22,037	7.3
Kazakhstan	2,717,300	70	3	73	73,373	2.7
Latvia	63,700	49	108	157	8,005	12.6
Liechtenstein	160	1	9	10	61	38.1
Lithuania	65,200	79	0	79	6,454	9.9
Luxembourg	2,585	1	18	19	372	14.4
Malta	316	0	7	7	2	0.6
Moldova	33,700	13	50	63	506	1.5
Netherlands	41,160	78	4	82	2,316	5.6
Norway	386,275	128	69	197	93,755	24.3*
Poland	312,685	106	417	523	29,291	9.4
Portugal	92,390	25	34	59	6,036	6.5
Romania	237,500	39	118	157	10,894	4.6
Russian Federation	17,075,400	208	8	216	516,688	3.0
San Marino	61	0	0	0	0	0.0
Slovakia**	14,035	19	79	98	10,605	75.6
Slovenia	20,251	14	18	32	1,202	5.9
Spain	504,880	219	110	329	42,418	8.4
Sweden	440,940	250	100	350	36,547	8.3
Switzerland	41,285	107	104	211	7,447	18.0



Macedonia (TFYR)	25,713	16	10	26	1,813	7.1
Turkey	779,450	63	4	67	10,783	1.4
Ukraine	603,700	25	1	26	8,985	1.5
United Kingdom	244,887	157	359	516	50,001	20.4
Vatican City State	0.4	0	0	0	0	0.0
Yugoslavia	102,173	27	77	104	3,389	3.3
<b>FORMER USSR</b>						
Kyrgyzstan	198,500	31	47	78	6,939	3.5
Tajikistan	143,100	18	1	19	5,870	4.1
Turkmenistan	488,100	22	1	23	19,773	4.1
Uzbekistan	447,400	11	0	11	8,184	1.8
<b>MIDDLE EAST AND RIVERINE MEDITERRANEAN</b>						
Algeria	2,381,745	18	18	18	58,908	2.5
Egypt	1,000,250	12	4	16	7,938	0.8
Israel	20,770	15	173	188	3,256	15.7
Jordan	96,000	9	2	11	2,980	3.1
Lebanon	10,400	2	1	3	48	0.5
Libya	1,759,540	6	2	8	1,730	0.1
Morocco	458,730	7	5	12	3,174	0.7
Syria	185,680	0	0	0	0	0.0
Tunisia	164,150	6	1	7	445	0.3

Source: Modified from IUCN (1998), data from the WCMC Protected Areas Database.

\*An important amount is due to Svalbard Islands. If only the data from continental Norway (323,895 sq. km), is considered, the results are: 178 protected areas, 20,865 sq. km, 6.4%.

\*\*See the explanatory note on the important UNEP-list's mistakes on this country, in the references to the national system reviews in this report.

Data on IUCN's category VI has been excluded. Overseas off-Europe –e.g. French Guyana, Falkland Islands, etc.- or African –ie., Ceuta, Melilla- territories have not been considered.

The archipelagos of Svalbard, Jan Mayen, Canarias, Madeira and Azores have been included into the geographical boundaries of Europe.

**Tab. No. 5 Protected Areas IUCN's categories**

Category	Meaning	Main management goals
I	Strict Nature Reserve (Ia)	science
	Wilderness area (Ib)	wilderness protection
II	National Park	protection and recreation
III	Natural Monument	conservation of specific natural features
IV	Habitat/Species Management Area	conservation through management intervention
V	Protected landscape/seascape	landscape/seascape conservation and recreation
VI	Managed Resource Protected Area	sustainable use of natural ecosystems

Source: IUCN (1998)

**Tab. No. 6 Aggregation levels of the wild plants, and their respective concerning study science and protection designations**

<u>Level</u>	<u>Science</u>	<u>Unit of study</u>	<u>Protection</u>
Species species	Taxonomy	Species/Subspecies	Protected
Habitats habitat	Phytosociology	Plant associations	Protected
Landscape units	Symphytosociology	Sigmatums (vegetation series)	Protected area
Macro-landscapes	Geosymphytosociology	Geo-sigmatums	Protected area

### **Interpretative comments**

The data to build these great databases on protected areas must be obtained from the information given by the national authorities. However, there are no common interpretation on the meaning of the vocabulary and technical terms currently used, and each national officer has his own interpretation. For instance, the word “reserve” has a different meaning for a Spanish naturalist (who only uses it to designate scientific or strict reserves) and for his colleagues living in Sweden, Germany or most European countries (where the meaning is often open to a compatible human intervention). In an extreme situation, “nature reserves” can mean touristic natural areas (e.g. some areas for Iceland, or for several private reserves in Belgium), obviously with some measures for nature conservation. This discussion is similar to the case of “protected species”, that usually needs precise explanations – see references on the usual terminology and some discussion in Clers (1998).

Some types of “protection” designations, especially for the traditional IUCN’s categories V and VI are not usually considered as “protected areas” by most national legislations, so their data are not given by the environmental authorities, when they are requested. Designations like “forest park”, “protective forest”, “public forest”, “public utility forest” or others that mean an effective tutelage of vegetation under forestry laws, are not often considered as protected areas in most European countries; however, paradoxically, similar designations to give partial protection to animals (e.g., hunting preserves, national hunting reserves, etc.) appear in the same as suitable designations for protected areas.

On the other hand, those protective figures coming from forestry laws, often mean a very wide range of management chances, going from the strict-conservation frames to the controlled exploitation, or to the long-term reservations for timber. The historical experience of some countries shows that the priority to reach productive aims can yield disastrous consequences for rare or threatened plants. As it was explained in the first section of this report, most of the rare, endemic or threatened plants only live in open areas, so they can easily be displaced by the natural succession from grasslands to woodlands. The legal designations to protect forest production and timber reservation, usually tend to force a quick vegetal succession, accelerating the displacement of the richest herbaceous plant communities. In other cases, more common in the Mediterranean countries, the opposite effects can be found. The preventive actions to reduce forest fuels, benefit most endemic plants, but can at the same time cause important problems for nemoral ones – especially for relictic plants from Eurosibirian climates living on the highest Mediterranean mountains. In addition, some forestry management techniques to reduce land erosion, to prevent wild fires or to ensure the quick growth of the “protective forests” or similar areas – e.g. terraces, lineal deep ploughing, wide firebreaks, etc. – can result in significant damage to the landscape and zoological communities – especially in Mediterranean natural areas, where aesthetic and negative environmental effects can persist for long periods of time.

An additional problem deals with the correct choice of a category in which to include a concrete national or regional designation for the protection of wild plants. Intermediate designations, with transitional characteristics between different IUCN's categories, are very frequent, especially between the groups I-IV, II-V, IV-V, IV-VI and V-VI. Some mixed designations can actually be taken to secure an *ad hoc* protection level (e.g. the Latvian 'Complex Nature Reserves' can simultaneously designate areas for the categories III, IV and V). In addition, the texts of the protection acts, decrees or other legal measures at national or regional level, show no precise meaning for some designations. For example, under the Spanish Law 4/1989 on Conservation of Natural Areas and Wild Flora and Fauna, no significant differences can be found between the meanings of the designations 'Park', 'Nature Reserve', 'Natural Monument' and 'Protected Landscape'. This lack of close links between the technical and legal meanings of these designations, can lead someone into error, and can cause generalised interpretative problems. All these troubles increase when the information asked for refers to small areas. Most sources of information only give data on large areas (e.g. UNEP's list of protected areas of the World only includes ones over 1,000 ha; EUROPARC's databases, only include National Parks, Nature Parks or similar large areas).

Finally, there are significant differences depending upon the territorial level of the information. Usually, the national data do not include references of the subregional, county, district or local level, even in the case of designations accepted, or coming from, the national laws. For instance, most former USSR republics, whose protected areas were declared under the USSR Law on Wildlife Protection and Use – passed 25 June 1980, entered into force 1 January 1981 – only give data on National Nature Parks, Zapovedniks and Zakazniks, but not on Natural Monuments, that are usually created and managed by the territorial administrations, and not by the state institutions. This lack of information concerning small protected sites creates some significant discontinuities in the global picture of European protected areas.

### **Size of protected areas. the meaning of 'small protected areas'**

To successfully achieve a good comparative study, concepts such as "protected areas" and "large/small areas" must be defined in detail. In this report, only areas falling within the IUCN categories I to V will be considered as "protected areas". The extractive reserves (VI) will be excluded – except for some rare and remarkable cases useful for protecting rare plants, e.g. Cranberry Resources Reserves in Latvia.

No current classification exists regarding area size. For the purposes of this report the following classification is proposed:

- large areas: greater than 1,000 ha – that can form a part of the UNEP's list, edited by the IUCN and the WCMC;
- medium areas: between 100 and 1,000 ha;
- small areas: equal to or less than 100 ha.

### **On some general trends**

Basically, two main trends can be found in Europe regarding protected areas:

A.- Large protected areas for conservation, global landscapes maintenance, sustainable use and compatible tourism:

- National Parks, categories II, II/V or V;
- Protected Landscapes or similar designations, category V or close combinations – e.g. IV/V;
- Nature Parks, Regional Parks or similar, category IV or close combinations.

B.- Medium and small protected areas for conservation, often with a clear priority for strict protection or maintenance of wilderness areas:

- Strict reserves and wilderness areas, category I;
- Natural Monuments, category III;
- Nature Reserves, category IV – but often trending to I.

The main difference between the two groups (A and B) is the addresses of the management activities and protective measures. In the case B, the main objects of conservation are natural objects, so the measures taken to preserve them from the negative effects of human action would be important. In the first case (A), the most important event to be preserved is either the traditional relationship between man and nature, or the use of wild nature as a touristic resort; so, in the case A, the upkeep of the high wilderness levels is not an objective, but a tool. In any case, there is an inverse relationship between the size of the protected area and the intensity of the protective measures. Of course, many exceptions can be founded –e.g., protected caves open to the public, impressive strict reserves in uninhabited regions, etc.-. The most important exception is found in the ex-USSR republics, because the aforementioned Law on Wildlife Protection and Use promoted a combination of very big strict nature reserves (Zapovedniks, category I) with medium or small non-strict zones (Zakazniks, IV).

The IUCN categories were definitively proposed in the last decades, so they begin from an *a posteriori* analysis, based on the existence of a lot of different, former national policies and legal frames on protected areas. Prior to their extended use, no common or agreed meaning for any designation existed in Europe, except for National Parks, decisively driven by the Convention of Paris – 1912 – where most European countries agreed to protect insectivorous birds, to exterminate all predator or “destructive” animals – mainly raptors and carnivorous mammals – and to set up National Parks in order to promote tourism and to protect for science the last populations of these predators (wolves, bears, eagles, etc.). As a consequence, the meaning of each category title – like it was previously illustrated through the case of the Nature Reserves – can show strong differences between different national régimes. However, some cases are relatively similar through whole Europe. Perhaps the most evident examples are the Natural Monuments, that have mainly been used to protect small areas of great geological or geomorphological interest – caves, glaciers, impressive rocks, and so on – and occasionally for small but important areas concerning wild plants or animals.

## **Designations giving direct and indirect protection for plant conservation**

Following the framework drafted in the last paragraphs, protected areas can be declared in order to achieve very different purposes for nature or man, but the effects on the populations of rare, endemic or threatened wild plants can evidently be similar. However, the capacity to manage these areas, and to direct effective investments towards plant conservation, can differ a lot because of the diverse priorities for each protected area. In essence, the protection of a plant population can result from three different cases:

- Direct protection: The conservation of the plant species is the main object of the designation (often for some specific designations in categories I and III);
- Indirect protection: The plant species is conserved because it forms a part of the vegetation or habitats that are the main object of the designation (usually in the categories I, III and IV);
- Remote indirect protection: The plant species live on some landscape units that are the main object of designation (more frequent for categories II and V).

Obviously, given that threatened plants often need management measures, the most effective designations are related to categories I, III and IV, where the species is most favoured by *ad hoc* action plans.

## **Preventive (passive) and active designations for conservation**

The IUCN's categories I to VI are "active" designations, where the administrations and/or the landowners play the major role in conservation by means of direct management. But some countries or regions have attached great importance to preventive regimes – e.g. the UK's SSSIs – that would be excellent tools for plant conservation in some cases. Preventive designations usually consist of a legal frame that forbids or strictly limits activities, that can only be developed with administrative authorisations. They correspond – in most cases – to the IUCN category UA, and can be included in the concept of "passive" protection designations. The effective results – wilderness, maintenance of rare plant populations, etc. – are not obtained by means of actions directed towards plant conservation, but through banning activities that may prove harmful to the environment. Therefore they are mainly suitable for conserving those species or plant communities that need a high level of wilderness, or that do not need continuous plant or habitat management.

The advantages of preventive designations are obvious, because they can obtain a long-term conservation with a reduction in costs – e.g. the usual costs for active management are saved here – and can be widely spread to private properties, but this protection model must often be supported by means of compensation grants.

## **Giving protection to habitats and/or to areas**

Wild plants are organised in successive aggregation levels, following the schema shown in tab. No. 6

Most European countries have developed important legal frames in order to protect species and landscapes (respectively through the protected species and areas). However, with regards to habitat protection, only a few designations have been developed (this is also the case with the Valencian micro-reserves as explained in section one of this report). Protected habitats are also, in essence, a type of partially protected area.

## **Materials and methods**

The following pages (chapter on National Reviews) are dedicated to the explanation of national or regional designations that are useful for an effective *in situ* protection of rare, endemic or threatened plants, and the ones that have been used to protect small areas (equal to or less than 100 ha). Data on small protected areas have only been obtained for European countries and Asiatic ex-soviet republics. The legal structures are also explained for countries of the Middle East and the Mediterranean riverines of North Africa. This different treatment comes from the extensive lack of useful designations for small IPAs throughout the whole Arab world.

The information received from the different countries has been inequitable – some of them have not provided the information requested to help compile this draft – so data can not be readily compared, not with the information presently in hand. In any case, the last available data come from the last edition of the IUCN review of national systems (IUCN, 1992), in which some countries were notably absent – e.g. former USSR republics that were not independent countries at that stage. Data concerning most countries belonging to the former Republic of Yugoslavia and USSR can be inaccurate, because of the aforementioned lack of information on Natural Monuments or other designation belonging to the district or local level. In addition, the relative value of data must be considered from countries that have no national system on protected areas

except for National Parks (e.g. Austria, Belgium, Spain), or those other that have complex mixed systems (e.g. United Kingdom). In these cases, most regional or sub-regional administrations have given the data requested, but other have only responded with former edited data.

The references for the different designations are not explained in depth; the reader can find extensive explanations in IUCN (1992, 1998), and, for some specific designations of plant protection, in the excellent reports made by de Klemm (1996b, 1997).

The main bibliographic sources used to compile this report have been the following:

- UNEP successive lists of protected areas of the World (IUCN 1967, 1971, 1990a, 1994a and 1998; Harroy, 1972), their complementary systems reviews (IUCN, 1992), particularised treaties on some specific designations (IUCN, 1987) and references from several global worldwide works on plant protection (Davis & al., 1986; Lucas & Synge, 1978) or on protected areas (Heim, 1956; McNeely, 1993; McNeely & al., 1994; Wright, 1997; WCED, 1986)
- Bennett (1991 and 1994), Charbonneau (1991), CoE (1987), EP/DGR (1991), IUCN (1991c, 1994b), de Klemm (1996a, 1996b and 1997), Nowicki (1985), RPWG (1995), Saussay (1980), Shine (1996) and Wirth (1979) as global reviews for whole Europe
- Atkinson & al. (1990), Cerovsky (1988), and IUCN (1990b, and 1991 a and b) for Central and Eastern European (hereafter CEE) countries.
- Cutrera (1987 and 1991), Duffey (1982), Koester (1980) and Poore & Gryn-Ambroes (1980) for Northern and Western Europe, and CAFF (1994).
- Brigand (1991), Delanoë & al. (1996), de Klemm (1994 and 1995) and Lecomte & Lhériter (1988) for the Mediterranean area.
- Cognetti (1990), Grenon & Batisse (1989), Nordberg (1995), Prieur (1995), RAC/SPA (1994), Salm & Clark (1989) and UNEP (1989) for marine protected areas.
- Complementary data for common zoological-botanical main important areas, such as wetlands (Carp, 1980; CEC, 1993; Grimmett & Jones, 1989; Karpowicz, 1993; RCB, 1990; Smart, 1975)

The references to the habitat protection are only orientative – they would need a long specific treatment, not aimed at in this report. In order to learn more about this topic, several treaties compiled by de Klemm (1994, 1996a and 1997) are recommended.

## **Reviews of the national status**

The following data are presented country-by-country in alphabetical order. The first references of the designations are followed, in brackets, by the IUCN category in which they are usually classed; in some cases, more than one category is mentioned.

### **ALBANIA**

Albania has a wide range of designations useful for plant protection (see Cerovsky, 1988; IUCN 1991a and b) that include National Parks (II), Integral Reserves (Ia), Oriented (or Managed) Nature Reserves (IV/Ib), and Nature Reserves (IV). Forestry legislation (Law on Forest Protection No. 3349, 3 October 1963, superseded by acts of 1966 and 1968) encloses a very versatile designation, named Forest Protected Area, that is divided into some different types. One of them, the “Area of Scientific Importance”, contains several designations useful to protect plants in small areas: natural monuments (III); research areas (I/IV); forests occurring outside normal phytoclimatic zones (IV/III); forests protected for their rare and vulnerable species (I/IV); areas of rare scrub and endemic plants (I/IV); and biogenetic reserves (I/IV). According to the data from IUCN (1998), 19 protected areas are under 1,000 ha; into the WCMC databases, at least two Managed Nature Reserves and one Natural Monument have less than 100 ha.

Vangjeli (pers. com.) gives information on the different kinds of reserves, including the areas of scientific importance – most of them are not listed in the IUCN and WCMC databases – where the main object of conservation are plants or plant habitats. 68 protected areas have been declared throughout the country, all of them less than or equal to 50 ha. Most of them have a very small surface area (under 2 or 3 ha), so an important similarity can be found with the Valencian plant micro-reserves. Some interesting plant areas have been reported by Vangjeli and Habili (1995). During the last few years, military conflicts have produced generalised damage to the network of protected areas in Albania.

#### **ALGERIA**

Useful designations include National Parks (II), Strict Nature Reserves (Ia), Nature Reserves (IV) and Regional Parks (IV/V); some Strict Nature Reserves and Nature Reserves with a really small surface area (see, e.g., De Smet, 1984; RAC/SPA, 1986; Touharia, 1986). However, a model to create a network of small protected areas does not seem to have been established. On the contrary, Algeria, just like the rest of the North African countries, has clearly developed a policy to protect large areas as their national territory contains some of the biggest National Parks of all the riverine Mediterranean countries (e.g., Ahaggar, 4,500,000 ha, and Tassili N'Ajjer, 1,140,000 ha). In addition, civil conflict that has been afflicting this country during the last few years does not permit one to find easy solutions for plant conservation on a small scale.

#### **ANDORRA**

Andorra can be qualified as the only European country that has no protected areas but that could easily do so. Most forest and highland grasslands are regulated under forest regulations, providing an effective protection, so their transformation into protected areas could easily be achieved. Simultaneously, local and Catalan botanists have in great depth studied its flora and vegetation. During the last few years, the Under-secretariat of State for Environment has made plans for the creation of a future network of nature conservation areas, and it is foreseen to be up and running in next few years.

