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"IN SITU" CONSERVATION OF THREATENED PLANT SPECIES IN SPAIN

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Abstract

In only ten years, the number of legally protected areas in Spain has increased from 81 to 557. This has resulted in a growing number of endemic and/or threatened plant species becoming legally protected "in situ". Matching the 1,200 existing endemic species against 557 protected spaces into a presence-or-absence table may be a formidable task, but a satisfactory approach can be obtained through the 600 prioritary species whose conservation situation is analysed in two Spanish red data books. Estimations with this method suggest that a highly satisfactory proportion of the threatened flora is now included in these legally protected spaces, at least for the most endemic-rich regions. At the same time, law enforcement, active protection plans and rescue activities are being developed in several protected areas.

Introduction

Ten years ago, a reference to this subject would have been necessarily short and vague because there were very few things to say. But in one decade the situation has changed so dramatically, that the problem is now to summarize. Below, an estimation of the proportion of Spanish endemic plants which grow within the borders of ancient or newly declared protected areas is attempted. Although it refers to Spain only, there are many indications that such impulse has gone more or less parallel in other Mediterranean countries.

National Parks

Table 1 shows the names, date of creation and surface of the ten national parks now existing in Spain, while Figure 1 shows their geographic position. Four of them are in the Canary Islands, one in the Balearic Islands, and five more in the peninsular mainland. The oldest parks, Covadonga (recently enlarged and renamed Picos de Europa) and Ordesa, were created shortly after the most ancient national parks in other countries. The youngest, Cabañeros, was created while this article was written. The next in age, Archipiélago de Cabrera is largely submarine.

Put together, national parks only cover 0.4 % of the total land area of Spain (in turn slightly over 500.000 sq. km.). The figure is notoriously insufficient to protect threatened plant species, mostly for a country where roughly 1,200 endemic plants (plus many subspecies) exist. Additionally, as in many other countries, traditional criteria to protect areas were mainly based on the landscape, animal wildlife, recreation, etc., while the presence of threatened plant species was largely or totally ignored.

Name	Year	Surface (ha)
PICOS de EUROPA	1918	64,660
ORDESA y MONTE PERDIDO	1918	15,608
TEIDE	1954	13,571
CALDERA de TABURIENTE	1954	4,690
DOÑANA	1969	50,720
TABLAS de DAIMIEL	1973	1,928
TIMANFAYA	1974	5,107
GARAJONAY	1981	3,984
ARCHIPIELAGO de CABRERA	1991	5,500
CABAÑEROS	1995	40.000

Table 1. NATIONAL PARKS in the SPANISH NETWORK. (Source: National Parks Service)

During many years, a net of game reserves played an unadverted but important role in the conservation of both, flora and vegetation, It is perhaps the moment to recognize the historical role to these now archaic figures of protection which originally included areas as emblematic as Sierra Nevada, Sierras de Cazorla y Segura, Sierra de Javalambre, etc. Beyond any doubt, their benefits for the endemic flora should be ranked higher than those by traditional national parks.

Even with strict vegetation criteria the above scheme is unbalanced, because, for a long time, none of the Spanish national parks properly corresponded to the real Mediterranean vegetation which potentially covers some 60-75% of the Peninsular area. Helm oak stands have traditionally supplied fuel, acorns, wood, charcoal, shade, twigs for grazing animals, simbiotic tubers and up to 12 recognized economic benefits, plus a high number of ecological ones. In spite of this appreciation (or perhaps better, because of it), they are now in strong regression. Much talking has taken place, for many years, to create a helm oak park in one of the few places where this is still possible, but no real progress was made until the creation of Cabañeros, late in 1995 (Tablas de Daimiel and Doñana correspond to humid zones).

But still, from the point of view of the conservation of threatened flora, the rule througthout the Mediterranean area is that climacic or quasi climacic-vegetation dominated by helm oaks (durisilva) is not at all the right place to protect endemic or endangered plants. This is because most single-country endemics of the Mediterranean area are adapted to subserial situations where a certain exploitation (natural or artificial) occurs. In the Iberian Peninsula, endemic plants grow on steppes, rocky systems, humid zones, etc. Only in the Canary Islands there is a noticeable handful of endemics thriving in association with climacic laurisilva forests but, most often, they grow in more open vegetation on volcanic soils.

