THE PRESENT SITUATION OF BIRDS OF PREY IN PORTUGAL

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ABSTRACT

This paper describes the status of various diurnal raptors in Portugal and suggests reasons for their decline together with the measures necessary to conserve them. Three species are classed as endangered, seven as declining, two as probably declining, two as vulnerable with a restricted distribution and eight as stable; two are of unknown status. Less detailed information is given for owls.

INTRODUCTION

In recent decades there has been a considerable lack of information on the status of raptors in Portugal. In consequence, some species, such as the Osprey (*Pandion haliaetus*) and Imperial Eagle (*Aquila heliaca*), were until recently considered extinct, whilst others, such as the Long-eared Owl (*Asio otus*), were considered not to breed in the country (Bruun & Singer 1978). If we look at the distributions given for Portugal in *The Birds of the Western Palearctic* (Cramp & Simmons 1980) we can see, for example, that birds as common as the Short-toed Eagle (*Circaetus gallicus*) are shown as almost absent. These facts can be explained only by very deficient observation over the last four decades. Only in recent years has increasing work been done and the first papers in this volume result from this.

The Portuguese landscape is relatively diversified but for the most part lacks large areas of any one habitat. Therefore we still retain most species of raptor although, except for some less specialized species, these are represented by small populations. Besides, large areas of the country are either densely populated or covered with commercial pine forests of low structural diversity holding, as a result, an impoverished community of birds of prey. Human population density is relatively high, especially towards northern, central and extreme southern coastal districts, where urban, industrial and road development, and intensive agriculture and forestry, have led to an impoverishment of habitats for birds of prey. Human density in these coastal districts reaches 100–580/km^2 evenly distributed, while inland densities gradually decrease to 20–39/km^2. In these less populated districts, settlement is otherwise very much of a concentrated type, and some areas still remain important for birds of prey, especially in the north-east, central interior and south.

LEGAL SITUATION AND PUBLIC ATTITUDE

From 1967, shooting of uncommon diurnal species and most owls has been prohibited by law, as well as the destruction of nests and nestlings. Only since 1974 have the other species been included in the law (Red and Black Kites, Harriers, Sparrowhawk, Buzzard, Kestrel, Hobby and Eagle Owl). Organized and rewarded persecution ended after 1974, but from then on the number of hunters increased greatly, up to around 300,000.

In spite of penalties incurring one to six months in prison and fines from about US$14 to $280, temporary prohibition from hunting, and confiscation of the means used in infringement of the law, raptors continued to be systematically persecuted until very recently. This was due not only to general ignorance of the law and of the reasons for respecting these birds, but also to the obvious negligence of the authorities. Now this situation has improved slightly; nevertheless, especially in the hunting season, significant numbers of raptors are still shot, and this affects in particular the resident species. The main motivations are boredom due to scarcity of game, and interest in stuffed trophies.

Whereas the deliberate seeking of nests in order to destroy them is no longer a wide-scale practice, resin and cork extraction operations are still a great danger to breeding birds, as large areas of good nesting habitat are systematically combed and significant numbers of nests thereby destroyed. The slight improvement in numbers is partially due to education and protection laws, but more particularly to the depopulation of the countryside.

ENDANGERED SPECIES

Osprey (*Pandion haliaetus*)

In 1979 I could find (Palma, in litt.) two pairs breeding on the southwestern coast, and five more nesting sites which, from their appearance, must have been occupied in recent years; one of them was occupied by an isolated adult in 1979/80/81. In 1982 both pairs still bred with success but apparently the isolated adult still had not managed to acquire a mate. This agrees with information collected from local people, which led me to believe that there were seven or eight pairs about eight years ago.

Besides the confirmed breeding records cited above, there are two more places where Ospreys have been observed with possible but unconfirmed breeding.

The only published data from previous periods belong to Coverley (n.d.) from the 1940s and 1950s—a period when, according to information gathered personally, the Osprey population might have reached 20 pairs, which could have corresponded to the original population size.

Considering that its last small breeding area is now beginning to be increasingly in demand for tourist development, and that the species has such a low population level, we may consider it as probably the most seriously endangered raptor in Portugal.

Black Vulture (*Aegypius monachus*)

One pair on the banks of the Tejo river is the only unconfirmed breeding record from recent years. Two nests observed by Spanish ornithologists in 1973 on Portuguese territory near the Spanish Picos de Aroche breeding colony (Francisco Amores, pers. comm.) have now disappeared, apparently due to forestry work in the area.

Table 1: Status of breeding populations of diurnal raptors in Portugal.