#### **ARMENIA**

Armenia is in the process of changing the ancient soviet system for protected areas to a new one. At this stage, the international databases only consider the former USSR traditional designations for Albania – see EP/DGR (1991), Cerovsky (1988) and IUCN (1991a): National Parks (II), Zapovedniks (I) and Zakazniks (IV/Ib). The WCMC Protected Areas Database lists at least five protected areas with less than 100 ha, but have no references regarding Natural Monuments – usually managed by the local powers. Wider explanations on the former USSR schema on protected areas can be found in this report consulting data about Russian Federation or Ukraine.

#### **AUSTRIA**

Austria has a wide range of protected areas – see EP/DGR (1991) and comments by de Klemm (1996b) – that consist of National Parks (V), Protected Landscapes or Landscape Protected Areas (V), Protected Landscape Sections (V), Nature Parks (V), Natural Monuments or Sites (III) and Nature Reserves (IV). Declaration and management are decentralised into the different Lander. At least 200 protected areas have a medium size –between 100 and 1,000 ha- and 317 sites have less than 100 ha. Most of the latter (250 areas) are Nature Reserves. This figure contains a small quantity of private reserves owned by NGOs (e.g., WWF, the Naturschutzbund and Österreichischer Alpenverein).

Some Länder, such as Carinthia, have specific regulations to protect some important plant habitats (de Klemm, 1997). The same author (de Klemm, 1996a) reminds that Austria is one of the rare countries that have some Nature Reserves where the only forbidden activity is the collection of wild plants – similar to the Valencian micro-reserves–.

#### **AZERBAIJAN**

As in the case of most former republics of the USSR, Azerbaijan maintains a schema similar to that of the Russian Federation – see data about Armenia and global explanations in EP/DGR (1991), Cerovsky, (1988) and IUCN (1991a) – consisting of National Parks (II), Zapovedniks (I) and Zakazniks (IV or Ib). No protected areas of less than 100 ha have been noted in the WCMC databases. In a global overview on protected areas, Azerbaijan is one of the less developed European countries. However, all consulted sources have no references regarding protection at local or district level. That information could play an important role for this report.

#### **BELARUS**

There are mainly National Parks (II), Zakazniks (IV) and Zapovedniks (Ia). At least three Zakazniks are under 100 ha (the so-called Antonovo, Lebjazij and Nekasetsky, all of them in the region of Minsk). As explained before for most former republics of the USSR, references on protected areas for this country seem to be uncertain, because of the lack of designations that are not dependent on a national body, such as Natural Monuments.

Maslovsky (pers. com.) reports that there are two designations holding interesting plant or vegetation samples, but usually not considered as protected areas. It deals with Natural Memorials (mainly old parks with rare trees and shrubs) and Rare and Old Trees (Monumental trees, usually separate objects). At the national level 20 Natural Memorials and 52 Rare or Old Trees are known of; however, at the local level, more than 1,000 protected items are known of. Some of them – at least for semi-natural or small natural areas included in the memorial parks – could be considered useful as small protected areas for wild flora.

#### **BELGIUM**

Following the same schema as explained for Austria, Belgium has no national integrated system for protected areas – see references made by de Klemm (1996b). Declaration and management of the classified areas is conducted by the regional authorities (Regions of Flanders, Walloon and Brussels). Useful designations are Nature (State and Private) Reserves (I/IV), Nature Parks (V) and Forest Reserves (V). Belgium is one of the rare European countries that do not seem to have National Parks. Some regional designations are incompatible with small protected areas. For instance, the Nature Parks in the Walloon region must have more than 5,000 ha.

Only two Forest Reserves (both in the Walloon region), protected for their distinctive indigenous tree species (e.g. relicts of termophilous vegetations, rare tree concentrations, and so on), have less than 100 hectares. Public Nature Reserves with less than 100 ha are numbered at 73. The most important group is made up of Private Nature Reserves. According to the WCMC databases, at least 222 reserves, the majority owned by NGOs, can be found in Belgium. Most of them are managed for ornithological purposes – mainly on small wetlands – but they obviously contain interesting plants. In depth explanation on this model of privately owned protected areas is compiled by Shine (1997).

Important data which needs to be gathered in order to form future networks of small protected areas is the pattern of distribution of the forest properties in Belgium. The forested areas are divided amongst over 100,000 landowners, and most of them have very small properties – 69% of them own one or less ha-. It is evident that the combination of the present system of public and



private reserves, with a policy to provide grants to a select group of small private properties – those that contain the most important rare or threatened species – could yield an excellent future national network of protected micro-areas.

It must be commented that several habitats have special and/or global protection measures –e.g. wetlands in the Walloon region, or habitats from annex I of the Habitats Directive (92/43/CEE) in the Flemish region.

#### **BOSNIA AND HERZEGOVINA**

Bosnia and Herzegovina seems to maintain a system for protected areas inherited from the former Yugoslav republic – see data about the present-day Yugoslavian territories and general references in EP/DGR (1991), Cerovsky, (1988) and IUCN (1991a and b) – with a wide ranging of possible designations: National Parks (V/II), Nature (and Regional Nature) Parks (IV/V), Landscape Parks (V), Natural Monuments (III) and Nature Reserves (IV/Ib). Only three Landscape Parks and five Nature Reserves are under 100 ha. This number could be greatly increased by the addition of the Natural Monuments, that are usually missing in the international databases for this country. Most of the protected areas were severely damaged during the war at the beginning of the 90s.

#### **BULGARIA**

Bulgaria has a long standing tradition in the field of nature conservation, and provides a wide range of designations useful for plant conservation (EP/DGR, 1991; Carter, 1978; Cerovsky, 1988; IUCN 1991 a and b; Mileva, 1995; Profirov, 1989; Stoilov & al., 1981) such as National Parks (II or rarely IV/V), Protected Landscapes (V), Natural (National) Monuments (III or IV), Strict Nature Reserves (Ia) and Protected Sites (IV/V/VI). The national network includes more than 400 protected areas *stricto sensu* –although the IUCN (1998) only register 127 areas-. It must be emphasised that at least 35 Nature Reserves are more than 1,000 ha.

Data kindly provided by Hardalova (pers. com.) shows that the number of small protected areas for plants or containing important plant plots is made up of 150 Natural Monuments, 28 Protected Sites and 21 Strict Nature Reserves. Some of them having a notable concentration of endemic or rare species, e.g. the Natural Monument Vrachka Chuka, that simultaneously holds populations of *Ramonda serbica*, *Convolvulus elegantissimus*, *Paeonia mascula*, *Eranthis bulgaricus*, *Centaurea atropurpurea* and *Crocus tomassinianus*. These data are illustrated in Tab. No. 8, providing an excellent example of the organised systems existing in most CEE countries for the protection of botanic features.

#### **CROATIA**

The Croatian system of protected areas designation are relatively similar to that of the former Yugoslav republic – see explanation in EP/DGR (1991), Cerovsky (1988) and IUCN (1991 a and b) – with similar approaches as those referred to for Bosnia and Herzegovina in this report. There are also Forest Parks (IV), a particular category related to Nature Parks. Following Pravdic (1992), by 1992 there were at least 329 protected areas. Medium and small protected sites are frequent. According to the IUCN (1988) data, there are 27 large areas and 150 medium or small-sized ones; obviously, the IUCN's data does not register some types of protected areas – in most cases, the areas not considered by the IUCN are often medium and small sized, so the correct figure for these size classes would probably be 302 or more areas.

At least 65 protected areas are under 100 ha: 15 Forest Parks (IV), 15 Natural Monuments (III), 5 Protected Landscapes (V) and 30 Special Reserves (Ia, equal to Strict Nature Reserves). In addition, Cognetti (1990) talks about several Dalmatian marine protected areas, now falling within Croatian territory, that were probably not included in the prior relation: there is one National Park (Isle of Mljet, 65 ha), one Nature Reserve (Lokrum, 72 ha) and one Special Nature Reserve (Limski Canal, 60 ha).

## **CYPRUS**

Cyprus has two main designations useful for wild plant conservation: Nature Reserves (Ib/IV) and National Forest Parks (V/II). The last designation is only for recreation, but includes important areas of botanical interest and some of the best national landscapes. Only three of these areas – all them National Forest Parks – are below 100 hectares. Due to their particular natural conditions, with a large number of botanical micro-endemics (close to 130 taxa), Cyprus is an example of an idoneous territory for the creation of a network of micro-reserves or similar designations for the protection of plant populations.

## **CZECH REPUBLIC**

The Czech Republic probably has the most complete and integrated system of protected areas in Europe –see the specific chapter in the third section of this report. A large number of drafts, papers and books explain extensively the Czech model –see e.g. EP/DGR (1991), Cerovsky (1988), IUCN (1990, 1991a), Jenik & Price (1994), de Klemm (1996b), Urban (1993) and Vavrousek & al. (1990)-. There are six major categories for conservation: National Park (shortened NP, category II/V), Protected Landscape Area (CHKO, V), National Nature Reserve (NPR, IV/I), Nature Reserve (PR, IV), National Natural Monument (NPP, III/IV) and Natural Monument (PP, III/IV). Other minor categories – which can provide very effective measures for plant conservation – useful for wild areas are Protected Study Areas, Protected Habitats, Protected Natural Features, and Protected Natural Monuments.

According to data available in the Web site of the Czech Agency for Nature and Landscape Protection, and the book edited by Kos & Marsakova (1997), in 1996 there were three National Parks and 24 CHKOs; the remaining four major designations (NPR, PR, NPP and PP) reached a total number of 1,757 protected areas – see below more for recent data upto 1998. All the 1,787 protected areas had 1,235,836 ha (at least 15.68% of the national surface). The figures shown by IUCN (1998), updated to 1997, are slightly higher (1,790 protected areas, covering over 1.277.600 ha, 16.2% of the country), and erroneously lists 26 CHKOs, instead of 24 – it seems that the buffer zones of two National Parks have been considered as CHKOs. Most of these protected areas function as suprarregional biocentres, inter-connected by means of a complex network of biocorridors (see Michal, 1998), included in the EECONET programme.

More recent data provided by Podhajska and Marsakova (pers. com.), updated to autumn 1998, shows that there are 1,847 protected areas: three NPs, 24 CHKOs, 117 NNRs (64 of them under 100 ha), 100 NNMs (94 of them smaller than 100 ha), 602 NRs (554 under 100 ha) and 1,001 NMs (973 of a small area ones). With regards to small protected areas, the sum reaches 1,686 sites smaller than 100 ha. These small areas could be divided into geological (G), botanical (B), zoological (Z), and forest or complex sites (C), divided by their main reason for being declared; approximate proportions are C 75%, G 15%, B 8% and Z 2%. So, the number of small areas protected mainly for botanical reasons (contents on rare, threatened or endemic plants) reaches close to 135. Obviously, the so-shortened C sites – about 1,265 areas – also play an important role for plants because they belong to forest or mixed vegetation, and the G zones contain some outstanding samples of rare geological or geo-morphological types very rich in some kinds of plants (e.g. natural springs, that usually hold rich-cryptogammic communities).

## **DENMARK**

Denmark has a complex combination of protected area designations useful for the conservation of rare or threatened wild plants – see de Klemm (1996b). Here we deal with one of the rare European countries that does not have any National Parks. To make up for this lack, there are a great number of designations (see Wulff, 1991) such as Major Conservation Areas (V/IV/III or rarely I), Areas of National Biologic Importance (IV/I, included the so called ‘National Nature

Areas' in some reports and databases), Nature (and Wildlife) Reserves (IV) and Scientific Reserves (I). 180 protected sites are under 1,000 ha, so the medium and small protected areas are really important for the structure of global conservation in this country. At least the following protected areas are under 100 ha, listed in the WCMC databases: One major Conservation Area, five Scientific Reserves, three Nature Reserves and 16 other protected areas – not specified. In addition, an impressive network of more than 26,000 protected monuments and ancient sites hold a lot of protected micro-areas that could play important roles for wild plant conservation purposes.

Denmark is one of the few European countries that have effective legislation for the protection of some habitats – this means that all areas that have those specific habitats have protection measures. According to Cutrera (1987) and Koester (1980), at least the following biotopes are partially protected: public and private watercourses, lakes, bogs, heaths, salt meadows and salt marshes. De Klemm (1997) emphasises that these protection measures are applied depending on some specified minimal surfaces: 100 sq metres for lakes and 2,500 for the other ecosystems.

#### EGYPT

Egypt has National Parks (V/II) and a wide-range of designations called “Natural protectorates” that include the following items: Scientific area (I), National marine park (IV), Conservation area (IV), Natural area (IV) and Protected area (I/IV). The national system for protected areas usually function on the basis of conservation of large territories – see, e.g. Ghabbour (1971) or Haas (1990); according to the IUCN (1998), only four protected areas are under 1,000 ha.

#### ESTONIA

Estonia recently passed a Law (The Act on Protected Natural Objects, 1994) that established a large number of designations for nature protection, useful for the conservation of rare or threatened wild plants -see de Klemm (1996b); by 1993, the most useful protected areas for plant conservation were four National Parks (II), four Nature Reserves (I), one Nature Park (IV), 13 Landscape Reserves (V), 25 Mire Reserves (IV), two Botanical Reserves (IV), six Botanical-Zoological Reserves (IV), one Biosphere Reserve (IV) and one Hydrological Reserve (V). After that, some new or reconverted categories have been established: Nature Protection Areas (IV), Protected Landscapes (V), Strict Nature Reserves (I) and Protected Natural Monuments (III), that can include wild natural elements and some artificial areas, e.g. parks.

According to Külvik (1997), at least 424,300 ha (7.4% of the national territory) were being protected by 1996, but the author also comments that these numbers were rapidly increasing. The IUCN (1998) believe that by 1997, 11.9% of the national surface area was being protected under effective designations, and that there were at least 220 protected areas, excluding Natural Monuments. There are at least 1,460 Natural Monuments in Estonia.

Külvik (op. cit.) comments that in the national network there exist the above mentioned two botanical reserves and six botanical-zoological reserves (one of them less than 100 ha), plus another 85 protected areas of special botanical values (some of them under 100 ha) at the district level.

A very interesting initiative that is being developed is the Estonian National Environmental Monitoring Programme, that is based on the continuous study of a large number of monitoring sites. These sites can belong to some of the aforementioned categories, or to the different minor designations that provide partial but effective protection in some places (e.g., protection of forests, coastal line, etc.). This partial protection is obviously increased by the inclusion of these areas in the monitoring programme. At least 830 IPAs are included into the programme, 101 of them specifically for threatened plants. This programme shows evident similarities with the Valencian micro-reserves programme, due to their purposes of study and monitoring, and the legal guarantees to provide a non-disturbance régime and long-term conservation.

## FINLAND

The schema of protected areas in Finland has been described by EP/DGR (1991), EP/DGR (1991), Kanerva & Kemppainen (1997), Kemppainen & al. (1996), de Klemm (1996b), Koester (1980), Udbvardy (1988). Approximately one quarter of the national surface area is state-owned and managed by the Forest and Parks Service – Metsähallitus. 1,365,000 hectares are protected by law, and 1,490,000 ha are classified under a special protectorate as Wilderness Areas (often VI).

The main designations are National Parks (II), Strict Nature Reserves (Ia), State Nature Reserves (IV), Private Nature Reserves (IV), Protected Mires and Peatland Reserves (IV), Special Reserves (IV, closely related with the general sense of a Nature Reserve or a Nature Park), and Natural Monuments (III). Special Reserves are usually divided into several categories such as Protected herb-rich forests or Old growth forests – usually named ‘preserves’ by scientists and plant officers.

Useful sites for plant conservation, managed by the Forest and Park Service, enclose 28 National Parks, 14 Strict Nature Reserves, 173 Peatland Reserves, 45 Protected herb-rich forests, 117 other areas protected by law, and the aforementioned 12 Wilderness Areas. The last ones are not exactly protected areas in the classical sense – most of them belong to the category VI – but include large regions, such as Lapland, with a high proportion of non-disturbed habitats. Two Wilderness Areas (Kaldoivai, 294,000 ha, and Käsivari, 221,000 ha) are placed in category Ia at the UNEP list (IUCN, 1998).

The protection of some habitats has been treated very effectively by means of diverse national programmes since the beginning of the 80s, including action plans for eutrophic mires, lakes, rivers and coast lines. The recent law aimed at nature protection, passed the 20 December 1996 includes the legal protection of nine habitats: several kinds of woodlands (dominated by *Quercus*, *Tilia* and/or *Acer*, *Corylus*, *Alnus glutinosa* on marshes), natural sand beaches, coastal meadows, dunes without tree vegetation, grasslands with junipers, wooded prairies and isolated groups of trees in open natural spaces. The exact boundaries of each site must be determined and noted by environmental authorities. These programmes can include official regulations in which sites can be protected – they are the so-called Protection Programme Areas; until now, the main regulations passed included protected areas of interest for plant conservation such as the Herb Rich Forest, Mire, and Waterfowl Habitat Conservation Programmes.

The data on small protected areas containing threatened plants have been compiled by Alanen (pers. com.). There are 120 zones: 96 Private Nature Reserves, four Special Nature Reserves, five Protected Mires, 12 Herb-rich Forest preserves and three Old-growth Forest Preserves. In addition, there are 183 Protection Programme Areas (PPA) in the same condition: 120 Herb-rich Forest PPAs, 62 Mire PPAs and one Waterfowl Habitat PPA.

## FRANCE

France has a very complex system of protected areas. Protected territories *stricto sensu* are mixed with some effective designations that must be considered *sensu amplo* –e.g. state-owned territories through the Conservatoire de l’Espace Littoral et des Rivages Lacustres, CELRL – and different “under autothorisation” ones – e.g. Protection Forests. Most main bibliographic general references for Europe – see the introductory paragraphs of this chapter – detail the different designations, also explained in more concrete works (such as Augier, 1985; CELRL, 1992; Gerfau, 1979; Nowicki, 1983 and 1990; Saussay, 1980; Tesson, 1990) and especially by de Klemm (1997b).

Major designations are National Parks (II), Nature Reserves (IV/I) –also including the Integral State Biological Reserves (Ib)-, Voluntary Nature Reserves (IV/I), Marine Reserves (IV), Natural Monuments (III), and the aforementioned CELRL Sites (IV/III/V/I). Special kinds of designations are the areas submitted to limitations through the Prefectorally Decreed Biotopes, where a mixed treatment for species and areas can be found; these areas – mainly sites necessary for developing

action plans for threatened species – usually receive a treatment similar to that of the category IV, but in some cases, more strict protection measures can be applied (category I or transitions to IV). The schema of Voluntary Nature Reserves is unique to Europe and allows for temporary protection by means of a contract between landowners and the administration for a period of a few years.

Additionally, a special case is that formed by the Biological Forest Reserves and the Forest Reserves, as explained by de Klemm (1996b), because they are often treated as sites belonging to the category UA, but area areas that would function better as integral or managed nature reserves. Due to this interpretative mistake, they are often missing in the national lists of protected areas, or are only referred to overseas territories.

Since 1967, several Decrees govern a special protected area named “Regional Natural Parks” that cannot be considered the same as other protected sites. These areas include large territories and the aim of their declaration is to ensure a long-term sustainable development through the conservation of landscapes, traditional farming, etc. Therefore it deals with a wide range of Protected Landscapes, but their inclusion in the IUCN’s category V (e.g. in IUCN, 1998) is uncertain – at least if their legal framework is compared with most other similar designations in Europe.

Perhaps, the most impressive model of effective action toward protecting important natural areas is the activity of the CELRL – see explanations on its legal framework made by Prieur (1995) – that is responsible for purchasing land for nature conservation along the coast line and neighbouring areas (islands, islets, coastal landscapes), and of the over-1,000 ha inland lakes and wetlands. The CELRL owns more than 450 sites (most of them in European territories of France). Only five of them are listed as over 1,000 ha by IUCN (1998). The lands purchased by the CELRL are often transferred to the local or regional governments, scientific societies and conservationist NGOs, under an agreement to ensure long-term conservation. Unfortunately, this outstanding model of active conservation has not spread to other azonal ecosystems that could benefit from effective protection – for e.g. mires, small wetlands, etc.