Thus, the conservation of Mediterranean forest, an important issue by itself, must be considered largely independent from the conservation of threatened species of plants. It is revealing that Cabañeros park - certainly a giant leap forwards for the conservation of Mediterranean forest - was not mentioned even a single time in the Red Book of

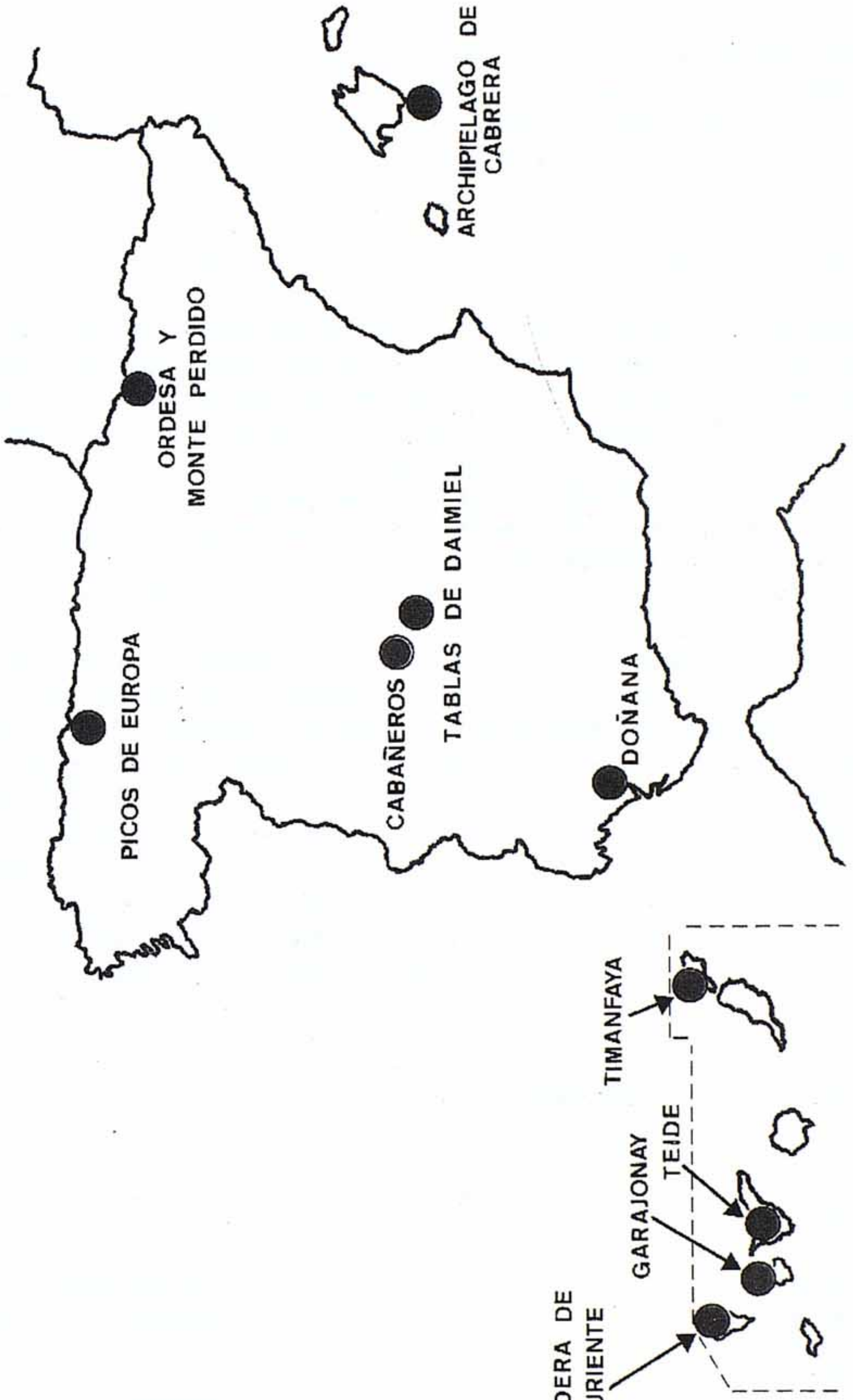

Figure 1. Spanish national parks.

the Spanish Peninsula and Balearic Islands (Gómez-Campo, 1987). In fact, very few of the plants included in this book are associated to arboreal ecosystems.