Species	Trends/Degree Abundance[1]	of threats	Limiting factors Hab. ch.	Shoot.	Nests	Distur.	Food res.	Toxic che.
Pandion haliaetus	R	E	×	×		×		
Pernis apivorus	R	T			?			
Elanus caeruleus	C	I		×				
Milvus milvus	F	T		×	×			?
Milvus migrans	C(A)[2]	S			×			
Neophron percnopterus	F	S					×	?
Gyps fulvus	F(C)[2]	T					×	?
Aegypius monachus	R	E	×			×	×	
Circaëtus gallicus	C	S			×			
Circus cyaneus	U	T	?	×				
Circus pygargus	C	T	×		×			
Circus aeruginosus	F	T	×	×				?
Accipiter nisus	F	T	×	×	×			?
Accipiter gentilis	U	T	×	×	×			
Buteo buteo	C(A)[2]	S		×	×			
Aquila (heliaca) adalberti	R	E	×	×	×	×	×	
Aquila chrysaetos	U	T	×	×	×		×	
Hieraaëtus fasciatus	U	S		×		×*		
Hieraaëtus pennatus	C	S	×					
Falco naumanni	F	T			×		?	?
Falco tinnunculus	C	T		×	×		?	?
Falco eleonorae	R	?					?	?
Falco subbuteo	F	S	×					
Falco peregrinus	U	T		×	×	×*	×	

Key: **Abundance** (only valid in suitable habitats)
R = rare—very seldom seen, even once or less/year or extremely localized.
U = uncommon—1–5 seen monthly.
F = frequent—more than 10 seen monthly.
C = common—1–5 seen daily.
A = abundant—more than 10 seen daily.
Degree of threats/Trends
E = endangered—in danger of extinction.
T = threatened—declining or vulnerable.
S = stable—not threatened at present, possibly stable.
I = increasing.
Limiting factors
Hab. ch. = habitat changes.
Shoot. = direct destruction by shooting.
Nests = destruction of nests.
Distur. = disturbance of nesting sites.
Food res. = scarcity of food resources.
Toxic che. = contaminating and poisoning.
* only on the coast.

Notes: 1. Abundance ranking closely follows Garzón (1977) for comparative purposes.
2. Letters in brackets indicate higher ranking in some particular areas.

The species can now be considered as probably extinct in the country. Only in some areas in the south near known Spanish colonies (Hiraldo 1974) is the species regularly seen. Confirmed or suspected breeding areas according to the literature (Coverley n.d.), or to local information collected by myself in Alentejo, disappeared a long time ago. At least for some areas in Alentejo, the large-scale 'wheat campaign' in the 1930s–40s, with the conversion of grazing land into wheatfields, can be identified as responsible for the disappearance of this vulture, as well as of other sensitive species (e.g. the Pardel Lynx, *Lynx pardina*).

Imperial Eagle (*Aquila heliaca adalberti*)
Against the supposed extinction of the species in Portugal (Meyburg 1976), there were, in the last ten years, seven sightings of adults, partially within the breeding season, and also of eight juveniles and immatures in the south and centre (only in the border area) of the country, in two kinds of habitat: the plain cork oak woodlands of the Tejo and Sado valleys, and the southern and central hilly country covered with cork oaks and maquis.

The only published observation is of a pair seen in 1933 in the Sado cork oak woodlands (Ticehurst & Whistler, *in* Coverley n,d,).

In 1977 I conducted a search in the cork oak plain woodlands, where I was able to collect much information on the species in the area and see some birds. Most of this information referred to the period before 1975/76. In September 1977 I was shown a nest in the top of a tall maritime pine (*Pinus pinaster*) which had been occupied in that breeding season. According to the information collected, and birds seen since 1972, I think that before 1974/75 the number of pairs might have reached 10–15 in the lowlands and the total population might then have amounted to 15–20 pairs. However, after 1974 habitat changes following agrarian reform profoundly altered that situation. Lack of economic support from successive governments and the collectivization of former private estates, many of them also former private hunting reserves, included the felling of the largest and best part of the old, unproductive pine stands and isolated pines, which were the favoured nesting sites, as a source of finance. At the same time, the opening up of these areas to hundreds of hunters did away with their traditional tranquillity. In hilly country most of the shrubby understorey that kept the places quiet was also destroyed in order to extend pasture and crop areas.

A search group is now being organized but practical difficulties in this season have prevented conclusive results. Some few pairs may survive, but the situation is undoubtedly critical. Imperial Eagle survival depends, in the first place, on persistent and methodical searching to ascertain location and conditions of the possibly remaining pairs and, from then on, on a land management plan for the area.

DECLINING SPECIES

In general terms, most species seem to be on the decrease, although there is a lack of objective data, particularly from the period preceding the last decade. However, two papers, while insufficiently covering the whole country and certain species, allow us to evaluate in some measure the evolution of the raptor situation over the past 47 years: these are Coverley's MS—his own data from 1935–1945, and Bugalho's data (1970) from 1960–1970. After 1972 my own observations in central, eastern and southern Portugal, traditionally the richest bird of prey areas in the country, lead to the conclusion that a significant decrease is affecting some species. In the first years of this period, a raptor could be seen every 19 minutes or every 10km in those areas. Now less than 50 percent of this average can be observed, which reflects in particular a decrease in some commoner species, such as *Milvus milvus, Circus pygargus, Falco naumanni* and *F. tinnunculus.*

Red Kite (*Milvus milvus*)
Although occurring over a large part of the country (Rufino & Araújo, in litt.), the Red Kite has decreased sharply, being now rather scarce in most areas. Its abundance may be comparable to or slightly higher than that of the Short-toed

Eagle in a general way. Formerly, Coverley considered it 'common' and 'nesting in fair numbers'; however, Bugalho already remarked on an 'enormous decline' after 1960. In the last decade a decline of at least 50 percent could be noticed in many areas.