In addition to this complex model, there is intensive NGO activity, and especially by the ENF (Espaces Naturels de France), numbering 21 regional “conservatoires” -associations for nature conservation-. The ENF owns or manages more than 700 zones areas protected by national, regional or local regulations.

At the present moment, it is known that at least the following protected areas are smaller than 100 ha – excluding overseas territories: 14 Integral State Biological Reserves, 83 Managed State Biological Reserves, 56 Nature Reserves, two Marine Reserves, one Natural Monument, 117 CELRL’s sites, 27 areas declared under the prefectorially decreed biotopes, and 26 voluntary nature reserves. In addition, two Forest reserves and eight Biological Forest reserves are also smaller than 100 ha.

## **GEORGIA**

Georgia has very recently passed its first acts on nature conservation, so it is slowly changing from the former USSR schema on protected areas – see EP/DGR (1991), Cerovsky (1988) and IUCN (1991 a) – which were based on three main designations: National Parks (II/V), Zapovedniks (I) and Zakazniks (IV). Usual references to Nature Reserves must be mainly referred to the Zapovedniks, as they are really strict nature reserves – NCEE, 1997. There appear to be no protected areas under 100 ha; however, no references have been found in the bibliographic sources, regarding Natural Monuments or other important affective protected areas at local or district level.

## **GERMANY**

Germany has a non-centralised administrative nature protection system. Responsibilities and legal capacity is run by the Länder – see Cutrera (1991), Holzner (1986), de Klemm (1996b) or Poore & Gryn-Ambroes (1980). After the reunification, the Länder of the former GDR adopted the system of protected areas existing in the FDR, that consists of National Parks (V/II), Nature Reserves (IV/I), Landscape Reserves and Landscape Protected Areas (V), Nature Parks (V), Natural Monuments (III) and Protected parts of Landscape (V). The meaning of ‘Nature Reserves’ before the union was different, because there were a lot of strict nature reserves (I) in GDR, whereas most FDR ones belonged mainly to category IV. In both cases, but mainly in the former FDR, there are public and private Nature Reserves, frequently owned and/or managed by NGOs.

The network of protected areas cover 25% of the national territory, and is made up of 1,398 areas according to the UNEP list (IUCN, 1998), which usually does not include the private reserves.

There are a large number of protected sites under 100 ha: 302 Landscape Protection Areas and 1,493 Nature Reserves – including private ones, which explains why there is a discrepancy with the UNEP’s data. In addition, a select group of biotopes (about 20) are protected by Federal Law through general measures, and some Länder have added other additional cases. An extensive explanation can be found in de Klemm (1997).

## **GREECE**

Greece is one of the countries in Europe with the lowest percentage of large protected areas, and does not seem to compensate these figures with dense networks of nature reserves or other small protected sites. Useful designations – see de Klemm (1996b) – are National Parks (II), Aesthetic Forests (V and sometimes IV), Natural Monuments (III/IV), Nature Reserve Areas (V), Protected Significant Natural Formations (V) and Marine Parks (V). The meaning of some official designations must be commented on, as it is usually quite different to other European countries. For instance, the Nature Reserve Areas are listed in class V; their main aim combines tourism and sustainable development, so conservation of rare natural features does not take priority over all other reasons. However, the Natural Monuments have often been used to protect interesting vegetation plots and rich-areas of endangered or endemic plants, and not only for singular or individual natural features; the largest one being the “Petrified Forest of Lesbos Island” (15,000 ha, category III) is traditionally recognised as one of the most important mixed geological and palaeontological sites in Europe.

In the categories III or IV, there are only seven Aesthetic Forests and 10 Natural Monuments of less than 100 ha, but it must be stated that the database used has not included the most recent increases in protected areas.

Due to their outstanding botanical richness, Greece – like Spain or the South of Italy –should be the object of more effective national plans to protect important plant micro-areas.

## **HOLY SEE (VATICAN CITY STATE)**

The Vatican authorities usually shows interest in nature conservation projects, but unfortunately, Holy See appears not to have any natural areas -excluded small sites covered with nitrophilous vegetation. Provided that the Holy See is one of the most visited places in the World, the Vatican gardens could play an excellent role for educational purposes, in order to spread the popular knowledge on endemic European plants.

## HUNGARY

Hungary's network of protected areas has been laid out and explained by EP/DGR (1991), Cerovsky (1988), IUCN (1988, 1990b, 1991a), de Klemm (1996b) and Laszio (1984). The Hungarian model, in contrast with the rich schema of some of their neighbours (Czech Republic, Poland), has an apparent lack of protected areas. There are only three useful designations: National Parks (II), Landscape Protected Area (V) and Nature Conservation Area (IV). According to data from the IUCN (1988), these designations enclose at least 186 protected areas; 78 Nature Conservation Areas are under 100 ha. However, the statistics do not show data designations at a local level (the so-called 'local sites') that form a very important network (more than 1,000 protected areas), often less than 100 ha and enclosing important natural areas useful for plant protection. A recent law (June 1996, coming into force in January 1997) has improved this framework and permits the achievement of new possibilities, such as the protection of some specific habitats, implementation of future biocorridors, etc.

## ICELAND

The main elements to know about Iceland's protected areas model can be found in Duffey (1982), Koester (1980) and Poore and Gryn-Ambroes (1980). Main useful designations are National Parks (II), Nature Reserves (IV/III) and Natural Monuments (III). There are specific Nature Reserves to protect landscapes (V), in a similar way to Protected Landscapes designated by other countries. Reserves can be of several types, including Scientific Reserves (I). There are also other unspecified Conservation Areas (V).

53 protected areas have less than 1,000 ha. At the national level, at least 10 Nature Reserves and 21 Natural Monuments are under 100 ha.

## IRELAND

The main Irish designations – see Craig (1976), Cutrera (1991), Hickie (1994), Poore & Gryn-Ambroes (1980) – are National Parks (II), Nature Reserves (IV) and the so-called Areas of Outstanding Natural Beauty – AONB – or of Nature Conservation Value – ANCV – both belonging mainly to category IV. Nature Reserves can be National – State-owned – or Private. National Parks must have at least 2,000 ha. The name of the designations is similar to the UK's, and their meaning are closely related – for further explanations see the references to the United Kingdom. However, the preventive figures to conserve sites of special interest, named Areas of Scientific Interest (ASIs), have not been implemented in the same way as the UK's (SSSIs and ASSIs). Medium and small protected areas are really important in the global national frame; 57 of the 72 nationally protected areas (see IUCN, 1998) are under 1,000 ha. In addition, the main areas often considered of maximum botanical interest (e.g. remainders of ancient sub-Mediterranean vegetation) are covered by the network of protected areas. In contrast with this data, NGOs usually seek greater legal recognition of the importance of the privately owned important plant areas.

According to the WCMC databases, at least 40 National Nature Reserves have less than 100 ha.

## ISRAEL

Israel can perhaps be considered as the only Mediterranean non-European country that has developed a suitable model for the protection of medium and small areas. At the end of the 80s Israel had more than 40 National Parks (II) and 280 Nature Reserves (I/IV) – NRA, 1988 – most of them small protected areas. Nature Reserves can be divided into Scientific Reserves (Ia or Ib) and Managed Nature Reserves (Ib/IV). There are public and private Nature Reserves. The public network seems to maintain at least the National Parks and close to 150 Nature Reserves. This schema is really important for the conservation of the rich-endemic areas in the Middle East, due

to the lack of similar systems in all the neighbouring Arab countries; most of them having less than 1% of their national territories invested in protected areas useful for intensive plant protection; contrary to this, Israel's protected areas cover more than 15% of the national surface area. No references have been found on the degree of conservation of the protected areas situated in the Israel's territories governed by the Palestine Authorities. Recent news states that some important plant areas that unfortunately suffered the effects of the continuous wars and litigation between Israel and their neighbouring countries, such as the Golan Heights, could be converted into great Nature Parks; that could provide definitive protection for a lot of exclusive endemic plants.

## ITALY

Italy has a complex model of protected areas, because of the combination of national and regional networks – see references, e.g., in Barducci (1978), de Klemm (1992 and 1996b), Meli (1986), Saussey (1980) and SCN/MA (1991). Useful designations for intensive plant conservation are National Parks (II), Regional or Provincial (Nature) Parks (V), Marine Reserves (IV), State Nature Reserves (IV), and Regional or Provincial Nature Reserves (IV). State Nature Reserves – which like the infra-national level ones – are divided into Strict Nature Reserves (I), Managed Nature Reserves (Ib/IV), Partial Reserves (IV, that include a particular category for wild plants, Botanical Reserves), and Special Reserves (III/IV); Special Nature Reserves have several categories: Nature Reserve Areas (IV), Natural Monuments (III), Forestry Reserves – for vegetation or animals – (IV/VI), and Special or Biogenetic Reserves (IV). Most natural lakes have a status similar to that of Nature Reserves by means of different laws. At least 422 protected areas are of medium or small size. It appears that the statistics covered by the IUCN (1998) do not cover most of the categories on the Special Nature Reserves – that could be of great interest for plant conservation.

Based on the information from the WCMC Protected Areas Database, Italy has at least the following zones that have less than 100 ha: 66 State Nature Reserves, 34 Regional/Provincial Nature Reserves, four Regional/Provincial Nature Parks, seven Special Nature Reserves, two Reserves on natural lakes and four Areas of Marine Biological Tutelage.

All regions and autonomous provinces have regulations on plant conservation, and protected areas. Some of them have created specific areas to protect rare, endemic and threatened plants, that unfortunately are often lacking in the usual databases on protected areas. The most important is perhaps the case of the Marche Region, detailed by de Klemm (1996a and 1997). Since the Regional Law of 30 December 1974, the regional government has the right to establish a list of areas assigned to be protected, where the main activity banned was collecting plants. The similarity with the Valencian model of micro-reserves is greater than any other model to protect plant micro-areas in Europe, because forbidden and allowed activities are the same. However, there are some significant differences. The Marche plant protection areas have been designed in a wider sense, to be applied on private and public land – with or without an active collaboration of landowners; it clearly seems to be useful for wider areas, including landscapes dominated by semi-natural or agrarian zones. A Decree created in 1979 declared a total number of 154 areas.

In addition, some habitats have complementary protection measures since 1985, after the so-called 'Galasso Law' – see explanation in de Klemm (1997) – that ensures the conservation of several hotspots in plant topics; e.g. all areas over 1,600 m. have this kind of protection – especially against important urbanistic changes, great public works, etc..



## **JORDAN**

Jordan has a combination of strictly protected areas – mainly the Wetland Reserves (Ia)- and lighter ones such as National Parks (V) or Reserves (IV, mainly for fauna). Like most other Arab countries, there are severe regulations set up to protect woodlands, so most public forests – usually having medium and small surface areas- could be included in the IUCN's category IV. Unfortunately, further detailed information was not received to compile this report.

## **KAZAKHSTAN**

Kazakhstan has passed a Law recently on Especially Protected Areas – 1997 – they have converted the former USSR designations (Zapovedniks and Zakazniks) into Nature Reserves (I/IV). Apparently, there is a good national network of protected areas that enclose at least 73 areas, according to the IUCN (1998): three National Parks (II, also named National Nature Parks), eight Strict Nature Reserves (former Zapovedniks, I) and 62 non-strict Nature Reserves (former National Zakazniks, IV). Kovshar (1998) comments that the National Parks network is really made up by four areas so one of them was not included in the UNEP statistics. All strict Nature Reserves are over 50,000 ha.

The new law permits the creation of Botanical Managed Reserves (Kovshar, op. cit.). At least nine new Nature Reserves are planned at this moment. It seems that no National Parks or Nature Reserves are under 100 ha.

Data about the sub-national level could not be obtained for this report. However, like other former USSR territories, they could be very useful for plant conservation – e.g. networks of Natural Monuments.

## **KYRGYZSTAN (KYRGYZIA)**

No recent information on this country is available so the reader is referred to the former USSR system – see references on other countries in a similar situation – explained in EP/DGR (1991), Cerovsky (1988) or IUCN (1991a). The network at a national level has 78 protected sites (five National Parks, six Zapovedniks and 67 Zakazniks). All the National Parks (II) and Zapovedniks (Ia) have more than 100 ha. The Zakazniks (IV/Ib) have the following size distributions: 20 over 1,000 ha, 17 between 100 and 1,000 ha; and 20 under 100 ha. The same references on the sub-national level given for Kazakhstan can be extended to Kyrgyzia.

## **LATVIA**

Latvia have one of the most developed models on protected areas useful for wild plants in Europe, due to the combination of diverse legislations *ad hoc* for most of the main conservation needs – see in Cerovsky (1988), EP/DGR (1991) and Ernsteins & Seglins (1993). Latvia had developed new categories of protected areas before its definitive independence from the former USSR. The “Law of the Latvian SSR on Nature Protection”, adopted on December 20, 1968”, established the following categories, mainly developed by the “Resolution No. 107, passed by the Council of Ministers of the Latvian SSR on April 10, 1987” and especially useful for plant conservation: National Parks (V), State Nature Reserves – Zapovedniks – (I), Protected Landscape Areas (V), Nature Parks (III), and a large group of partial reserves that substitute the traditional SSR's concept of Zakaznik, including some categories basically used for plants -Botanical Reserves (IV), Cranberry Resources Reserve (IV/VI), Mire Reserve (IV) – and some others that have other main functions but can usually be good for alternative plant protection – Complex Nature Reserve (III/IV/V, equivalent to the current meaning of a “Nature Reserve” in most European countries) and Geological and Geomorphological Objects (III, like the Natural Monuments in other countries). At the beginning of this decade, there was 1 National Park, five State Nature Reserves,

40 Complex Nature Reserves, 46 Botanical Reserves, 37 Mire (or Bog) Reserves, 51 Cranberry Reserves, 11 Nature Parks, six Protected Landscape Areas, and 169 Geological or Geomorphological Objects. The overview on protected areas was completed by 15 Zoological Reserves (IV) and a wide conservation area, the Northern Vidzeme Regional Nature Protection Complex (V).

At least the following areas are under 100 ha: 34 Botanical Reserves, 17 Cranberry Resources Reserves, 11 Complex Nature Reserves, three Mires Reserves and one Nature Park. There are also in this size of category 167 Geological and Geomorphological Objects.

#### **LEBANON**

Lebanon's economy is still recovering slowly after the civil war, followed by civil and military conflicts, which severely inhibited any discussion on policies for nature conservation during those years. Two main designations, National Parks (II/V) and Nature Reserves (IV/I) are used for wild plant conservation. A good, but still small network of Nature Reserves has been established, mainly due to the intense activity of the Society for the Protection of Nature and Natural Resources, and the set up of privately owned lands.

#### **LIECHTENSTEIN**

In spite of its small national size – only 16,000 ha – Liechtenstein maintains a good level of conservation areas and regulations. A new Law was adopted in May 1996.

The two main designations are the so-called 'Protection Areas' (IV/V) and Nature Reserves (IV or I), that in both cases mainly belong – as an effective result of the local natural characteristics – to true Botanic Reserves. The largest conservation area is the Floral Mountain Protection Area, that covers the 37.5% of the national area, which was created with the main aim of conserving the rich alpine flora and their habitats. There are at least nine Nature Reserves, all of them less than 100 ha. The activity of NGOs is very important to help maintain all these protected lands. At this stage, most natural and some semi-natural landscapes are protected by means of the two mentioned designations (Broggi, 1977 and 1988).

On the other hand, the aforementioned Law has established precise measures to protect the habitats for the grasslands low in nutrients (dry, semi-dry and wet grasslands, and marshes) – see explanation in de Klemm (1997).

#### **LITHUANIA**

Lithuania, like Latvia, has a modified system originating in the former-USSR laws. Useful designations –see Kavaliauskas (1993)- are National Park (II), Nature Reserve and Strict Nature Reserve (Ia), Regional Park (V) and some kinds of partial reserves, including the following mostly used in the protection of plants: Botanical/Zoological Reserve (IV), Botanical Reserve (IV), Geomorphological Reserve (IV) and Landscape Reserve (IV). These designations and others specific to animals form a network of 79 protected areas. Small surfaces are usually covered by some of the aforementioned partial reserves – see below – the Natural Monuments (III) and some kinds of Managed Nature Reserves (IV or Ib), mainly governed at district or local level. At the beginning of this decade there were 295 Managed Nature Reserves and 688 Natural Monuments, most of them under 100 ha, and usually used to contain interesting IPAs.

Vaiciunaite (pers. com.) provided more information on the partial reserves for plants. There are 32 Botanical Reserves, from 2 to 524 ha; 14 of them are under 100 ha. The Botanical/Zoological areas are bigger –from 104 to 9,237 ha- and there are 15 of them in total.

## **LUXEMBOURG**

Main references on nature conservation in the Grand Duchy of Luxembourg can be found in Kremer (1988), and updated comments have been made by de Klemm (1996b). Main designations are Nature Parks (V/IV), Protected Landscapes (V), Natural Site or Natural Monument (III), and Nature Reserves (IV/I), that are divided into 4 classes: Forest Reserves, Dry Grasslands, Wetlands, and Diverse Nature Reserves. The country's main large protected area is the transboundary 'Parc Germano-Luxembourgeois' – 36,000 ha in the Grand Duchy. It also has a large number of medium and small areas; at least 109 Nature Reserves of the aforementioned types are under 100 ha.

It must also be stated that the regulations on species protection have indirectly created wide areas where the substrate is effectively submitted to a passive protection. This is the case with limestone rocks, due the fact that all lichens, mosses and ferns growing on this kind of habitat were protected under the Ducal Regulation of 19 August 1989.

## **LYBIA**

The pattern of legal rules and natural protected areas in Lybian Arab Jamahiriya is closely related with the other Arab Mediterranean countries. Designations useful for plant protection are National Parks (II/IV), Nature Reserves (I) and the so-called "Protected Areas" (IV) –similar to a Nature Park-. At least 2 zones are medium or small protected areas.

## **MALTA**

Information for Malta could not be well updated for this report. The data found comes from the beginning of the decade, when there was only one National Park (II) and two Nature Reserves (I); all three sites are under 100 ha and having zoological and botanical interest. More recent works (Schembri & Lanfranco, 1993; Lanfranco, in press) indicate that the number of Nature Reserves has increased, but that their effectiveness is very low due to the lack of ward measures. Some new protected areas have been proposed by scientists (Lanfranco, 1995).

## **MOROCCO**

Morocco's regulations (Du Puy, 1986) allow the possibility for the creation of National Parks (V), and Reserves (I/IV). Two of the three legal kinds of Reserve are useful for plant protection: Botanical Reserves and Biological Reserves. Botanical Reserves are rare but effective, and can reach huge sizes (e.g. N.R. Talassantane, category Ib, 2,603 ha, included in a National Park). According to the IUCN (1998) there are seven major protected areas, and five under 1,000 ha. A recent regulation deals with the establishment of a national network not only with protected areas: 11 National Parks and 159 Sites of Biological or Ecological Interest (SBEI)

An important comment must be made on the network of reserved forest areas, owned or managed by the Forest Service, which enclose more than 1,200 sites – usually of medium or small size – where economical activities are severely limited. Most of the aforementioned SBEI are reserved forest areas. With no excessive effort, most of these zones, especially those holding rare or threatened species, could be transformed into small protected areas.