Many endemic species, and traditionally few protected areas have resulted in a rapid development of "ex situ" plant preservation procedures. In Spain, an actively growing net (now six) of seed banks are specialised in the conservation of wild endemic plants, mostly rare, vulnerable or endangered ones.

Other protected areas

Fortunately for the conservation of threatened flora, the number of protected spaces has climbed in the past ten years, from 81 (national parks, game reserves and others) to 557. Table 2 describes this proccess year by year, with the number of areas and their total surface. Table 3 shows the main types of protected spaces. The high relative surface provided by natural parks is noteworthy.

Now, almost 6,0 % of the Spanish area is legally protected. For an old country, plundered by centuries of overexploitation, this figure sounds not too bad. Moreover, it keeps still increasing almost every week.

Year	Number	Surface in ha
1985	81	374,890
1986	88	625,967
1987	162	957,809
1988	174	1,089,070
1989	252	2,193,776
1990	275	2,276,400
1991	389	2,461,627
1992	407	2,494,536
1993	410	2,484,675
1994	557	2,802,425

Table 2. Protected areas in Spain. (Source: National Parks Service)

Type	Number	Total surface ha
National parks	9	205,000 approx.
Natural parks	101	2,087,000 "
Natural reserves	95	28,400 "
Natural sites	109	110,760 "
Others	146	490,000 "

Table 3. Protected areas in Spain (December 1994). (Source LUCIO-VICENTE & al., 1994)

Increased public conscience and more available money have certainly played a role. But much more significantly, the fact that the Spanish government is now to a large extent decentralized into 17 autonomous regional governments, has helped to appreciate the values of Nature from a closer perspective. Except for the net of national parks, responsabilities for the conservation of Nature have been transferred to local goverments.

Protected plants. A quantitative estimation

Certainly, lists of protected species, red data books, seed banks, living collections in botanic gardens, etc. are important activities for the protection of the flora. But with a significant proportion of the national surface legally protected, the so long expected "in situ" protection is now at the door. At this respect, two key questions arise:

a, how such recent advances are reflected in the legal "in situ" protection of those 1,200 plant endemic species mentioned above?
b, are protection measures in these areas really effective, or will the declarations be mere labels attached to meaningless structures i.e. to so-called "paper parks"?

We will try to answer the first question and make a few comments on the second.

To match 1,200 species against 557 protected areas may be certainly a formidable task (a table with almost 700,000 squares should be filled). Nonetheless, much progress is being done, mostly through a series of works connected with the Directive of Habitats program.

For the time being, a satisfactory approach can be obtained by using the two red books of the Spanish threatened flora, the first on the Peninsula and Balearic Islands and the second on the Canary Islands (Gómez-Campo, 1987, 1996). Each contains 300 data sheets on endemic species. Table 4 gives a summary of the number of species included, according to their IUCN categories.

	PENINSULA + BALEARIC ISL.	CANARY ISL.
Endangered	35	105
Vulnerable	87	118
Rare	138	57
Not threatened	31	12
Indeterminate	9	8
	300	300

Table 4. Endemic Species and iucn categories. (As considered in the two Spanish red data books)

Both books contain the same number of sheets and, together, they approximately refer to one half of the Spanish endemics. Though Canary Islands contain less than one half of the Spanish endemics, their degree of danger is higher, so that a selection by equal parts has been considered more balanced.

In general, the Red Book species have not been randomly selected because the aim was to include the higher possible number of prioritary cases, chosen among strict endemics. Thus, statistical significance cannot be claimed, but the whole selection is a good approach on the side where conservation priorities are concentrated.

Thus, from now on, we will refer to this sample of 600 endemics as RB endemics (Red Book endemics)

Canary Islands

With only 1.42 % of the national area, the Canary Islands roughly contain 40 % of the Spanish endemic plants. These figures speak by themselves on the importance of this archipielago from the point of view of plant conservation. Fortunately, a high proportion of Canarian soil is now legally protected (Figure 2). Tables 5, 6, 7 and 8, show the number of RB endemics present in the 23 most significant protected spaces involving four different categories (total number of protected areas is 108).

It is to be noted that the number of RB endemics is higher in several natural or rural parks than in the four national parks present in the Islands. Only Anaga holds more RB species than all the four national parks together; it would be necessary to add the endemics of twelve Northern or Central European countries to equal this figure! But Europe was several times under an ice cap during the quaternaire, while the Canary Islands remained uninfluenced by a large series of events which impoverished the flora even in temperate regions. Anaga is a rural park, a variant of a natural park where some traditional agricultural practices take place.

To appreciate the situation as a whole, the best way is to go through all the RB species, marking the ones which grow within protected areas. After doing so, only ten species are not mentioned as growing in any park or protected space. Two are asigned K category, two are undescribed species, and still, for another couple of them, they seem

Name	island	RB endemics
La Caldera de Taburiente	P	19
Teide	T	15
Garajonay	G	11
Timanfaya	L	3
.....		45 *

Table 5. CANARIAN NATIONAL PARKS. G, La Gomera; L, Lanzarote; P, La Palma; T, Tenerife. (* Three endemics are shared by two parks)

to be ommisions in the corresponding red data sheets. This means we can estimate that 97-99 % of the Canarian endemics are now legally protected "in situ". An eye should be kept on *Sideritis cystosiphon* Svent. and *Taeckholmia heterophylla* Boulos, two "E" plants apparently not included in any protected area.

Name	island	RB endemics
Los Islotes	L	28
Corona Forestal	T	24
Tamadaba	C	22
Jandía	F	21
Las Nieves	P	13
Pilancones	C	12
Majona	G	8
Cumbre Vieja	P	5
Dunas de Corralejo	F	3
Islote de Lobos	L	2

Table 6. Canarian natural parks. C, Gran Canaria; F, Fuenteventura; G, La Gomera; L, Lanzarote; P, La Palma; T, Tenerife.

Name	island	RD endemics
Anaga	T	47
Teno	T	37
Nublo	C	25
Frontera	H	12
Valle del Gran Rey	G	10
Doramas	C	7
Betancuria	F	7

Table 7. Canarian rural parks. C, Gran Canaria; F, Fuenteventura; G, La Gomera; H, Hierro; T, Tenerife.

Name	island	RD endemics
Lanzarote	L	27
El Canal y Los Tiles	P	9

Table 8. MAB reserves in the Canary Islands. L, Lanzarote; P, La Palma.