## **MOLDOVA**

Until 1998, Moldova had a modified version of the traditional designations that characterised the former USSR republics – see in EP/DGR (1991), Cerovsky (1988), IUCN (1991a), and Petrușevschi & Cibotari (1994). There were State Nature Reserves (Zapovedniks, I), State Nature Parks (Zakazniks, IV), State Landscape Reserves (V), and a small network of State Natural Monuments (V), but not in the same concentrations as in their neighbouring countries such as the

Ukraine. In addition, there were the so-called State Garden Monuments or Parks, for artificial areas. Following the orientative map published by Petruschevski & Cibotari (op. cit.), there were at least two large Nature Reserves (Codru and Iagorlic) and 10 minor ones classified as Biological, or medicine and rare plants Nature reserves.

Recently, a new Law on 'Found of Natural Territories, Protected by the State', has been passed – 25 February 1998, coming into force 16 July 1998. This new Law established the following protected areas: Scientific Reserves (I, mainly equivalent to the former Zapovedniks), National Parks (II), Natural Monuments (III), Nature Reserves (IV, including most of the former Zakazniks), Landscape Reserves (V/IV), Biosphere Reserves (V or VI) and Territories of Multifunctional Use (V/VI, called hereafter TMU). Assignations to the different IUCN categories are approximative, because the Law does not include references to the protection status (Gorbunenko, pers. com.).

According to the data kindly sent by Gorbunenko (pers. com.), there are at least 50 small protected areas in the Republic of Moldavia, distributed as follows: 32 Nature Reserves, 10 Natural Monuments and eight TMUs. All of which can be considered as areas of botanical interest.

#### **MONACO**

The possibility of Monaco protecting their natural areas is very limited due its small size and the hard urbanistic development in the last few decades. No designations appear to exist except the Marine Reserves (IV/V). Two areas have been declared in this category, both of them under 100 ha; both with the aim of protecting the *Posidonia* beds and the benthic populations (see Augier, 1985). However, the small national surface-area would favour the creation of very small protected areas to maintain populations of endemics or other important plants; the main national NGOs, and also other organisations from the neighbouring French regions, have frequently request the approval of laws to allow these types of protected sites.

#### **NETHERLANDS**

The Netherlands have a mixed system of protected areas, with major areas in public or both public and private properties, and a wide net of privately owned areas, usually not included in the national listings, but very important to small-scale conservation (see, e.g., Boer, 1988; Cutrera, 1991; Gersie, 1987; Roderkek, 1980). Main designations are National Park (II/V), State Natural Monument (III-VI, sometimes Ib), Protected Natural Monument (III/IV), and Nature Reserves – also called Nature Conservation Law areas – (IV, also V, III or Ib); different acts have defined other less intensive areas for conservation, such as National Landscapes (V), Large Landscape Zones (V), Large Nature Zones (V/IV), that cannot be applied to small surface-areas.

References on the number of Dutch protected areas in the IUCN (1998) are far from being accurate. There are a large number of medium and small protected areas, both public and private. According to the data kindly provided by the WCMC (Freeman, pers. com.) there are at least the following small protected areas: 483 Nature Conservation Law areas under the public tutelage or property, one State Natural Monument, 143 State Forest Reserves (usually from categories IV to VI, that can also enclose restricted areas used for science, long-term monitoring, etc.) and 358 Private reserves – usually included in the provincial or local frames of nature conservation but not strictly considered as protected areas by the Law. The main organisations holding private conservation areas are the Vereniging tot Behoud van Natuurmonumenten (Association for the Conservation of Natural Monuments) and the Provinciale Landschappen (Provincial Landscape Boards).

## NORWAY

An overview of Norway's features on protected areas is given by EP/DGR (1991), de Klemm (1996b), Koester (1980) and Poore & Gryn-Ambroes (1980). There are a few but precise designations: National Park (II), Nature Reserve (Ia), Managed Nature Reserve (IV), Landscape Protection Area (V) and Natural Monument (III); Natural Monuments are considered in a wider sense – not only for geological or geomorphological objects – and usually include IPAs. Arctic territories, especially Svalbard, have some special designations. One of them, being the so-called Plant Protected Reserve, which is entirely dedicated to wild flora. However, conservation sites in Svalbard never consider small areas, due to the impressive natural features of that territory.

Norway has at least 31 Nature Reserves under 100 ha in the national network of protected areas. There are also 280 or more Natural Monuments, which are small protected areas, very useful for plant conservation.

In addition, at the sub-national level, the development of county territorial plans are dynamising the creation of a wide network of local nature reserves. No definitive updated information on this topic has been received in time to add to this report.

## POLAND

Poland has one of the most complete European systems for the protection of wild plants. References prior to the 1991 Act on Nature Conservation can be found in EP/DGR (1991), Cerovsky (1988) and IUCN (1990b, 1991a). There are some updated comments made by de Klemm (1996b). According the INFOTERRA data – up to January 1996 – kindly facilitated by Gronkowska (pers. com.), there are in Poland 22 National Parks (II), 1,113 Nature Reserves (IV/I) and 101 Landscape Parks (V). Other useful designations are Natural Monuments (III) and the so-called “Ecological units” or “Ecological grounds” (UA or combinations of different categories). Natural Monuments are mainly restricted to individuals (trees, rocks, etc), so their number is impressive: more than 23,500 in the whole country; 17,000 of them are monumental trees. As a paradoxical coincidence, the National Parks in Poland must be greater than 100 ha.

Nature Reserves are really useful for plants in Poland, because of their inner classification. Five classes are exclusively dedicated to protect plants or plant associations: Floristic Reserve, Steppe Vegetation Reserve, Halophytic Reserve, Peatbog Reserve and Forest Reserve. Data kindly sent by Sienkiewicz (pers. com.) indicates that there are an important number of Nature Reserves under 100 ha, strictly and/or mainly dedicated to protect wild plants in Poland. The data, updated 1994, yields the following numbers: 123 Floristic Reserves, 31 Steppe Reserves, three Halophytic Reserves, 71 Peatbog Reserves and 450 Forest Reserves. Total number being 678 Nature Reserves for plant protection (close to 61% of all the Nature Reserves).

With regards to the Ecological Units, their utility as a preventive measure for conservation must be commented on, because their protection should be included in local physical plans and listed in the official land registry. Ecological Units can at the same time be considered as a kind of designation for protecting habitats, provided that their main aims are the conservation of some selected rare areas such as swamps, dunes, old-river beds, etc.

On the other hand, the forest regulations have very effective models for providing long-term protection for selected plant plots. Since 1994, more than 100,000 natural objects or sites (usually vegetation plots), and a selected group of untouched or non-disturbed forests, form part of a great network of natural (mainly botanical) elements providing continuous monitored information; these elements often have less than 100 ha. Most of them are not strictly protected, but their constant monitoring measures avoid any disturbance being reported. Apparently, this impressive network has no comparable cases in Europe, with the only exception being Estonia – see references in this report. In addition, Poland has a national network of biological corridors – see also similar references for Czech Republic – according to the ECONET programme.

In addition to this overview, the role of NGOs in the global frame of plant conservation is really important, especially through the activities of the Nature Protection League (Liga Ochrony Przyrody) that owns and manages a large number of natural areas.

#### PORTUGAL

Designations used in Portugal – see, e.g., de Klemm (1996b) – include National Parks (II), Natural Monuments (III), Nature Reserves (IV), Integral Nature Forest Reserve (Ib) and Protected Landscapes (V); designated areas destined to form part of the future Nature 2000 EU's network also have specific treatment – classified sites – when in the past they have had no protection measures. Nature Reserves have different designations, some of them specific or important for plants, such as Botanical Reserves, Integral Reserves or Biogenetic Reserves.

In accordance with information provided by Carvalho (pers. com.), there are in Portugal the following small protected areas where wild plants are the main motivation behind the declaration decision: one Botanical Reserve (Cambarinho B.R., for *Rhododendron ponticum* subsp. *baeticum*), three Integral Reserves, one Nature Reserve (Berlenga, that includes two specific endemics, *Armeria berlengensis* and *Herniaria berlengiana*), one Biogenetic Reserve and three Classified Sites. There are also at least six Natural Monuments and one Protected Landscape under 100 ha.

A large number of habitats can receive a high level of protection by means of planning legislation – see de Klemm (1997).

#### ROMANIA

Romanian laws have a long tradition in effective plant conservation measures – see EP/DGR (1991); Cerovsky (1988); Dinu & al. (1994); Kirby & Heap (1984); IUCN (1991 a and b). The main designations are National Parks (II), Biosphere Reserves (II), Nature Parks (IV or V), Natural Monuments (III), Scenic Reserves (V, closely related to the definition of a protected landscape), and a large number of Science/Nature Reserves (I/IV), including the following types specific to plants or vegetation: Botanical Reserve, Flora Reserve and Mixed Forest Reserve. The references often include Nature Reserves (IV), as an independent group. By 1994 there were 534 protected areas into the national network (Dinu & al., op. cit.).

According to the WCMC databases (Freeman, pers. com.), the areas with less than 100 ha in the national network include: 32 Nature Reserves, one Botanical Reserve, one Flora Reserve, two Mixed Forest Reserves and one Scenic Reserve. This database also contains data on one Natural Monument under 100 ha, but the IUCN (1992) states that by 1991 there were 31 sites designated as monuments of nature, covering 364 ha – so the average size was 11.7 ha. After the recent frame Law, passed on 29 December 1995, there also exists a general declaration on some species – whole plants belonging to each taxon – as natural monuments (see de Klemm, 1997: 42). This Law, includes regulations on the protection of some rare habitats, especially thermophilous and open vegetations – juniper moors and thickets, grasslands, etc.

#### RUSSIAN FEDERATION

The Russian Federation maintains, with a few modifications, the traditional system of the former USSR on protected areas – see EP/DGR (1991), Cerovsky (1988), Danilina & Fedotov (1995) and IUCN (1991a) – made up by National Nature Parks (II/V), Zapovedniks or Strictly Nature Reserves – including most Biosphere Reserves – (I), Zakazniks or Nature Reserves – including protected landscapes – (IV), and Natural Monuments (III) – divided into federal, republican and regional importance. Information on the three main designations of the national network (National Parks, Zapovedniks and National Zakazniks), is readily available. However, no protected areas with less than 100 ha have been found within these three designations. References on Natural

Monuments, and other minor categories of Zakazniks (at republic or regional level), are more difficult to obtain. Unfortunately, most small protected areas exist at this level. Natural Monuments are usually declared to protect interesting samples of rare vegetation, or for their content of threatened flora. Danilina (pers. com.) reports the following numbers of Natural Monuments: 26 at the federal level, and 7,305 at the regional level.

Despite the Environmental Protection Law passed in 1991, the number and the size of the national network of Zapovedniks and Zakazniks has increased only slightly. However, most National Parks (that began being declared recently, after 1983) have been created in the last few years. Most of the uninhabited wild undisturbed areas of the Russian Federation, have been designated as National Parks, Zakazniks or Zapovedniks, often of impressive size – some of them being considered important sites for plant conservation.

#### **SAN MARINO**

Traditionally, San Marino has a good combination of designations for the protection of species and habitats, which have similar effects to protected areas. These regulations have been fixed by the Law of 16 November 1995, whose benefits for the wild flora have been widely explained by de Klemm (1997). No definitive references on protected areas, at least in a classical sense – Nature Reserves and so on – have been found to compile this report, but the legal measures referred to by de Klemm (op. cit.) show that the creation of a network of small nature reserves would be easy, due to the prior policy on plant and habitat preservation. Most trees and shrubs have basic protective measures if their trunks are over 10 cm in diameter (so most trees in the country are effectively under protection), and the main wild and semi-natural habitats also possess a good level of legal protection.

#### **SLOVAKIA**

The model of protected areas in Slovakia comes from the same former Czechoslovakia's legal frame, as described for the Czech Republic – see EP/DGR (1991), Cerovsky (1988), IUCN (1990b, 1991a), de Klemm (1996b), Vavrousek & al. (1990) – but there are some differences between these two countries, mainly with regard to the great national goals for nature and landscape conservation. Whereas the Czech Republic has focused its conservation laws in an intensive protection, with some large protected areas and a lot of small ones, Slovakia have more large protected areas and fewer small ones. In both cases, there are big projects on great national biocorridors. The Slovakian government approved in 1992 the General Project of the Super-regional Territorial System for Ecological Stability.

Slovakia's main designations are similar to those explained before for the Czech Republic, but the official data usually include other sites called Protected Areas or Protected Nature Creations (mainly IV), especially referred to as important areas for karstic phenomena. It seems that so-called Natural Areas, Research Natural Areas, and Protected Localities, usually found in the WCMC databases, mainly refer to the Nature reserves. According to the data shown by Voloscuk (1995), the National Act No 287, which came into force in 1995, also considers the designation named 'Protected Range' (V), that seem to be reserved to great mountain chains or similar areas.

The data compiled by the Section for Documentation and CITES (Centre for Nature and Landscape Protection, Slovak Agency of Environment), kindly transmitted by Ferakova (pers. com.) shows that there are five National parks (abbreviated to NPs), 16 Protected landscape areas (CHKOs), 229 National nature reserves (NPRs), 332 Nature reserves (PRs), 45 National nature monuments (NPPs), 209 Natural monuments (PPs) and 174 Protected areas or protected nature creations (CHAs). Biosphere Reserves are mainly found in the perimeter of the largest protected areas (Jenik & Price, 1994). Just like the Czech Republic, a large number of the last five designations mentioned would include small protected areas; no ultimate data could be obtained

on these zones to compile this report. Oddly, enough Dr. V. Ferakova suggested during the 2nd European Conference on Plant Conservation (Planta Europa, June 1998, Uppsala, Sweden) that primary plant area of importance for Slovakia is the National Nature Reserve 'Devinska Kobyla', whose total size is 101 ha.

The Slovak Act on Nature Conservation, passed in 1994, is one of the rare European legislations that include references to sizes of protected areas. This Act considers that a 'small protected area' must be smaller than 1,000 ha.

It must be stated that the UNEP's list of protected areas in Slovakia is mistaken on the issue of the total surface area protected. This error has recurred in the last few editions. The listings consider 75.6% of the national territory as being protected areas. The data were calculated on an incorrect figure of the national area – 14,035 sq. km, based on the last edition by IUCN (1998). Slovakia's national size is ca. 49,014 sq. km. If the correct figure is used, updated to 1996, the total area protected by the seven aforementioned main designations reaches ca. 9,634 sq. km., i.e. 19.7% of the national territory.

## **SLOVENIA**

The system of protected areas in Slovenia prior to separating from Yugoslavia has been analysed by EP/DGR (1991), Cerovsky (1988) and the IUCN (1991a). The framework on environmental legislation was passed in 1993. By 1995, the main designations were still similar to the former Yugoslavian ones. According to the article published by Skoberne (1995) there were: National Parks (II or II/V), Regional Parks (V), Landscape Parks (V), Nature Reserves (IV or Ib), Natural Monuments (III), and Nature Parks (V or IV). The national network contained one National Park, 10 State Nature Reserves, 32 Landscape Parks and lots of Natural Monuments. The changes to the legal framework, adopting a new Nature Conservation Act, seem to be very recent, so their effects will not be shown for the next few years.

At least two Landscape Parks are under 100 ha. In addition 10 of them are gorges, caves, small rivers or ravines, with no concrete size – but probably small protected areas. No references could be found on Natural Monuments, that appear often to be smaller than 100 ha.

## **SPAIN**

Spain has a very complex model of protected areas, because of the combination of the national system the 17 different frameworks employed by the Autonomous Communities, so more than 20 different designations can be found in bibliographic sources. Main studies have been made by Álvarez & al. (1988), Azcárate (1990), Chinchilla & Ferrer (1983), Costa & Pacheco (1990), González & González (1991), Hoyo (1992), de Klemm (1992 and 1996b), Llorens & Rodríguez Aizpeola (1992), Morillo (1990) and Ruíz-Larramendi & al. (1992). In a global overview, the habitats for most endemic, rare or threatened species are not sufficiently covered by the network of protected areas (Blanco, 1989; Simón, 1994), except for some regions such as the Canary Islands or the Valencian Community's programme of plant micro-reserves.

The national basic legislation, Law 4/1989, passed on the 27 March 1989, and modified in November 1997 (Law 41/1997), includes the following designations: National Parks (II), Parks (V or IV, usually named Nature Parks or Regional Nature Parks), Protected Landscapes (V), Natural Monuments (III) and Nature Reserves (I or IV). There are also Marine Reserves (IV or V). National Parks (and some Nature Parks depending on the regional governments) are both terrestrial and marine protected areas. There are 11 National Parks – the more recent being Sierra



Nevada N.P. (it has just been declared in December 1998), the main botanical sanctuary in the European continent – depending on the State administration (Ministry of Environment) and one on the regional government of Catalonia. Usually, the large protected areas – mainly Nature Parks and National Parks – have external buffer zones regulated by Natural Resources Ordination Plans, and some inner zones with strictly protected areas – reserve areas, integral reserve areas, etc., category Ia or Ib – not declared as independent protected areas.

Galicia has six Nature Parks (IV/V), three Natural Sites of National Interest or NSNI (III or V), and 11 Natural Areas under Special Protection or NASP (V). The three NSNI are under 100 ha and contain some interesting rare or endemic plants (mainly some *Armeria* coastal species). One NASP (the river Tea) is under 100 ha, and two more are lineal protected areas (river beds) with no defined area – usually considered in km, not in ha.

Asturias has a global regional plan on natural resources, passed in 1994, that includes the following areas: one National Park (part of the N.P. Picos de Europa), three Nature Parks (V), one Integral Nature Reserve (I), 9 Partial Nature Reserves (IV/I), 10 Protected Landscapes (V) and 34 Natural Monuments. Four of the Partial Natural Reserves (all of them caves of geological and geomorphological interest) and all the Natural Monuments are under 100 ha. Eight of them are the most ancient and monumental regional trees (mainly yews), and the remaining 26 are botanical or botanical-geological important areas.

Cantabria mainly has the designations originating in of the national legislation and none seem to be under 100 ha – although one of the four Nature Parks (V) has only 194 ha. These Nature Parks, and the Cantabrian section of the National Park Picos de Europa, also have smaller restricted or reserved areas.

The Basque Country also has only medium or large protected areas (Nature Parks, V), over 100 ha, but they usually contain smaller integral reserves (I) or restricted areas (IV). Several plans started during the last few years propose the establishment of nature reserves and other small protected areas, depending on the provincial and local level.

Navarra has a complex combination of protected areas, where small sites have a great importance. The main designations are Nature Park (V or IV), Natural Enclave (IV/I), Integral Reserve (Ia) and Nature Reserve (I/IV). They are suitable for some zoological designations such as the Birds' Directive SPAs (IV) and the Wild Fauna Protection Areas (IV/I). The so-called Recreative Nature Areas (V) can also be included in some interesting botanical areas, but they are not in the accepted legislation on small protected areas foreseen for this report. The following sites are under 100 ha: 22 Nature Reserves (six of them divided into separate smaller reserves, amounting to 13 areas), 26 Natural Enclaves (seven of which divided into 17 smaller reserves), and one Integral Reserve (Lizardoya, that enclose one of the best European untouched beech forests); in addition, there is one SPA and four Wild Fauna Protection Areas smaller than 100 ha. The Natural Enclave is mainly designed to hold natural areas of less than 100 ha; the only Natural Enclave greater than 100 ha – its size reaches 111.3 ha is divided into four isolated vegetation patches or smaller reserves, all under 100 ha.