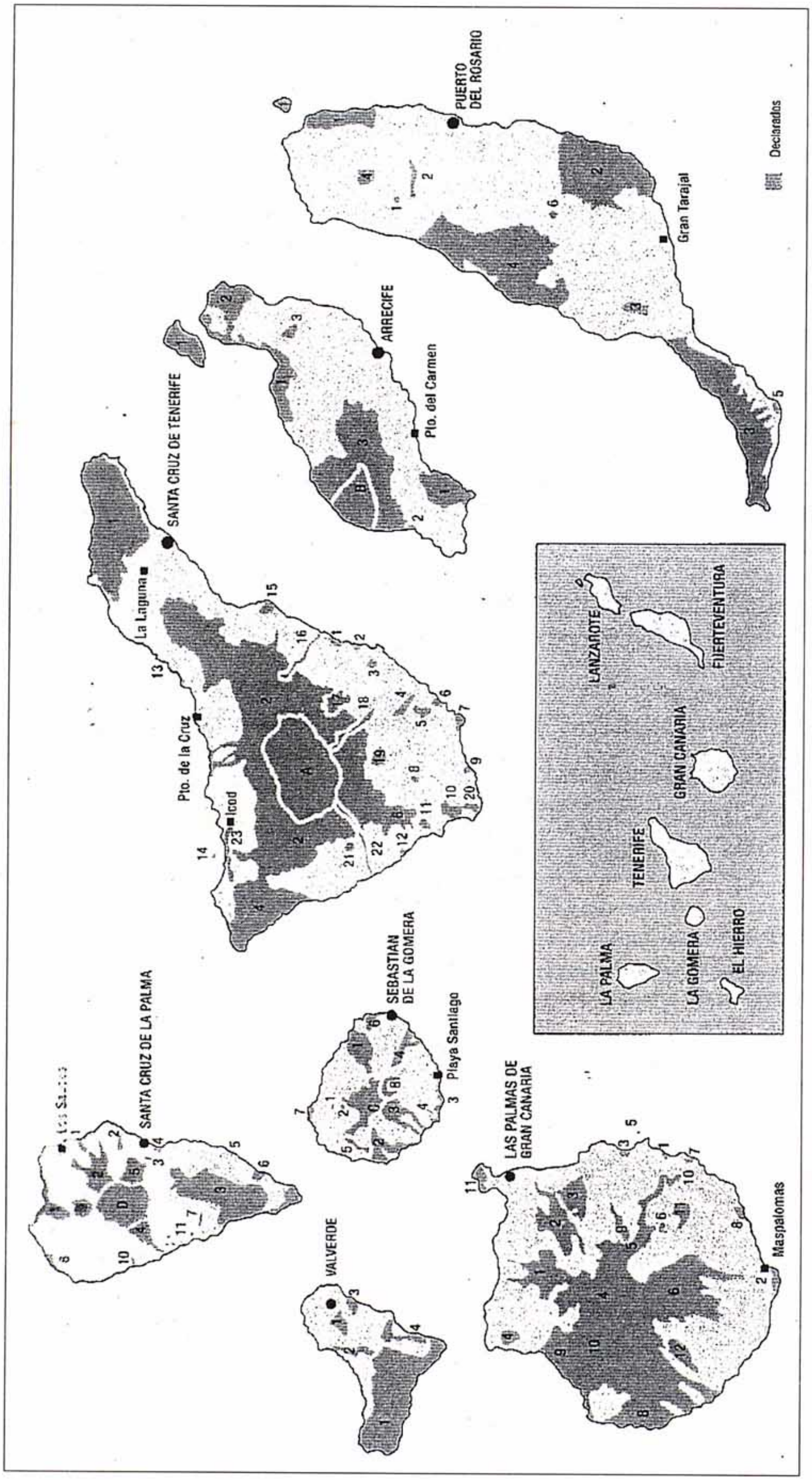

Figure 2. Protected Areas in the Canary Islands (source FPNNE).

The Peninsular Area

Table 9 represents all autonomic regions of Spain (excluding Canary Islands) with the number of RB endemic species they contain. The first column of numbers reflects those species endemic to Peninsular Spain and present in that autonomic region. The second column refers to those endemics which are exclusive of that region.

In the measure that the Red Book represents the endemic flora of Peninsular Spain (+ Balearic Islands), the table reflects some realities in the distribution of plant biodiversity in the Peninsula. The Center and the North are relatively poor (given the larger size of both Castillas) and, apart from the leading position of Andalousia (see below), the concentration of endemics on the Mediterranean side is very conspicuous. A band extending between Algeciras and Minorca, contains a large proportion of the non-Canarian Spanish endemics.

Making numbers with some other autonomous communities which are poorer in endemic plants may not have much meaning; thus, for the sake of simplicity, we will concentrate on Andalousia and the Balearic Islands.

The picture would have changed, but only slightly if the red books were not strictly restricted to single-country endemics. Taking into account rare species shared with France, Portugal or Moroco, the flora of some adjacent regions (including Andalousia again) would be proportionally richer.

Aut.Comunity	general	local
Andalucía	152	123
Aragón	33	8
Asturias	14	0
Baleares	30	26
Cantabria	12	0
Castilla-La Mancha	34	7
Castilla y León	30	5
Cataluña	23	9
Extremadura	5	0
Galicia	14	4
Madrid	4	1
Murcia	25	7
Navarra	3	0
País Vasco	1	0
Rioja	1	0
Valencia	39	16

Table 9. Distribution of endemic plants (mentioned in the Red Book) in 16 Spanish Autonomic Communities (Canary Islands are excluded)

The case of Andalousia

The Andalousian government has done a tremendous effort in declaring many protected spaces in the last few years, so that at least 17 % of the Andalousian area has now some type of legal protection assigned. There are, for instance, twenty-two natural parks covering an area over one million hectares. Figure 10 describes a selection of them, exactly those ranking higher in the number of RB endemics. Total number of protected areas is 83. Andalousia has a single national park, Doñana, very well known by its fauna of birds and mammals, but not especially rich in endemic plants.

Sierra Nevada's altitude, its type of substrate and its paleoclimatic history have endowed these mountains with a high and interesting phytodiversity. Nineteen of the RB endemics are exclusively "nevadensis". There are writtings since the beginning of this century signaling this wealth and calling for protection, but it was not until 1989 that it was declared a natural park. Many people firmly thinks that it should be the second national park of Andalousia.

In spite of the effort done, if we go through the RB Andalousian endemics checking their presence in protected areas, thirty are found (out of 152, thus 20%) with no apparent protection. The figure for the protected ones (80%) is, therefore, lower than in the Canary Islands. However, three sierras (Gádor, Tejeda and Almijara) containing a significant number of endemic species are on the way of being declared natural parks. When this occurs, the index of protection for Andalousian endemics will climb to 90%, approximately.

It is fortunate that both Canary Islands and Andalousia, the regions which are the richest in plant diversity, have also been so progressive in declaring protected areas.

Balearic Islands

Balearic Islands has a single National Park (Archipielago de Cabrera), largely maritime, and only two Natural Parks, s'Albufera and Mondragó. However, it has up

Name	area ha	RB endemics
Sierra Nevada	171.646	46
Cazorla, Segura y Las Villas	214.100	23
Sierra Mágina	19.900	11
Sierra de María - Los Vélez	18.962	6
Sierra de Baza	52.337	5
Entorno de Doñana	54.200	5
Cabo de Gata - Níjar	26.000	4
Sierra de Grazalema	51.695	4
Sierras Subbéticas	31.568	3
Despeñaperros	6.000	3

Table 10. Andalousian natural parks with the higher number of RB endemic plants.