In Aragon, protected areas include one National Park (II/V), one Nature Reserve (I/IV), three Nature Parks (IV), one Protected Landscape (V), one Natural Site of National Interest (V/III), and 10 Nature Monuments (III). Only nine Nature Monuments are under 100 ha, all of them to protect the Pyrenaic glaciers. They can be thought irrelevant for plants – because they mainly protect geological objects, but the canyons containing those glaciers also enclose important endemics, threatened and rare Pyrenaic plants.

La Rioja has a high amount of protected surface-area, mainly made up of large protected areas (Nature Parks or related designations), that have numerous small reserves. A part of this region is managed as a great protected landscape, because it falls within one of the largest Spanish hunting reserves (IV): Cameros (92,918 ha), that occupies close to the 20% of the regional territory. The regional planning on natural environment, passed 28 June 1988, includes a lot of designations

mainly used for medium and small sites, mid-way for the protection of areas and habitats. The most useful for plant conservation are the so-called Great Areas of Subatlantic Mountain, Great Areas of Mediterranean Mountain, Areas of Summit-Mountain Protection, Rangelands of Outstanding Interest, Sites of Outstanding Riverine Vegetation, Complexes of Riverine Vegetation, Areas of Outstanding Vegetation, Sites of Geomorphological Interest, and Wetlands. Most being managed as “under authorisation” or “under permission” passive protected areas, and some being managed as *stricto sensu* active protected areas. At least 36 sites can be considered small protected areas.

Castilla-León has Nature Parks (V or IV) and Natural Sites of National Interest (III or V); the last mentioned designation often has medium to small size. At least one of them is under 100 ha. This site was declared in 1974 in order to protect one of the most important relict beech forests under Mediterranean climate in Spain. It must be stated that some of the best botanical sites stated in this region are indirectly protected by means of other designations; for instance, the best important plant areas of Sierra de Gredos, Sierra de la Demanda or Picos de Urbión – including some exclusive endemics of these mountains – form a part of the 504,713 ha declared as National Game Reserves, where the vegetation is maintained in order to ensure the game resources.

Madrid mainly has Regional and Natural Parks (V, IV), on the basis of the protection of great or medium areas. At least two protected sites under 100 ha are suitable for plant protection: one Nature Reserve (IV) and one Natural Monument of National Interest – one of the oldest Spanish natural monuments, having been declared in 1930. In addition, since 1990, all wetlands and reservoirs are under a protective régime, but these humid areas must be defined and classified.

Extremadura has two Nature Parks (IV/V), one Nature Reserve (IV), three Natural Monuments (III/IV) and 4 SPAs (V). Only a Natural Monument (Mina la Jayona) is under 100 ha. It deals with a complex of ancient abandoned mines, mainly of geological interest. Extremadura has an important complex of Mediterranean temporary ponds, and several micro-habitats that could need the use of designations to protect small areas.

Castilla-La Mancha has developed its policy of protected areas based on large territories, such as National Parks (II), Nature Parks (V/IV) and Nature Reserves (IV/Ib). However, two cases of protected micro-areas must be mentioned. The first one deals with the Biosphere Reserve “Complejo lagunar Pedro Muñoz-Mota del Cuervo”, a multi-distributed protected area with a total size of 600 ha, which is formed by a lot of small wetlands and salt lakes that hold several endemic exclusive continental species of *Limonium*. In addition, the regional government set up a plan to purchase the land, or the land rights of use, of the extensive system of micro-wetlands (more than 50 areas) that are distributed widely within this Autonomous Community. On the other hand, there is the case of the so-called ‘mini-reserve’ of La Encantada, a very small nature reserve for plants near Villarrobledo (province of Albacete) that include a high concentration of endemic species (Gómez-Campo & Herranz, 1993).

Andalucía has a very complex model, after passing in 1989 its Law on Protected Natural Areas. 82 protected sites cover 17% of the regional area, that holds the most important biodiversity centre of the continent. The regional territory holds more than 460 absolutely endemic vascular plants. Just the Sierra Nevada Nature Park<sup>8</sup> (140,200 ha) alone contains close to 150 exclusive endemics. The useful designations are National Parks (II), Nature Reserves (I and IV), Nature Parks (V or IV), Natural Areas –“Paraje Natural”- (V) and Marine Reserves (IV). There are 21 Nature Reserves and three Natural Areas smaller than 100 ha, all of which are protected wetlands and estuaries.

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<sup>8</sup> The Sierra Nevada National Park (close to 80.000 ha, managed by agreement of national and regional administration) is enclosed in this Nature Park (140,200 ha, managed by the regional administration of Andalucía).

The region of Murcia mainly contains the aforementioned national designations, and Regional Parks (IV). No protected areas have been found under 100 ha. The protection of several micro-habitats – e.g. small islands in the Mar Menor – have been proposed, but no definitive measures have been taken yet.

The Valencian Community has Nature Reserves (Ib), Nature Parks (IV or V), Nature Areas – called “Parajes Naturales” in Spanish – (V), Plant Micro-reserves (I/IV) and Marine Reserves (IV). Other designations in the regional Law on Natural Protected Areas – passed in December 1994 – are Protected Landscapes (V), Municipal Nature Areas (V), Natural Monuments (III) and Sites of Interest (IV/V). One Nature Reserve and one Nature Park are under 100 ha. All the Plant Micro-reserves (close to 160 sites) are smaller than 20 ha – see extensive explanations in section one of this report. The Nature Park ‘Penyal d’Ifach’, that has only 45 ha, is the focal area for some Spanish endemics such as *Teucrium hifacense*, *Silene hifacensis* or *Thymus webbianus*. In addition, the regional Law provides protection to all wetlands, marshes or humid zones – close to 30 being under 100 ha – and also all caves – a provisional inventory enclosing references to more than 80 sites, all of them under 100 ha.

Catalonia has since 1985 a mixed system which combines the laws on protection of nature – that provide designations for active conservation – and on territorial planning – providing passive-conservation designations. According to those laws most activities are forbidden or can only be done under permission or with specific authorisation. All of them being regulated by the so-called PEIN (Plan de Espacios de Interés Natural) and the Catalanian Plan on Areas of Natural Interest, that protects close to the 20% of the regional territory. The PEIN encloses the declaration of 146 protected areas with the following designations: National Park (II), Natural Area of National Interest (IV), Integral Nature Reserves (I), Partial Nature Reserves (Ib or IV), Nature Parks (V) and other ‘PEIN Areas’ (under authorisation, following the territorial planning rules). The protected areas *stricto sensu* are one National Park, two Natural Areas of National Interest, 11 Nature Parks or similar designations and 18 Nature Reserves. None of these zones are under 100 ha, except for five Nature Reserves on rivers – their size not usually being cited in the official reports and references; their data usually being described in km. Information on the so-called PEIN Areas, which were data kindly sent by Ruíz & Pery (pers. com.) shows that there are 25 sites under 100 ha – seven of them being declared mainly for botanical reasons. The Catalonia’s PEIN also includes the protection of a lot of plant species in the network of protected areas: eight species and one genus of bryophytes, 14 species of pteridophytes, 187 species and three genera of phanerogamic plants.

The Balearic Islands have National Parks (II), Nature Parks (V) and Nature Areas of Special Interest (IV or V). The last one is a very variable designation, coming from the laws on urbanistic planning and territorial management, so they are in an intermediate position between the so-called passive and active designations for conservation – see the introductory paragraphs of this section. At least two Nature Parks and 33 Nature Areas of Special Interest are under 100 ha, mainly to protect small islands and rocky isles. A brilliant project to create a specific designation for small and medium surfaces, the so-called Areas of Botanical Interest, was drafted by the nature conservation officers by 1993. The draft enclosed a precise list on the creation of an important network of protected sites, in order to give effective protection to all threatened Balearic plants, mainly for the more rare endemics. However, the regional government did not pass this proposal, that could have notably improved the conservation level in this outstanding territory.

The Canary Islands are the most impressive plant biodiversity centres in Europe, holding more than 500 exclusive endemics – most of them relicts from the Tertiary flora. Up to 1994, the archipelago had 108 protected areas *stricto sensu*, through four National Parks (II), 34 Nature Parks (IV or V) and 70 Nature Areas of National Interest (III, IV or V) – called in Spanish ‘Parajes Naturales de Interés Nacional’. A more recent regulation (Law 12/1994) transformed these sites into four National Parks (II), 11 Integral Nature Reserves (Ia), 15 Special Nature

Reserves (Ib), 11 Nature Parks (IV), seven Rural Parks (V), 51 Natural Monuments (III), 27 Protected Landscapes (V) and 19 Sites of Scientific Interest (I/IV). At least 30 sites are smaller than 100 ha, usually holding exclusive Canarian endemic plants. The important role of medium and small areas for plant conservation has been recognised by the most important Canarian specialists – see e.g. Bramwell & Rodrigo (1982) or Bañares (1994).

The number of small protected areas reaches at least 254 declared sites of active conservation and 142 in the declaration procedures (case of the micro-reserves).

#### **SWEDEN**

Sweden has a good combination of public and private areas for nature conservation – see EP/DGR (1991) and Koester (1980) for public and Hjelm (1992) and Shine (1997) for private sites. Main designations are National Parks (II or IV), Nature Conservation Areas (V), Wildlife Sanctuaries (IV) and public or private Nature Reserves (IV or Ib). Sweden is one of the rare European countries that has large, medium and small National Parks; three of them are smaller than 100 ha. There are also 35 Nature Conservation Areas and one Wildlife Sanctuary under 100 ha.

In a more accurate study on the areas used for plant conservation, according to Wetterin (pers. com.), Sweden has 412 Nature Reserves and 18 Nature Conservation Areas of less than 100 ha, where the main reason for protection is their botanical value.

#### **SWITZERLAND**

Switzerland has passed successive lists on natural protected objects (de Klemm, 1996b). All the information received to make this report is prior to the last list, passed in 1996, that includes references to 1041 natural objects and areas. The main public designations are National Parks (Ia), Landscape Protected Areas (V) and Nature Reserves (IV). It must be underlined that the National Parks have a similar régime to integral or strict reserves. The forestry laws also allow for the creation of Forest Reserves (IV), and also for the conservation of outstanding areas of botanical interest. At least 10 Nature Reserves, 14 Landscape Protected Areas and one Forest Reserve are smaller than 100 ha.

There exists a big network of private Nature Reserves (IV). The NGO 'Pro Natura' (Ligue Suisse pour la Protection de la Nature) manages 502 Nature Reserves – owned or under contract with the landowners. No precise information could be obtained on the size of these sites.

A system to protect habitats is achieved through the National Inventory of Biotopes (NIB), that usually contains sites under 100 ha. From 1991 to 1997, 524 raised bogs and transitional marshes, and 1,100 fenlands were included in the NIB. In 1992, 169 floodplain areas were added. Finally, in the near future, close to 900 swamping areas for amphibian animals will be included – that means the protection of a lot of interesting areas for aquatic vegetation, mainly for oligotrophic and mesotrophic temporary ponds. In addition, the first part of the Federal Inventory of Mire Landscapes of Particular Beauty, enclosing 88 areas, was passed in 1996.

#### **SYRIA**

Data from Syria is usually missing from the international databanks or main works on protected areas. This is probably due to its legal pattern of protection. Instead of protected sites, Syria has global regulations to protect and to manage habitats. Since the 80s, some wide areas have been declared as protected sites, mainly as Rangeland Reserves (IV), but no sites seem to be smaller than 100 ha.

## **TAJIKISTAN**

Data on this republic seem to be similar to those of other Asian republics which formerly belonged to the extinct USSR. Their basic model has been explained – see references to Russian Federation, Armenia, Azerbaijan, Georgia, etc. – and includes National Parks, Zapovedniks, Zakazniks and Natural Monuments. No information on any recent law changes could be obtained in time for this report-. No protected areas appear to be under 100 ha except as a part of the Natural Monuments.

## **THE F.Y.R. OF MACEDONIA (FYROM)**

The Former Yugoslav Republic of Macedonia has the following useful designations for wild plant protection (Melovski, 1996): three National Parks (II), three Areas with Special Natural Features (IV), 14 IPASONRs -Individual Plant and Animal Species outside Nature Reserves (IV)- and 48 Natural Monuments (III). The IUCN (1998) only makes reference to 26 areas (including one designation not considered at this report, the Historical Sanctuaries, category V, and a misprint repeating references for one Natural Monument), but also lists four Nature Reserves (IV) not referred to by Melovski (op.cit.). IPASONRs and Natural Monuments are especially useful for protecting small protected areas. Most action towards nature conservation was made prior to the independence from the former Yugoslavia – mainly the Law on Protection of Natural Rarities, from 1973 – so the regulations explained in EP/DGR (1991), Cerovsky (1988) or the IUCN (1991 a and b) have not changed in a significant way. The Law also includes other useful designations – e.g. Strict Nature Reserves or Nature Reserves for Scientific Research – that appear not to have been used until now.

Most of the IPASONRs – despite its name this designation deals with areas and not with individual plants or animals-, especially protect outstanding samples of native vegetation – black pine, beech, fir, Scots pine, spruce, birch, Crimean pine and Mountain pine dominated vegetation-. At least five Natural Monuments and one IPASONR are under 100 ha. One Natural Monument is over 100 ha: the Ohrid Lake, containing the impressive number of 146 endemics (Melovski, 1996).

The definitive approval of a new Law on Protection of Nature was expected in 1998, so the legal frame for protected areas may have changed recently.

## **TUNISIA**

Designations useful for plant conservation in Tunisia are National Park (II), Nature Reserves – mainly for animals, including the Integral Nature Reserves (I) – Protected Wetlands of National Importance (IV or V) and Marine Reserves (I or IV). All of them appear to be over 100 ha.

## **TURKMENISTAN (TURKMENIA)**

All references found on this country to compile this report are similar to those for Tajikistan, following the traditional ex-USSR designations with slight changes. No protected area appears to be under 100 ha – at least any forming part of the national network.

## **TURKEY**

Main designations in Turkey are National Parks (II/IV/V), Nature Reserves (I), Nature Parks (V), Especially Protected Areas (IV) and Natural Monuments (III). Some comments can be found in de Klemm (1996b). At least one National Park, one Natural Monument and four Nature Reserves are smaller than 100 ha, but no area appears to have been declared for protection due to its

outstanding botanic value. Byfield (pers. com.) reports that the only small area protected mainly for botanical reasons in Turkey is near Domanic (NW Anatolia), holds a healthy population of the rare and over-picked *Gentiana lutea* ssp. *symphyandra*, and appears not to be included in the national network – this probably depends on the local government.

Turkey has a lot of large and medium protected areas, but the distribution pattern of its rare, endemic or threatened plants could be improved with a network of small areas, mainly in some IPAs – e.g. the Istanbul's isthmus. Apparently, there are a lot of medium and small IPAs, according to the map of the Turkish Society for the Protection of Nature, published by Akeroyd (1996). Byfield (pers. com.) reinforces this idea, and reports that a project to identify and establish some pocket reserves near Istanbul has been started – Istanbul Greenspace Project – undertaking prototype work with *Crocus olivieri* ssp. *istanbulensis*.

## UKRAINE

The Ukraine, in a similar way to the Czech Republic or Poland, has a complex model of protected areas that consists of a combination of a few large major sites and a vast number of small ones. This schema based upon numerous small protected areas was working before the definitive independence from the former USSR – see, e.g., Braden (1986), EP/DGR (1991), Cerovsky (1988) Newcombe (1985) or IUCN (1991a) – and has been significantly improved since – see Hardashuk (1995), and some comments made by de Klemm (1996b). Nowadays, the model is a combination of the traditional former USSR designations – National Nature Parks (II/V), Zapovedniks or (Strict) Nature Reserves (I/IV), Zakazniks – or Nature Reserves in a wider sense (IV) – and Natural Monuments (III), with some others such as Protected Sites and Regional Landscape Parks (V or VI). Biosphere Reserves seem not to be considered as particular designations, and are often designated on the pre-established zapovedniks. For *ex situ* conservation, there are some specific interesting categories: Botanical Gardens of National Importance, and Remarkable Park-Gardens of National Importance.

According to the data kindly sent by Melnik (pers. com.) and Andrienko (pers. com.), combined with the references from the WCMC (Freeman, pers. com.), total real numbers are: seven National Parks, three Biosphere Reserves, 14 Zapovedniks, 26 Regional Landscape Parks, 2,292 Zakazniks – 277 at national level and 2,015 at local level – and 2,958 Natural Monuments – 131 national and 2,827 local. There are several types of Zakazniks, including a special one for plants (Botanical Reserves).

The main designations which protect small areas are Zakazniks (often from 100 to 500 ha) and Natural Monuments (typically under 100 ha). Exact distribution of these areas according to their size could not be obtained, but there seems to be no great difference between the two aforementioned designations – except for the case of individual protection of trees or other natural units, only available through Natural Monuments. In practice, Natural Monuments should be the comparable units useful for this report on small protected areas, and most of them are used as good reserves to protect rare or threatened plants. In this way, Andrienko (pers. com.) comments that some rare species are only protected in small areas, giving some examples: *Fumana thymifolia* (L.) Spach, *Erodium beckettowii* Schmalch., *Syringa josikaea* Jack. fil., *Swertia perrenis* L. or *Pinguicula alpina* L.

## UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND

The United Kingdom (UK)- has one of the most complete systems of protected areas in Europe, especially for those of medium and small size. The legislation has been mainly reviewed by Clark (1997), de Klemm (1992 and 1996b), Palmer (1997) and Poore & Poore (1987). For private reserves owned by NGOs, a good review is that by Shine (1997).

There are a lot of designations, coming from the combination of very different qualitative reasons, as follows: 1) the presence of national and international designations (SPAs, Ramsar Wetlands, CoE's Biogenetic Reserves, etc) – usually the last ones are simultaneously protected in the national network-; 2) the combination of passive and active designations; 3) the maintenance of different names, but with a similar meaning, depending on the great historical territories of the UK – England, Scotland, Wales and Northern Ireland. A recent publication of the JNCC (1998) explains all the legal frameworks and the kinds of protected areas. The following sites have been designated under the national legislation: 37 Areas of Special Protection (shortened AoSPs, IUCN's category ), 343 National Nature Reserves (NNRs, IV), 10 National Parks, three Marine Nature Reserves (MNRs, IV), 6,234 Sites of Special Scientific Interest in England, Wales and Scotland (SSSIs, UA), 91 Areas of Special Scientific Interest in Northern Ireland (ASSIs, UA), 572 Local Nature Reserves in England, Scotland and Wales (LNRs, IV), three Local Authority Nature Reserves in Northern Ireland (LANRs, IV), 47 Areas of Outstanding Natural Beauty in England and Wales (AONBs, V) and 40 National Scenic Areas (NSAs, V) in Scotland. In addition, some interesting botanic areas could be protected in some of the 281 Country Parks (V), and the local authorities can pass orders to protect the Limestone Pavements. The Forestry Commission also establishes the Forest Parks (V), and there exists a special status for the New Forest<sup>9</sup>, an outstanding area submitted to protection rules since the XIth century. Periodically, the different statutory bodies – Joint Nature Conservation Committee, English Nature, Scottish Natural Heritage, Countryside Commission, Countryside Council for Wales, the Environmental and Heritage Service for Northern Ireland, and the Department of the Environment, Transport and the Regions – give updated information on the development of the plans and criteria on protected areas – e.g. CC-CCW (1991), DENI (1993, 1995 ), EN (1994), JNCC (1995), Lawson & Reed (1997).