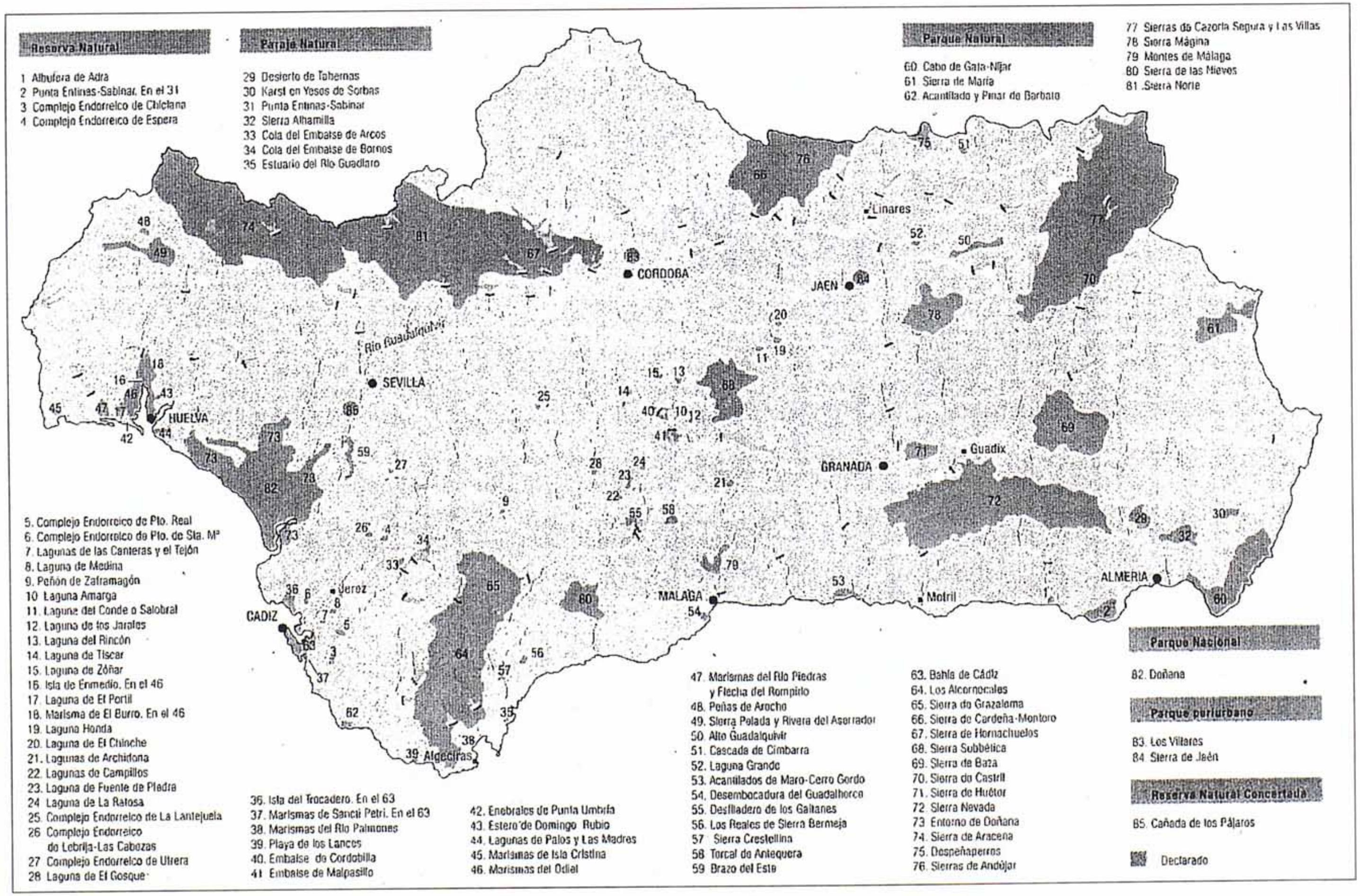

Figure 3. Protected Areas in Andalousia (source FPNNE).

to 86 protected spaces under the figure of "Natural areas of special interest" covering a large part of the Archipielago.

The Red Book includes 30 Baleric species (sixteen from Mallorca, twelve from Menorca and ten from Ibiza plus two additional ones which are present in two islands).

After checking that list of thirty species, it can be concluded that most of them, if not all, grow in protected areas. However, this is only true if we include the Northern Sierra of Mallorca, Sierra de Tramontana, holding several endemics; it seems to be only protected against urbanistic development, but this might be enough for a place where the impact of building is very heavy in the surroundings.

Thus it is not very far from reality to state that near 100% of Baleairc endemics are now legally protected "in situ".

A final question

The situation presented is certainly optimistic, but full optimism would depend upon the answer to an important question: are protecting laws being enforced and are protection measures really effective or, alternatively, these protected areas everywhere in Spain are mere labels, or - as said above - only fictitious "paper parks"?

To be sincere, many areas may be just "paper" areas in this moment. But they are newborn, and declaration is a necessary legal first step, which should antecede the second and any following one. Therefore, we should not be impatient or pessimistic, because for most cases, it has not been even enough time to go further.

We should be optimistic, because the public is now very conscious about these subjects and because politicians have firmly and definitely taken conservation as an important issue.

Additionally, that second step has also been often decidedly initiated. Very clearly, for instance, in Andalousia. In the Canary Islands not so much, but the ambitious scheme for protected areas was improved as recently as in December 1994. In Balearic Islands they are also going on. In several autonomic regions, plans for effective protection and rescue activities for a number endangered plants are now taking place very conspicuosly.

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