There also exist the non-statutory site designations, managed or owned by NGOs, that are recognised by the environmental authorities. This group includes, among others, the following items useful for plant conservation, falling in the categories IV or V: 45 Heritage Coasts (England and Wales only), 27 Sensitive Marine Areas (in England), 29 Marine Consultation Areas (in Scotland), 178 Regional Landscape Designations (in Scotland), 22 Preferred Conservation Zones (in Scotland), and a big network of properties – close to 262,000 ha – owned by the National Trust (mainly in England and Wales) and the National Trust for Scotland – see explanations made by Shine (1997) – and protected under an Act of Parliament from 1907, that declares that their holdings are inalienable and cannot be sold or mortgaged.

The activities of the NGO known as Plantlife must be emphasised. It is the UK's – and also Europe's – only wild plant conservation charity and has a membership of more than 10,000. Plantlife's main goal, unlike other European NGOs, is the conservation of wild plants, and one of its main strategies consists in the purchase of medium and small-sized areas – mainly meadows,

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<sup>9</sup> The New Forest was protected by means of a specific law, the 1877 New Forest Act. In the same way, as some other areas are protected under own legislations, such as Norfolk and Suffolk Broads, the Forest of Dean, the Malvern Hills, Ashdown Forest and Chichester Harbour; it mainly deals with medium or large protected areas.

and also recently limestone pavements-. The land is bought, directly or by means of agreements with important economic partners such as Timotei shampoo. In this way, Plantlife holds or manages, directly or in agreement with regional, county or local Wildlife Trusts, close to 20 nature reserves (Plantlife, 1995 and 1997; Costley, 1997), preferably on SSSIs or important plant areas.

In a global and quick overview, there exist the following protected areas smaller than 100 ha in the UK: 4,045 SSSIs, 60 ASSIs, 336 LNRs, three LANRs and 183 NNRs; there also exist one Forest Park and six Marine Consultation Areas. Finding out information on those small protected areas declared because of their botanical value, Vin Fleming (pers. com.) states that for Scotland there are three NNRs -Glemm Dionham for *Sorbus pseudofennica* and *S. arranensis*, Ken of Hamar with *Cerastium nigrescens* and Den of Airlie with *Polygonatum verticillatum*-, and 31 SSSIs – with some endemics such as *Primula scotica*, *Hieracium attenuatifolium* or *Epipactis youngiana* – where rare, endemic or threatened plants have been an important reason – or the main one, in the case of the NNR Glemm Dionham – in the decision to provide protection.

#### **UZBEKISTAN**

The ancient model of the former USSR seem to continue – with some slight changes – in Uzbekistan, where laws on protected areas date from 1993. There exist the following protected areas (Tsaruk, 1997): nine Strict Nature Reserves or Zapovedniks (I), nine Wildlife Preserves or Zakazniks (IV), two Nature Regional Parks (V) and two Nature Monuments (II); none are under 100 ha.

#### **YUGOSLAVIA (SERBIA AND MONTENEGRO)**

Serbia and Montenegro have the following useful designations for plant conservation, coming from the traditional Yugoslavian model – see EP/DGR (1991), Cerovsky (1988) and IUCN (1991 a and b): National Park (V/II), Landscape Park (V), Nature Park and Regional Nature Park (V/IV), Natural Monument (III) and Nature Reserve (I or IV).

According to the data kindly sent by Sabovljevic (pers. com.) there are nine National Parks, 104 Nature Reserves, 20 Nature and Regional Parks, four Ramsar Convention Areas, 19 protected sea areas, and a great many National Monuments (at least 1,000 in Serbia, mostly at the regional level). 18 protected sea areas are under 100 ha. Small protected areas on the continent are the followings: three Landscape Parks, two Nature Parks, two Regional Nature Parks, 69 Nature Reserves, and 26 Natural Monuments – belonging to the national network.

#### **EUROPEAN UNION**

At this moment, the data for the EU's future Natura 2000 network encloses a large number of proposed sites smaller than 100 ha<sup>10</sup>, but they mainly coincide with those already mentioned as protected areas. On the other hand, this network is not yet effective, and only some countries have clearly adopted legislation in order to provide a legal framework for the proposed areas that were not previously protected.

A different case is proposed by the SPAs (Special Protection Areas, under the 79/409/CEE Directive to protect Birds), due to the actual legal level of protection. Despite the fact they have been proposed to protect the bird habitats, SPAs under 100 ha are really frequent. According to the

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<sup>10</sup> The last revision of the national proposals to build the Natura 2000 Network, for all kinds of sizes (large, medium and small), reaches 1,781 SPAs (Special Protected Areas, Bird's Directive 79/409/CEE) and 6,584 SACs (Special Areas for Conservation, Habitat's Directive 92/43/CEE), updated 12.05.1998 (*Natura 2000* No 6: 6, edited by the EU's DG XI, Brussels).



list in the IUCN (1998), the following small SPAs could be found: 17 in Austria, one in Belgium, two in Denmark, eight in France, 296 in Germany, one in Greece, 12 in Ireland, eight in Italy, four in Luxembourg, 11 in Portugal, eight in Spain, eight in Sweden, 20 in the UK, and none in Finland and the Netherlands. Altogether they represent 396 sites. Most of the smallest areas are little islands, rocky falls, moors and temporary or semi-temporary ponds, all of them rich contain habitats for endemic and scarce plants.

#### EUROPEAN WETLANDS

In a similar way to the Birds Directive's sites, some small Ramsar sites (Wetlands of International Importance) are smaller than 100 ha, and are usually related to marshes, bogs, moors, temporary ponds or inter-tidal areas. The list of these areas appearing in IUCN (1998) shows the following data for the European and geographically close countries: two in Austria, one in Bulgaria, two in Ireland, one in Israel, three in Italy, two in Malta, one in Monaco, three in Netherlands, three in Norway, five in Spain and 10 in the UK. So, in total there are 33 European Ramsar sites under 100 ha.

### **Taking an overview on the small protected areas in Europe**

Global results are shown in Tab. No. 7. As it can be seen, there is a big dispersal of data between the different columns, because of the credibility gap in the data. The more exact references received, concerning small areas protected for botanical reasons (Tab. No. 7, third column), often yield a sum quantity bigger than the precedent columns – global data for small protected areas, and for the sum of small and medium ones (first and second columns) – so these figures have not been included. This difference seems to be due to the gaps regarding natural monuments in the main international databases and published treaties on protected areas.

The whole account on small areas reaches 19,738 areas –including those that only appear in the third column and not in the second-, but this number is an obvious under-estimation. At least three countries (Estonia, Lithuania and Slovakia) lack data on small protected areas, but have at the same time provided high numbers on medium and small ones<sup>11</sup>. For at least 16 countries in the second column, data on natural monuments is lacking – in some cases, the bibliographic sources talk about a high number, such as in Slovenia – and for two of them (Hungary and Belarus), at least 1,000 items are expected in each case. Adding the expected data for those five countries, the global sum raise up to ca. 24,000 zones. It must also be considered that some countries and regions have measures for protecting all caves or a big part of them, and that, in practice, these areas function as protected small sites where several groups of plants find their most appropriate habitat – mainly several cryptogamic plants, ferns, etc. This is the case, at least, for Hungary, Czech Republic, Slovakia, or the regions of Liguria (Italy), Thuringia (Germany) and the Valencian Community (Spain). Rounding numbers off, it can be expected that Europe and its closely related countries from Asia and North of Africa hold more than 30,000 small protected areas, most of them used for plant conservation.

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<sup>11</sup> Comparing the data for those cases where there is data for the first and second column, a first evaluation shows than usually small protected areas represent over 60% of the global account (small + medium zones). So, close to 2,200 small areas can be expected for the tree mentioned countries.

From the results of this section, some conclusions can be reached:

1. Small protected areas systems are mainly represented by natural monuments and nature reserves throughout Europe. Other designations could be found, but with closely related meanings.
2. Networks of small protected areas have been mainly developed by Northern, Central and Eastern European nations. The Mediterranean countries, despite their bigger global biodiversity richness – usually held by small meta-distributed habitats – have no integrated systems for small-sized areas. These conclusions could be especially extended to the countries of the Middle East – except Israel – North Africa and the States coming from the former Asian USSR republics. The initiatives to create networks of small protected areas in the Mediterranean region have mainly been at the regional level.
3. Frequently, small protected areas are declared – or at least managed – at the local, district, county or regional level.
4. Despite most small protected areas giving indirect or additional protection for plants, there are a low number of these areas mainly being declared for botanical reasons, and most countries do not have specific designations (Botanical reserves, Flora reserves, Plant micro-reserves, etc.). This is the case, at least, for Albania, Estonia, Finland, Kazakhstan, Latvia, Lithuania, Luxembourg, Norway, Poland, Portugal, Romania, and some autonomous communities or regions in Spain and Italy. There also are ‘thematic’ zakazniks (partial reserves) for plants in most of the countries that were formerly USSR republics.

**Tab. No. 7. Distribution of medium (>100-1000 ha) and small (100 or <100 ha) protected areas within the study area, according the data obtained –see text for each country**

Country	Amount (No) of Protected Areas		
	Medium and small	Only small	Small, mainly for plants
Albania	.	.	68
Algeria	-	-	-
Andorra	-	-	-
Armenia	.	5*	.
Austria	517	317	.
Azerbaijan	-	*	-
Belarus	.	72 (>1000)	.
Belgium	.	287	.
Bosnia and Herzegovina	.	5*	.
Bulgaria	.	.	199
Croatia	.	65*	.
Cyprus	.	3	.
Czech Republic	1832	1685	135
Denmark	.	25*	.
Egypt	.	4	.
Estonia	1627	.	85
Finland	.	.	303
France	.	336	.
Georgia	-	*	-
Germany	.	1795*	-
Greece	.	17	.
Holy See	-	-	-
Hungary	.	78 (>1000)	.
Iceland	53	31	.
Ireland	57	40	.
Israel	173	.	.
Italy	422	120	.
Jordan	2	.	.
Kazakhstan	-	*	-
Kyrgyzstan	47	20*	.
Latvia	.	233	54
Lebanon	1	-	-
Liechtenstein	.	9	.
Lithuania	983	.	14*
Luxembourg	.	109	.
Lybia	2	.	.
Malta	3	3	.
Marocco	5	.	.
Moldova	50	50	.
Monaco	2	2	.
Netherlands	.	985*	.
Norway	.	311	.
Poland	.	.	678
Portugal	34*	.	9
Romania	.	97*	5
Russian Federation	.	7331	.

San Marino	-	-	-
Slovakia	989	.	.
Slovenia	.	2*	.
Spain	.	.	254
Sweden	.	.	430
Switzerland	104*	25*	.
Syria	-	-	-
Tajikstan	1*	.	.
The FYRO Macedonia	.	6*	.
Tunisia	1	.	.
Turkmenistan	1*	.	.
Turkey	.	5	.
Ukraine	5250	.	.
United Kingdom	.	4634	.
Uzbekistan	-	*	-
Yugoslavia	.	120*	.

\*Natural Monuments (at least at local or district level but recognised by the national laws), private reserves, or both, are not included.

Parentetical are referred to numbers must be increased, but needing confirmation of the deffinitive sum.

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**Tab. No. 8.- Small protected areas mainly declared to protect plants in Bulgaria  
(kindly reported by R. Hardalova)**

CATEGORY	No	NAME	Year of declaration	Surface in ha.	OBJECT OF PROTECTION
<b>Reserve</b>	1	Malkiat mostak	1946	5.5	<b>Castanea sativa</b>
	2	Kastrakli	1948	11.3	Forest of <i>Pinus nigra</i> , <i>Picea abies</i> , <i>Fagus sylvatica</i> , <i>Carpinus betulus</i>
	3	Patlejna	1948	37.8	<b>Cercis siliquastrum</b>
	4	Dervicha	1948	10.1	<b>Aesculus hippocastanum</b>
	5	Izgorialoto gune	1949	29.3	<i>Juniperus excelsa</i>
	6	Gabra	1949	89.5	Forest of <i>Pinus nigra</i> , <i>Fagus sylvatica</i> , <i>Quercus</i> sp.
	7	Jenda	1949	39.9	Forest of <i>Pinus nigra</i>
	8	Borovec	1951	36.0	Forest of <i>Pinus nigra</i>
	9	Chamlaka	1954	13.4	Forest of <i>Pinus nigra</i>
	10	Chabanica	1956	23.0	Forest of <i>Picea abies</i> , <i>Fagus sylvatica</i>
	11	Momchilovski dol	1968	31.4	Forest of <i>Pinus nigra</i>
	12	Amzovo	1968	0.3	<b>Lycopodium inundatum</b>
	13	Momin grad	1960	10.9	Forest of <i>Fagus sylvatica</i>
	14	Elenova gora	1961	85.9	Forest of <i>Fagus sylvatica</i> , <i>Acer</i> sp., <i>Ulmus campestris</i> , <i>Abies alba</i>
	15	Arkutino	1962	96.6	Forest of <i>Fraxinus</i> (longoz); <i>Leucojum aestivum</i> ; <i>Nymphaea alba</i> , <i>Trapa natans</i>
	16	Pjasachna lilia	1962	0.6	<b>Pancreatium maritimum</b>
	17	Vodnite lilii	1962	13.6	<b>Nymphaea alba</b>
	18	Tamnata gora	1962	90.0	Forest of <i>Picea abies</i> , <i>Fagus sylvatica</i> , <i>Abies alba</i>
	19	Boraka	1966	11.1	Forest of <i>Pinus nigra</i>
	20	Kirov dol	1968	77.1	Forest of <i>Quercus frainetto</i> , <i>Q.cerris</i> , <i>Fagus orientalis</i>
	21	Bukaka	1980	62.6	Forest of <i>Fagus sylvatica</i>
<b>Protected site</b>	1	Kalpunar	1970	12.0	<b>Leucojum aestivum</b>
	2	Blatoto	1970	29.0	<i>Leucojum aestivum</i>
	3	Ivan gjol	1970	30.0	<i>Leucojum aestivum</i>
	4	Blatoto	1970	16.0	<i>Leucojum aestivum</i>
	5	Vinica	1970	19.0	<i>Leucojum aestivum</i>
	6	Dolnata ova	1970	20.0	<i>Leucojum aestivum</i>
	7	Kalinata	1970	83.1	<i>Leucojum aestivum</i>
	8	Tchairite	1970	2.0	<i>Leucojum aestivum</i>
	9	Bukova usojna	1972	16.2	Forest of <i>Fagus sylvatica</i>
	10	Osmar	1979	19.0	<b>Leucojum aestivum</b>
	11	Lozenski pat	1980	32.0	<i>Leucojum aestivum</i>
	12	Population of .....	1981	1.5	<i>Adiantum capillus-veneris</i>
	13	Tchibucite	1989	4.8	<i>Spiraea salicifolia</i>
	14	Krucheto	1989	0.8	<i>Ligularia sibirica</i> , <i>Laserpitium archangelica</i>
	15	Marina reka	1991	47.3	<i>Taxus baccata</i> , <i>Rhododendron ponticum</i> , <i>Ilex aquifolium</i>
	16	Rudenovo	1991	15.3	<i>Vaccinium arctostaphylos</i>
	17	Tchibukliata	1991	31.8	<i>Quercus cerris</i>
	18	Dokuzak	1991	5.0	<b>Sideritis syriaca</b>
	19	Topliste	1992	0.3	<i>Osmunda regalis</i>
	20	Dupkata	1992	6.5	<i>Orchidaceae</i> ( <i>Cephalanthera epipactoides</i> , <i>Limodorum abortivum</i> , <i>Himantoglossum hircinum</i> , <i>Ophrys scolopax</i> , <i>O. sphegodes</i> )
	21	Likana	1992	3.0	<b>Cephalanthera epipactoides</b>
	22	Mechovata gora	1992	5.8	<i>Galanthus nivalis</i> , <i>Scilla bifolia</i> , <i>Colchicum</i>
	23	Usketo	1992	1.9	
	24	Uruchnik	1992	51.0	
	25	Irakli	1994	42.3	<i>Pancreatium maritimum</i> , <i>Lactuca tatarica</i> , <i>Euphorbia peplis</i> , <i>Stachys maritima</i>
	26	Smrikite	1995	58.9	<b>Juniperus communis</b>
	27	Tchinar dere	1995	27.7	<i>Platanus orientalis</i>
	28	Debelata koria	1996	16.4	<i>Leucojum aestivum</i>
<b>Natural monument</b>	1	Jdreloto na Erma	1961	8.7	Rocky vegetation
	2	Tulovskata koria	1961	75.7	Forest of <i>Quercus</i> sp.

	3	Kojuha	1962	94.2	Sub-Mediterranean vegetation; <i>Dracunculus vulgaris</i>
	4	Snejanska koria	1963	81.0	Forest of <i>Quercus</i> sp.
	5	Bratia	1963	3.0	Forest of <i>Fagus sylvatica</i>
	6	Vetrenskata koria	1966	25.3	Forest of <i>Quercus</i> sp.
	7	Preobrajenski manastir	1974	17.1	<b><i>Corylus colurna</i></b>
	8	Bojurluka	1974	3.5	<b><i>Paeonia tenuifolia</i></b>
	9	Cholachki orman	1974	82.5	<i>Paeonia peregrina</i>
	10	Jankjovec	1974	1.2	<i>Paeonia peregrina</i>
	11	Jankjovec	1974	2.2	Forest of <i>Quercus</i> sp.
	12	Sinia hvojna	1974	2.0	<b><i>Juniperus communis</i></b>
	13	Population of ...	1974	0.4	<i>Platanus orientalis</i>
	14	Population of ...	1974	0.7	<i>Platanus orientalis</i>
	15	Population of ...	1974	11.4	<i>Platanus orientalis</i>
	16	Population of...	1973	0.5	<i>Leucocjum aestivum</i>
	17	Uperska koria	1972	23.2	Forest of <i>Quercus</i> sp.
	18	Ajtoska koria	1972	15.0	Forest of <i>Quercus robur</i>
	19	Letna gora	1972	36.6	<b><i>Pinus nigra</i></b>
	20	Bojur poljana	1968	19.6	<i>Paeonia tenuifolia</i>
	21	Patjova koria	1968	81.2	Forest of <i>Quercus</i> sp.
	22	Kuchbunar	1969	0.4	Forest of <i>Fagus sylvatica</i>
	23	Livadite	1966	1.0	<b><i>Tulipa rhodopaea</i></b>
	24	Chirpanska koria	1966	58	Forest of <i>Quercus</i> sp.
	25	Koriata	1966	20.0	Forest of <i>Ulmus campestre</i>
	26	Pjasachni djuni	1976	10.0	Psammophytic vegetation
	27	Borovia kamak	1976	1.3	Forest of <i>Pinus nigra</i>
	28	Suha laka	1976	3.2	Forest of <i>Pinus peuce</i>
	29	Population of ....	1976	10.0	<b><i>Paeonia peregrina</i></b>
	30	Population of ....	1976	0.2	<i>Glycyrrhiza glabra</i>
	31	Population of ....	1976	28.1	<i>Glycyrrhiza glabra</i>
	32	Population of ....	1976	0.5	<i>Glycyrrhiza glabra</i>
	33	Dabova gora	1976	6.4	Forest of <i>Quercus</i> sp.
	34	Population of ....	1976	5.0	<b><i>Paeonia peregrina</i></b>
	35	Dabova gora	1976	7.0	Forest of <i>Quercus</i> sp.
	36	Population of...	1976	0.15	<b><i>Lilium rhodopaeum</i></b>
	37	Population of ....	1976	0.3	<i>Ilex aquifolium</i>
	38	Population of ....	1976	0.5	<i>Paeonia peregrina</i>
	39	Vehti Belcov	1976	0.2	<i>Glycyrrhiza glabra</i>
	40	Ostrova na Tundja	1976	2.0	Forest of <i>Quercus</i> sp.
	41	Population of ....	1973	14.5	<b><i>Erica arborea</i></b>
	42	Population of ....	1973	1.8	<i>Vaccinium myrtillus</i>
	43	Population of ....	1973	0.1	<i>Pistacia terrebinthus</i>
	44	Population of ....	1973	0.8	<i>Juniperus communis</i>
	45	Mogilata	1973	47.5	Stepic habitat
	46	Kuchbunar	1969	0.4	Forest of <i>Fagus sylvatica</i>
	47	Population of ....	1977	28.0	<i>Tamarix</i> sp.
	48	Population of ....	1977	1.0	<b><i>Paeonia peregrina</i></b>
	49	Lipova gora	1977	32.7	Forest of <i>Tilia</i> sp.
	50	Dabova gora	1977	35.0	Forest of <i>Quercus</i> sp.
	51	Vekovna gora	1977	50.0	Forest of <i>Quercus</i> sp.
	52	Ussojkata	1977	4.0	<b><i>Pinus nigra</i></b>
	53	Population of...	1977	35.8	<i>Leucocjum aestivum</i>
	54	Dabova gora	1978	3.0	Forest of <i>Quercus</i> sp.
	55	Brestnichko braniste	1978	20.0	Forest of <i>Quercus</i> sp.
	56	Chechmata	1978	0.2	<b><i>Glycyrrhiza glabra</i></b>
	57	Population of ....	1978	0.1	<i>Haberlea rhodopensis</i>
	58	Population of ....	1978	0.1	<i>Galanthus nivalis</i>
	59	Population of ....	1978	2.2	<i>Hippophäe rhamnoides</i>
	60	Population of ....	1977	3.1	<i>Paeonia peregrina</i>
	61	Population of ....	1977	5.0	<i>Paeonia peregrina</i>
	62	Lalebair	1978	2.0	<i>Tulipa rhodopaea</i>
	63	Petka balkan	1979	5.4	Forest of <i>Quercus cerris</i>
	64	Halka bair	1979	15.0	<b><i>Paeonia peregrina</i></b>
	65	Population of ....	1979	0.1	<i>Haberlea rhodopensis</i>
	66	Population of ....	1979	3.0	<i>Convallaria majalis</i> , <i>Paeonia peregrina</i>
	67	Elata	1979	0.5	Forest of <i>Abies alba</i>

	68	Population of ....	1979	5.0	<b>Paeonia peregrina</b>
	69	Population of ....	1979	4.1	<i>Paeonia peregrina</i>
	70	Kolchakovska koria	1979	25.5	Forest of <i>Quercus</i> sp.
	71	Marachka koria	1979	23.0	Forest of <i>Quercus</i> sp.
	72	Population de	1979	5.6	<b>Coryllus colurna</b>
	73	Aleksandrovska gora	1979	71.0	Forest of <i>Quercus</i> sp.
	74	Forest of ....	1979	29.5	<i>Quercus</i> sp.
	75	Forest of ....	1980	13.1	<i>Abies alba</i>
	76	Population of ....	1980	3.4	<b>Haberlea rhodopensis</b>
	77	Population of ....	1980	0.02	<i>Ilex aquifolium</i>
	78	Forest of ....	1980	1.4	<i>Abies alba</i>
	79	Forest of ....	1980	0.5	<i>Quercus cerris</i>
	80	Population of ....	1980	0.5	<b>Haberlea rhodopensis</b>
	81	Population of ....	1990	61.8	<i>Cyclamen coun</i>
	82	Population of ....	1981	20.0	<i>Coryllus colurna</i>
	83	Population of ....	1980	86.7	<i>Paeonia peregrina</i>
	84	Population of ....	1981	10.2	Forest of <i>Abies alba</i>
	85	Population of ....	1981	0.2	<b>Quercus cerris</b>
	86	Population of ....	1981	0.8	<i>Juniperus</i> sp.
	87	Population of ....	1981	0.9	<b>Quercus frainetto</b>
	88	Population of ....	1981	1.2	<i>Tulipa rhodopaea</i>
	89	Habitat	1981	42.7	Stepic habitat
	90	Bukova gora	1981	6.1	<b>Fagus sylvatica</b>
	91	Kitkata	1981	1.8	<i>Quercus</i> sp.
	92	Population of ....	1981	2.7	<b>Leontopodium alpinum</b>
	93	Population of ....	1981	8.2	<i>Galanthus nivalis</i>
	94	Population of ....	1981	88.3	<i>Tulipa rhodopaea</i>
	95	Population of ....	1981	10.4	<b>Galanthus nivalis</b>
	96	Bostanchetata	1981	0.3	<i>Fagus sylvatica</i>
	97	Population of ....	1981	4.0	<i>Paeonia peregrina</i>
	98	Djulun gjol	1982	18.2	<i>Trapa natans</i>
	99	Population of ....	1982	94.4	<b>Quercus frainetto, Fagus sylvatica</b>
	100	Population of ....	1982	0.2	<i>Quercus</i> sp.
	101	Smoljanski ezera	1982	49.5	Hydro- and Hygrophyllous scarce species
	102	Population of ....	1982	2.0	<b>Paeonia peregrina</b>
	103	Population of ....	1983	2.0	<i>Inula helenium</i>
	104	Population of ....	1983	0.1	<i>Quercus</i> sp.
	105	Population of ....	1983	3.0	<i>Quercus</i> sp.
	106	Population of ....	1983	12.0	<b>Tulipa urumoffii</b>
	107	Population of ....	1984	37.0	<i>Quercus</i> sp.
	108	Population of ....	1984	46.3	<b>Paeonia peregrina</b>
	109	Population of ....	1984	9.2	<i>Primula veris</i>
	110	Koriata	1984	39.0	Forest of <i>Quercus</i> sp.
	111	Population of ....	1984	1.7	<b>Lathrea rhodopaea</b>
	120	Population of ....	1984	10.0	<i>Salvia tomentosa</i>
	121	Population of ....	1984	80.0	<i>Salvia tomentosa</i>
	122	Population of ....	1984	5.0	<i>Salvia tomentosa</i>
	123	Population of ....	1984	15.0	<i>Salvia tomentosa</i>
	124	Population of ....	1984	1.0	<i>Ophrys bicornis</i>
	125	Pjasachni djuni	1984	24.0	Psammophytic vegetation
	126	Pjasachni djuni	1984	21.0	Psammophytic vegetation
	127	Pjasachni djuni	1984	24.0	Psammophytic vegetation
	128	Pjasachni djuni	1984	38.0	Psammophytic vegetation
	129	Pjasachni djuni	1984	12.0	Psammophytic vegetation
	130	Pjasachni djuni	1984	94.4	Psammophytic vegetation
	131	Nikolinski kladenec	1984	0.2	<b>Quercus cerris</b>
	132	Population of ....	1984	2.5	<i>Nymphaea alba</i>
	133	Population of ....	1984	2.0	<i>Nymphaea alba</i>
	134	Population of ....	1984	0.2	<i>Stratiotes aloides</i>
	135	Bratjata	1985	0.2	<i>Picea abies</i>
	136	Belacite	1985	0.2	<i>Pinus silvestris</i>
	137	Lalikoto	1985	37.9	<i>Tulipa urumoffii</i>
	138	Konadjika	1985	18.6	Forest of <i>Quercus hartwissiana</i>
	139	D8lbok dol	1985	5.8	<b>Abies alba, Picea abies, Fagus sylvatica</b>

	140	Tissovete	1985	0.2	<i>Taxus baccata</i>
	141	Population of ...	1985	0.8	<i>Colchicum diampolis</i>
	142	Vrachka chuka	1986	67.6	<i>Ramonda serbica, Convolvulus elegantissimus, Paeonia mascula, Eranthis bulgaricus, Centaurea atropurpurea, Crocus tomassinianus</i>
	143	Marina	1987	1.5	Forest of <i>Quercus dalechampii</i>
	144	Elenska glava	1987	4.0	<b>Taxus baccata</b>
	145	Tetralika	1987	16.5	<i>Tulipa splendens</i>
	146	Ljuljaka	1987	0.5	<i>Tulipa urumoffii</i>
	147	Stolista	1987	1.7	Forest of <i>Fagus sylvatica</i>
	148	Koriata	1987	0.3	Forest of <i>Quercus</i> sp.
	149	Tepeto	1987	6.0	<b>Paeonia peregrina</b>
	150	Juchbunar	1989	0.2	<i>Sequoia gigantea</i>



**Section three: comparison between  
the Valencian plant micro-reserves  
and some other systems of  
numerous small protected areas**

## **Introduction**

This chapter deals with a quick comparison between the model of the Valencian micro-reserves and some representative European cases of networks used mainly to protect small areas. Two cases have been considered 1) the SSSIs from the Great Britain, and 2) the nature reserves and natural monuments from the Slovak and Czech republics. The latter is at the same time a representation of a wider model, commonly found throughout the formerly socialist European countries, that has in Slovakia and the Czech Republic a good example of organised national strategy. These countries have been chosen because of their simplified model, provided the fact that other similar examples of closely related countries – in some cases with specific designations to protect plants (Bulgaria, Poland, Latvia, etc.) – have more dispersal in the legal items used.

## **A case of preventive conservation: the UK's SSSIs and ASSIs**

### **Explanation**

The Sites and Areas of Special Scientific Interest represent a particular system exclusive to the United Kingdom, with no other similar model in Europe, that permits a high number of areas to be declared for the preventive protection – mainly for medium and small areas. The Sites of Special Scientific Interest (SSSIs) are established in England, Wales and Scotland, and they are based on specific chapters of the 1949 National Parks and Access to the Countryside Act, strengthening the protection framework by means of the 1981 Wildlife and Countryside Act. Its extension to include Northern Ireland was made by a similar designation, the Areas of Special Scientific Interest (ASSIs), established by the 1965 Amenity Lands Law, and developed by the 1985 Nature Conservation and Amenity Lands (Northern Ireland) Order. All these legal frameworks have been slightly modified or enlarged with some small amendments. In practice, the sum of SSSIs and ASSIs, make up the main trunk protection designations in the UK, covering more than 8% of the total land of the country.

The legal and technical schemes have been explained by the JNCC (1995), EC (1990), HMSO (1992), NCC (1984) and by de Klemm (1992, and 1996 a and b). Prior to 1990, the main administrative body for declaration and management of SSSIs and ASSIs was the National Conservancy Council; following the 1990 Environmental Protection Act, its duties fell on 4 statutory offices – one for each traditional historical UK's territory: for England, English Nature (EN), depending on the national Department of the Environment, Transport and the Regions (DETR); the Countryside Council for Wales (CCW), depending on the Welsh Office; for Scotland, the Scottish Natural Heritage (SNH), related to the Scottish Office; and the Environment and Heritage Service (EHS), depending on the Department of the Environment (for Northern Ireland). All these four statutory agencies (EN, CCW, SNH and EHS) are advised if necessary by the head information agency, the Joint Nature Conservation Committee (JNCC).

As Shine (1997) shows, the SSSIs model combines legal rules and voluntary measures to protect the sites. The conservation authority – any of the aforementioned statutory agencies – can propose the declaration of a SSSI or ASSI for any area that, in its opinion, and only based on purely scientific criteria, was of special interest because of its flora, fauna, or geological or physiographical features – see also de Klemm (1992) – following the guidelines set out in section 28 of the 1981 Wildlife and Countryside Act. After some previous consultative procedures, the area is designated a SSSI/ASSI, which involves the notification to the landowner, the local

planning authorities and the Secretary of State for the Environment. This notification, regulated by section 15 of the 1968 Countryside Act and amended by schedule 9 of the 1990 Environmental Protection Act, refers to the interesting species or features that are the reason for the declaration, and deals with the operations that should be avoided or not exercised, in order to prevent damages to those natural elements. These damaging operations can only be carried out by the landowner or the land occupier in any of the five following cases:

1. Under authorisation of the conservation authority;
2. With official agreement, made with the conservation authority, dealing with the management of that area;
3. After the passing of 4 months without an official reply, to a notification made by the landowner to the conservation authority describing his/her intent to carry out the operations that can damage the natural elements. After this time, the activities can not be stopped, unless the Secretary of State makes a Nature Conservation Order;
4. Having a grant of planning permission in relation to the land; obviously, the planning department must have consulted or agreed with the conservation authority, before giving the grant;
5. The operations are carried out in an emergency; there is the duty to notify the conservation authority as soon as possible afterwards.

If the damaging operations are carried out under any other condition, it is considered a criminal infringement. The procedure for the aforementioned case No 3, usually includes the possibility of reaching an agreement between the landowner or land occupier, and the conservation authority, in order to compensate them for the economical damages caused by the prohibitions.

The Nature Conservation Orders have the capacity to force the landowners to exercise good practices in order to conserve the species or features in question, following the guidelines set out in section 29 of the 1981 Wildlife and Countryside Act. In addition, a procedure of expropriation can be started if the agreement is not possible. However, in practice, these Orders seem to be unusual. They rarely force the landowners to make operations against their will, and rarely end in a commandeering procedure.

More than 10% of the SSSIs are managed or owned by NGOs. The case of the National Trust must be stated (NT, 1995). The special functioning and legal status of the National Trust's properties have been widely explained by Shine (1996 and 1997). The National Trust is the second main landholder in the country, and its numbers are impressive (updated 1995 by Shine, *op. cit.*): 2,250,000 members, 270,000 ha of natural areas (30% of them declared as SSSIs, 470 areas), 24 Nature reserves and 850 km of coasts. Another main organisation is the RSNC (Royal Society for Nature Conservation), that established the WTP (Wildlife Trusts Partnership), a great network of local, district and county trusts for nature conservation – commonly named Wildlife Trusts – that manages close to 2,000 nature reserves, both designated (mainly nature reserves or SSSIs) and non-recognised private ones.

The SSSIs and ASSIs provide a protective framework for the active designations. At least the following sites must be first notified as SSSIs or ASSIs: Biosphere Reserves, Biogenetic Reserves, Special Protected Areas, Ramsar Sites, Areas of Special Protection, Special Areas of Conservation, and National Nature Reserves. By September 1996, there were 6,235 SSSIs covering 2,077,881 ha, and 91 ASSI with 76,000 ha.

In practice, the protection provided by the SSSIs and ASSIs is purely theoretical. Most of the natural elements that must be protected must also be conserved, and this conservation usually needs active intervention on behalf of the species, or habitats, or both. At the same time, as Shine (1997) explained, an impressive economical sum is necessary to pay all the compensations required by the landowners. So, the reality is a bit different, and the conservation authorities can

only effectively defend the most important SSSIs or ASSIs against the damaging operations. In the remainder of cases, stopping the landowners is not possible because of the lack of economical funds to compensate their money losses (at least as theoretical rightful losses). It is thought that at least 5% of all SSSIs suffer every year serious damages because of the lack of enough money to stop the aforementioned damaging operations.

In order to compensate for this system failure, two solutions were proposed and put in practice: 1) to centre the agreements on the most important habitats deserving protection, and 2) to strengthen the role of active conservation partners, mainly NGOs, by means of agreements and grants. The first way is through the “Wildlife Enhancement Scheme”, shortened WES; the second through the “Reserves Enhancement Scheme” (RES). Shine (1997) gives a good explanation on the results yielded by means of these two methods.

### Comparison with the micro-reserves model

Obviously, SSSIs and plant micro-reserves are not at the same interpretative level, because they really are very different designations, and they are coming from different prior assumptions. The SSSI is mainly a preventive model –not like the micro-reserve, that is clearly an active designation-, that can be applied against the landowner’s will – in contrast to the micro-reserves on private lands, where the goal is the active protagonism of the proprietor.

A lot of differences can be found between these two models, but the main one deals with the reason for protecting a site: for the SSSIs, in the same way as the classical designations, the protection is *per se* a first main goal. For the micro-reserves, the protection is only a tool but not a goal. Consequently, the order in which legal declaration of protected areas is made when these designations (SSSI or micro-reserve) must coincide with the same site as a nature reserve, is usually different. To designate a UK’s National Nature Reserve, the place must be previously notified as a SSSI, so it clearly has the function to create a prior conservancy framework. On the contrary, if a Valencian Community’s Integral Nature Reserve (the most intensive protection frame) contains a vegetation type that does not exist in other places of the Autonomous Community, a micro-reserve – that obviously can not increase the prior protection level – must be created into (i.e., the establishment of two micro-reserves for *Lobularia maritima* ssp. *columbretensis* and for *Medicago citrina* in the Integral Nature Reserve of the archipelago of Columbretes). In the same way, the monitoring of vegetation changes or scientific features, that could be made on the SSSIs network as an *a posteriori* activity –to know the evolution of a group of protected areas- is a main goal in the case of the micro-reserves.

The apparent failure of the SSSI’s model is not due to a design problem, but to the discrepancy between the rhythm of increase of the SSSI network, and the parallel growing of the economical resources dedicated to it. It is evident that the frequent problems found in the conservation of the SSSIs are due to the lack of funds available to compensate the landowners, as a condition for stopping their damaging operations. Obviously, the alternative way based on the positive will of the landowner, in the case of the plant micro-reserves, but also in the SSSI’s Reserves Enhancement Scheme, allows for a more realistic framework. It is evident that the UK’s model can not continue developing as it is, and that two future selective lines must be taken: 1) to allow the creation of new SSSIs only on several selected rich ecosystems – i.e., in the WES way – and 2) centre these new areas on NGO-owned or collaborator-owned areas, in concordance with the RES model.

The main conclusion is that the two models (micro-reserves and SSSIs/ASSIs) are very different in their assumptions and goals, and their combination in the same national conservation policy could be successfully developed, but the growth of both systems on private areas would need to be measured out, in order to avoid the future breakdown of one or both models. As a good

solution, it must be recommended that the creation of protected areas on private areas should be promoted in two divergent ways: 1) with severe restrictive measures (only for outstanding natural features) in the areas where the conservation must be imposed against the landowner's will, and 2) more generally, promoting active participation, where the landowners – mainly non-profit NGOs with statutory purposes on nature conservation – enjoy being the protagonists of active conservation.

## **A case of active conservation: the Czech and Slovak models of nature reserves and nature monuments**

### **Explanation**

The Czech and Slovak models have been described in section two. In the case of the designations for small areas, there are two main types of local importance, Nature reserves (PR, Přírodní Rezervace) and Nature monuments (PP, Přírodní Památka), and two similar ones of national importance – National nature reserves (NPR, Národní Přírodní Rezervace) and National nature monuments (NPP, Národní Přírodní Památka).

This model, in contrast with the SSSIs, is a traditional active conservation scheme based on the continuous action of the public power, that takes charge of the choice, declaration and full management of the site. Explanations can be found in the reports published by Cerovsky (1988) and de Klemm (1996 a and b, and 1997). This model was established by the Law 40/1956 so-named State Nature Conservancy Act. The equivalent one for Slovakia was the Act 1/SNR 1995, but some of the protected areas came from prior legal declarations. With a few variations, the régime for the small protected areas have been maintained in the Czech Republic by the more recent Nature and Landscape Protection Law, passed on 19 February 1992, and its implementing regulation passed on 11 June 1992. The analogous regulation for Slovakia is the Nature and Landscape Protection Law of 23 August 1994.

There are no great differences between the two designations, Nature Monuments and Nature Reserves that the Czech and Slovak laws consider under a traditional IUCN's meaning. A Nature or Natural Monument is usually very small and has a certain geomorphological or landscape homogeneity, or it deals with a well-defined natural feature (rocks, trees, caves, small homogeneous sites, etc.). A Nature Reserve can also be homogeneous, but their declaration seems to have an implicit goal of long-term management for science, education or conservation, or to become reservation areas without human influence. In practice, there exist whole transition cases between these two designations, and most areas could be indistinctly designated in order to be declared as protected areas.

The number of protected areas is shown in tab. No. 9. In the Czech Republic, all National Parks (Národní Parky, NP) and Protection Landscape Areas (Chrániné Krajinne Oblasti, CHKO) are large protected areas (over 100 ha), and most NPRs, PRs, NPPs and PPs are smaller than 100 ha; only five NPRs, three PRs, one NPP and six PPs are greater than 1,000 ha. In the Slovak case, all NPs and CHKOs are larger than 1,000 ha, with a few NPRs (only 15 areas, from a total sum of 229 NPRs) also being large protected areas; the remaining 214 NPRs, and all the PRs, NPPs and PPs are under 1,000 ha.

**Tab. No. 9 Distribution of protected areas in the former Czechoslovakia (No. of zones)**

		Czech Republic*	Slovakia**
National Park	NP	3	5
Protected Landscape Area	CHKO	24	16
National Nature Reserve	NPR	117	229
Nature Reserve	PR	602	554
National Nature Monument	NPP	100	45
Nature Monument	PP	1001	209

\*Updated to 1998; \*\*Updated to 1996

All protected areas are selected and declared by the national official agencies: the Agency for Nature and Landscape Protection in the Czech case, and the Agency of Environment in Slovakia. After the declaration, the NPs, CHKOs, NPRs and NPPs are usually managed by the regional delegations of the aforementioned agencies, or directly (except for the NPs) regulated as the result of agreements with regional or local authorities, that have an active participation in nature conservation. The PRs and PPs are mainly managed at the local level.

It must be stated that the Czech and Slovak systems are the peak expression of a more generalised model – but usually less organised, or with a big dispersal of designations for protected areas – existing in all CEE countries. In the same way, with a few differences, other cases (i.e., Poland, Bulgaria, Latvia, Estonia, etc.) could be described. In most cases, there is little participation of private owners or NGOs. Simultaneously, all these countries coming from the prior socialist régimes are in the important dilemma of the re-privatisation of the public lands, expropriated in the last 80 years.

#### Comparison with the SSSI's and the Valencia's plant micro-reserves

The Czech and Slovak model, in the contrast to the UK's SSSIs, is developed on the mixed basis of a sustainable development and a participative conservation, so the areas are mainly declared to be integrated into a great network of useful areas for science, education, conservation and maintenance of traditional landscapes –including a careful touristic promotion for some cases, but taking care of avoiding a massive or incompatible tourism-; so, not only are scientific reasons taken as a basis to select a new area for the network, but also a lot of social and cultural values, trying to generate protected areas which will be easily respected by the local population. The SSSI's model comes from a scientific basis, to defend selected natural features against the changes produced by man's action, so usually the selection is not easily accepted by the local population. In addition, there exist the expected differences between the preventive and active models. In any case, it is evident that the upkeep of the Czech and Slovak model involves a very big economical cost, but it is directly spent on paying a high number of public employees, and not to pay compensation to the farmers or landowners. Obviously, these two cases come from very different starting points, provided that the Czech and Slovak model was built on the basis of a predominantly public surface.

When the Czech and Slovak model is compared with the plant micro-reserves one, there also exist significant differences, because of the goals pursued. The micro-reserve's goal is not to protect the singular areas as explained earlier, but to create a stable and permanent network of representative plots for wild species and plant communities, regarding the protection as a tool rather than a purpose.

## **Global discussion**

In a certain sense, the SSSIs and the Czech/Slovak system are the ends of a continuous transition from the preventive to the active protected areas. Most countries used to have the two kinds of protected areas at the same time, but the two cases described are an extreme example of their use to protect small areas. The Valencian micro-reserves are not exactly on the same conceptual plane, because they are not protected areas in a classical sense – but their effects are clearly similar to them – but a particularised form to protect habitats. It is evident that the micro-reserves system could be used in combination with some or both preventive and active models of protected areas. Probably, in the future, the good conservancy strategies should include the establishment of mixed networks of protected areas and habitats, combining the three aforementioned models, because they are not incompatible, and can be appropriately used to solve different problems: the preventive protection, the active conservation, and the long-term monitoring and experimental management of small important plant areas.

## Discussion and conclusions

### On the micro-reserves and other designations to protect small important plant areas

In this report, the model of the Valencian Community's plant micro-reserves has been explained, and an overview on the useful designations to protect small important areas for wild plants has been shown for all European countries – and also for other neighbouring countries. In addition the two most remarkable models of integrated use of preventive and active designations, represented by the UK's SSSIs and the Czech and Slovak system of Nature Reserves and Natural Monuments, has been explained and compared to the micro-reserves system.

The micro-reserves model is not comparable with any other similar system in Europe, due to the fact that it does not deal with the traditional scope of a protected area. Protection does not take first priority for the micro-reserves, and their main reasons for being declared are not only their singularity, but also the complementary role of each future protected plot, or its contribution to the micro-reserves network through the addition of new species or plant communities. The conceptual scheme of the micro-reserves can only be well understood if the network as a whole is considered. An individual micro-reserve is not really important *per se* because of its own value – despite some of them having an outstanding concentration of important plants and could deserve to be declared as integral reserves or similar designations – but because it is contributing to the network adding a new or scarcely represented plant species or community, that was formerly lacking in the whole net.

The micro-reserves network is built on the basis of having a great multi-distributed protected area to be managed, having some important goals that can only be achieved if the landowner – if different from the public powers – is an active collaborator, and especially if he/she wants to be a protagonist in the regional schema of wild plants conservation. Most important small plant habitats, or populations of singular species, could be indifferently found on public or private lands, so fighting against the landowner's will is not worthwhile for the wildlife administration. If a very important private area is under peril because of the damaging operations of the landowners or occupiers, there are a lot of traditional effective designations to force him or her to respect the nature conservation rules – i.e. nature reserves, natural monuments, and so on. In an extreme case, Spain and most European countries can begin if necessary expropriation procedures. This effort should be reserved for only outstanding cases. In most cases, if the aim is to add a new item – concrete plant population or small habitat – to the micro-reserves network, it can easily be obtained from the public-owned lands or from private lands owned by collaborating people – non-profit NGOs, City Towns' environmental local agencies, and some individual people. These bases and procedures are really different from the traditional ones for establishing networks of protected areas. Perhaps the only comparable model, that also aims to create a rich-biodiversity network, is the future Natura 2000 one, but their conception is mid-way between the classical model of the national scopes – to protect only the singular areas – and the micro-reserves – to have a long-term plant biodiversity network, at least for endemic, rare or threatened plants. In effect, the Natura 2000 regulations – see Directive 92/43/CEE – provide a very wide framework that only contains some basic rules, so countries must add new sites, both protected areas, and cases of not traditionally protected ones – e.g. most sites on the Spanish list of Special Areas for Conservation are not currently protected and probably will not be protected until their effective designation as SACs by the European Commission – provided that they can reach a good conservation level using other parallel regulations e.g. Spanish rivers could have an effective protection by means of the habitual application of the hydrological reglementary measures, but this model can only be implemented under the hypothesis of a good administrative practice.



Therefore, micro-reserves and traditional protected areas are not considered on the same level, because they pursue different aims and start from different scopes. This basis is important to be borne in mind, because the micro-reserves and the other protected areas (traditional ones such as nature reserves or nature monuments) are compatible designations that can be developed together on the same territory.

### **On the existing networks of protected micro-areas used to conserve wild plants**

As a main result of this report, it can be assured that there are important networks of small protected areas or similar useful sites, that can be used to provide direct or indirect protection to wild plants in Europe. It must be especially stated the role that nature reserves and natural monuments play in the North, Centre and East of Europe, and the impressive networks existing in the CEE formerly socialist countries. These networks are rarely referred to by the bibliographic sources, because in most cases their management is controlled by the regional, district or local authorities. The role of the natural monuments is very important, because this designation has been usually used to protect small plots of interesting areas for plants and animals, and not only for their more traditional aim (geological or geomorphological features, or old isolated or tall trees). In effect, it seems that natural monuments have been used as a good alternative to protect small areas without any excessive bureaucratic procedures, and later having wide freedom to manage them.

On the other hand, it is very important to state the case of a group of countries – mainly in the CEE nations – that have specific designations to protect wild flora (botanical reserves, flora reserves, etc) or important plant habitats (i.e. mire reserves). Often, the national networks are not very developed, but they could be increased in the future.

Additionally, most countries, and/or their regions, have important measures for protecting plant habitats, that provide a global framework for conservation of certain kinds of important plant areas. The most frequent being bogs, wetlands, caves, coastal dunes, mountain peaks – mainly on alpine grounds – and rivers. Transitional designations, mid-way between concepts of protected areas and protected habitats, are relatively common. In these conceptual frames, the case of the sub-Mediterranean or thermophile vegetations must be stated for the Northern and CEE countries, where there are often specific designations to prevent damage to dry steppes and grasslands.

### **On the idea of a future pan-European network of small reserves for wild plants**

Beginning with the ideas presented in this report and mainly addressed in the last few paragraphs, it is evident that there is a huge but unconnected network of micro-areas designated to protect wild plants or to provide useful *in situ* protection for these plant species and communities. This enormous network could reach the figure of more than 30,000 protected areas, under a lot of different designations (but mostly centred on the nature reserves and natural monuments). Until now, these areas have not usually been recognised at any international level, because their effects are easily outshone by the large protected areas. Indeed, most international organisations, such as Europarc, only deal with sites over 1,000 ha, and the international databases and lists available on protected areas only show data on these places (i.e. the United Nations list on protected areas). However, the effect of these small areas is extremely important for the local population, because people can understand that important natural features can be widely distributed, and that the sites deserving long-term conservation are not only a few big ones. Therefore, the increase in number of small reserves for plants can aid in spreading the idea of a more regular participation of local people in nature and landscape conservation tasks. If protected areas are scarce and are only found

in a few distant places, the local people will forget their important role in nature conservation; on the contrary, if protected areas were frequent – if, it were possible for all local communities to have one or more small reserves and natural monuments – people could consider protected areas as a common thing – not as a place like the zoo which maintains isolated patches of untouched nature – and, with a minor educational effort, could have broader attitudes on the role they can play in achieving good levels of nature conservation.

The main conclusion of this chapter can be considered that the creation of a big pan-European network of small protected areas for plants can be a reality without great efforts – because the national networks have been built during the last decades in most countries – and without modifications of the national legislation.

The future role the international organisations can play is decisive, and it is evident that the most appropriate institution to take this role would be the Council of Europe, by means of the Bern Convention procedures or through other new legal frames in the future. To make advances in this direction in the legal framework, it could be enough with just a wider meaning of the concept of ‘biogenetic reserve’, or creating a new umbrella pan-European designation, taking care to allow the preventive and active national designations.

Convention on the Conservation of  
European Wildlife and Natural Habitats

Standing Committee

**Recommendation No. 71 (adopted on 4 December 1998) concerning guidelines for the protection and management of habitats through private or voluntary systems**

The Standing Committee of the Convention on the Conservation of European Wildlife and Natural Habitats, acting under the terms of Article 14 of the convention,

Conscious of the need to involve the private sector and non-governmental organisations in action undertaken to promote the protection of flora and fauna wildlife habitats, in particular those listed in Appendices I and II to the convention, and to safeguard endangered natural habitats in accordance with the provisions of the Rio Declaration on Environment and Development and of Agenda 21 (Chapter 27) adopted in Rio on 14 June 1992;

Considering that private organisations and voluntary systems of habitat conservation and management can contribute to cost-effective conservation and have a multiple effect;

Considering that these organisations can provide an effective contribution to nature conservation, particularly when their staff is supported by a qualified scientific team, their acquisition and management strategies are based on nature conservation criteria and objectives, they work in collaboration with a variety of public and private entities at local, national and international level; they encourage public participation and are active in the field of environmental education;

Being of the opinion that these organisations should therefore be deemed to perform a public service and, in certain circumstances, qualify for grants or loans;

Considering that it is essential to involve in the action taken to protect and manage habitats the main users of such habitats (farmers and foresters) as well as other users of nature, hunters and fishermen who practise their sport in compliance with the legislation in force, insofar as their activities are of great economic significance for habitat conservation and have a considerable influence on countryside management practices;

Having regard to Articles 1, 2, 3 and 4 of the convention and to its Resolution No. 1 (1989);

Conscious that most of the obligations under Articles 1, 2, 3 and 4 of the convention are binding upon the Contracting Parties as to the results to be attained while allowing them a choice of the means to be used for that purpose;

Noting that the status of voluntary habitat conservation and management is often determined by each state's legal, political and popular culture, with some countries maintaining that public ownership is the most appropriate method of nature conservation - private organisations in that case playing a complementary role - while others have firmly established private systems as an integral part of national conservation policy;

Recognising that some means of action have proved particularly effective in the states in which they have been applied and that the experience derived therefrom should be brought to the attention of all Contracting Parties;

Conscious of the need to promote the conservation and positive management of habitats, in the context of the Pan-European Biological and Landscape Diversity Strategy as endorsed by Ministers of the Environment at Sofia on 25 October 1995;

Recommends that Contracting Parties examine the possibility, for the purposes of the convention, of adopting measures such as those mentioned as examples in the appendix to this recommendation to promote the conservation of flora and fauna wildlife habitats, in particular those listed in Appendices I and II to the convention, and to safeguard endangered natural habitats;

### **Appendix: Examples of measures**

#### *1. Measures relating to acquisition and management of land for habitat conservation*

Given the need for acquisition and land management policies to be based principally on scientific criteria and for regulatory measures to support private conservation of non-statutory sites,

*Facilitate*, where appropriate, the acquisition of land for nature conservation, targeted at natural habitats of regional, national or international importance or which have special nature conservation value;

*Strengthen* the legal status of non-statutory sites, which are managed for nature conservation to prevent expropriation by public agencies for other purposes than conservation;

*Eliminate* legal obstacles (limited duration, prohibition on the insertion of positive management clauses) to the use of leases for private conservation and *promote* the institution of habitat management contracts;

*Ensure* that where habitat management is delegated to third parties, management practices comply with an agreed management plan, preferably in respect of the whole landholding so as to protect the integrity of the site;

*Encourage* the funding of acquisitions from diverse sources, including corporate partnership, and *promote* access to information on available sources of funding;

*Encourage* charging systems under which users of natural resources contribute to the conservation of such resources;

*Promote* innovative mechanisms for habitat conservation.

#### *2. Measures relating to conservation mechanisms for land owned by third parties*

Given the use which can be made of property law instruments, such as easements and covenants, and contractual mechanisms (management agreements and payment schemes) to promote private conservation of habitats by individuals or associations;

Given the possibility for public and private sectors to work together for conservation through a variety of formal or informal mechanisms,

*Develop* mechanisms encouraging third parties to conserve their land, insofar as such mechanisms are cheaper than acquisition and have the added advantage of mobilising new sectors of society to contribute to conservation;

*Provide*, where necessary, for an exception to legislation on easements and servitudes to remove the requirements of contiguity and benefit to the dominant tenement; *authorise* the donation of easements to approved conservation bodies; and *support* this reform by fiscal provisions to encourage individuals to grant nature conservation easements;

*Promote*, where appropriate, a mechanism for the long-term dedication of natural areas for conservation by means of an entry in the land register;

*Incorporate* within management agreements and conservation payment schemes, including agri-environmental measures adopted by member states of the European Union, measurable targets for the management of priority habitats;

*Simplify* the administrative arrangements of such schemes; avoid duplication with other funding programmes; ensure they are supported by adequate advisory services; *co-ordinate* such schemes with sectoral legislation to ensure that conservation initiatives, such as hedge replanting, are not cancelled out by territorial planning programmes such as land consolidation; *promote* more sympathetic policies of funding for extensive agricultural practices;

*Ensure* that public and private bodies combine their respective strengths in formal or informal partnerships to promote nature conservation.

### 3. *Measures relating to legislative support for private habitat conservation*

Given the difficulties that may be encountered by private organisations in controlling human activities in areas under their ownership and/or management and conserving the wider countryside,

Given the possibility for Contracting Parties to enable non-governmental organisations to play a constructive role in administrative and legislative procedures and law enforcement and the need to establish an optimal balance between regulatory and voluntary systems of conservation,

*Strengthen* legislative support for private nature conservation with due regard for other interests;

*Allow* recognised non-governmental organisations to participate actively in planning procedures and other administrative procedures relating to territorial development;

*Allow* recognised non-governmental organisations to use the courts to secure better enforcement of existing laws and, where appropriate, to obtain reinstatement of damaged habitat and, as necessary, adequate ecological compensation.

4. *Measures relating to tax policies to promote private habitat conservation*

Given that tax incentives may encourage donations of money or land to private conservation organisations and the ecologically sensitive management of land,

*Adapt or reform*, where necessary, the fiscal system to eliminate disincentives to habitat conservation and introduce a positive tax regime for donations of land or money for nature conservation;

*Give sympathetic consideration* to granting tax exemptions in respect of land managed principally for nature conservation;

*Encourage* the donation of land of nature conservation value to the state, local authorities or approved private organisations in lieu of inheritance tax and the right to a tax exemption for managing such land in accordance with an approved plan.

5. *Measures relating to the involvement of the voluntary sector in the management of land for habitat conservation*

Given that public support and involvement is essential to the successful management of protected habitats by government, private sector and non-governmental organisations,

*Promote* the added value of involving volunteers and local communities in the practical management of protected habitats;

*Recognise* the role the voluntary sector can play in building the capacity of volunteers and local communities to contribute to the management of protected habitats;

*Develop* partnerships between land managers and voluntary sector organisations which will implement training and capacity building programmes for volunteers and local communities;

**Take care** that budgets for protected habitat management include provision for supporting the development of a sustainable contribution by volunteers and the local community.

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### Abbreviations used

CAFF: Conservation of Arctic Flora and Fauna.  
CC: Countryside Commission (England, UK)  
CCW: Countryside Commission for Wales.  
CEC: Commission of the European Communities, European Union.  
CELRC: Conservatoire de l'Espace Littoral et des Rivages Lacustres. France.  
CoE: Council of Europe.  
DENI: Department of Environment for Northern Ireland.  
EC: Environmental Council (UK).  
EN: English Nature.  
EP/DGR: European Parliament, Directorate General for Research.  
HMSO: Her Majesty's Stationery Office.  
IUCN: International Union for Nature Conservation, The World Conservation Union.  
NCC: Nature Conservancy Council (UK).  
NCEE: IUCN Newsletter Central and Eastern Europe – periodical publication.  
NRA: Nature Reserves Authority (Israel).  
NT: The National Trust (UK).  
RAC/SPA: UNEP Regional Activity Centre for Specially Protected Areas.  
RCB: Ramsar Convention Bureau.  
RPWG: Regional Park Working Group, European Federation of National and Nature Parks.  
SCN/MA: Servizio de Conservazione della Natura, Ministero dell'Ambiente (Italy).  
UNEP: United Nations Environmental Programme.  
WCED: World Commission on Environment and Development.

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#### **Audio-visual documents**

- Laguna, E. (dir.), (1997): *Wild Flora preservation at the Community of Valencia, I and II\**. 30 + 30 min. Video VHS format. J.P. Producciones - Consellería de Medio Ambiente de la Generalitat Valenciana. Valencia.

\*Versions are available in Spanish and English

#### **4<sup>th</sup> cover page**

Many threatened populations of plant species occupy a very small area, ranging from a few square meters to a few hectares. To protect them, some countries have established legal systems that permit them to create and manage small or very small reserves (micro-reserves). An analysis is made of micro-reserves for plant species, with special reference to those set up in Region of Valencia (Spain).