Until recently, it was one of the most persecuted raptors, and this may have been the main cause of the present situation.

Montagu's Harrier (*Circus pygargus*)
Its decrease seems to be recent, since before 1970 no decline was noticed (Bugalho 1970) in the southern cereal fields. Today this bird is scarcer than at the beginning of the last decade, which could be a result of increasingly mechanized harvesting, with the consequent destruction of many nests, as I and other observers (Rufino, pers. comm.) have noticed and as was pointed out by Garzón (1977).

Sparrowhawk (*Accipiter nisus*)
This raptor occurs almost throughout the country, being more common in northern and central pinewoods, but is nowadays less common than in previous decades, being not much more abundant than the Hobby. Coverley found it 'fairly frequently' but Bugalho (1970) already considered it much scarcer than before. The use of persistent pesticides until 1972 probably explains its decline.

Golden Eagle (*Aquila chrysaetos*)
This eagle population dropped in mountain areas. It has disappeared from some mountains (e.g. Estrela) or is breeding irregularly in others (e.g. Gerês, Marão). This may result from persecution, illegal poisoning of wolves, and increased disturbance by tourist and recreational activities. Another cause is the afforestation of its hunting grounds.

It maintains itself, however, in the northern and central plateaux, where it breeds in river gorges, free from marked disturbance—a similar situation to that in Spain (Garzón 1974).

Lesser Kestrel (*Falco naumanni*)
This kestrel has decreased considerably, having disappeared from many known sites on town buildings and become scarcer in others. Coverley (op. cit.) knew of a raid on a large breeding colony in a castle which totalled 200 eggs. Now this colony has only some ten pairs. Robbing of nests still occurs, but the main reason for its decline is probably the diminishing amount of prey, mainly insects, caused by the use of pesticides.

Kestrel (*Falco tinnunculus*)
One of the most abundant species in the 1940s (Coverley, op. cit.), the Kestrel has suffered a sharp decline since then, and Bugalho (op. cit.) already pointed out a marked decrease within a few years. In the last decade its decline is clearly detectable, probably reaching 60–70 percent. Now only a few individuals can be observed where dozens could once be seen, which may be a result of intense persecution until recent years, and a drastic scarcity of prey due to the use of pesticides.

Peregrine (*Falco peregrinus*)
Now absent from most of the country, including sites where it once occurred (Coverley, n.d.). This seems to be explained by scarcity of suitable bird prey in otherwise good breeding areas. Among the most important population, located

on the coast, some sites were recently abandoned. Two factors threaten this population: Rock Pigeon (*Columba livia*) hunting and egg-robbing. Last year three eggs disappeared during incubation.

PROBABLY DECLINING SPECIES

Griffon Vulture (*Gyps fulvus*)
This species declined in the period 1940–1960 when some colonies disappeared as a result of diminished sheep- and goat-herding (Palma & Rufino 1981). This factor, together with new methods of husbandry, still pertains through most of Iberia (Garzõn 1977) and may be causing some decrease in Portugal, although we have no objective data to support this. One positive feature is the prohibition of strychnine and certain dangerous rodenticides such as thallium. Even illegal use of these is infrequent and localized in Griffon areas.

Goshawk (*Accipiter gentilis*)
Our present knowledge does not permit a precise statement of Goshawk population status. The species is commoner in the northern pinewoods and less common in the Mediterranean-type vegetation of southern hills and lowlands.

Two factors may be reducing its numbers, however: the afforestation of maquis areas with consequent diminishing food supply, and large-scale forest fires which, in recent years, have destroyed extensive areas of pinewood in many places in the north and centre.

VULNERABLE SPECIES WITH VERY RESTRICTED DISTRIBUTION

Hen Harrier (*Circus cyaneus*)
This harrier occurs in a very narrow strip in the extreme north of Portugal, in what seems to be the southernmost limit of its northern Iberian population.

In southern Portugal (Alentejo) its breeding in lowland cereal fields was known by Coverley (op. cit.) before 1940. He reported it as a frequent breeder and knew of nests in marshy depressions within croplands. Today, although much scarcer, recent observations and information support a belief in the continued existence of a small breeding population in that area (Rufino & Araújo, in litt.). So far as I know from the literature (Cramp & Simmons 1980), this species is only known to breed in the north of Spain, which adds interest to its breeding in southern Portugal.

It is a species vulnerable to any wide-scale habitat changes in its breeding area.

Marsh Harrier (*Circus aeruginosus*)
Habitat for this raptor has never been extensive, but nowadays is even less so due to drainage of wetlands. Although an important part of the suitable habitat areas is included in natural parks and reserves, which affords some protection, its low numbers (Rufino & Araújo, in litt.) make it vulnerable to environmental changes.

SPECIES NOT DECREASING

The following species show no detectable decline, at least not on a country-wide scale.

Black-winged Kite (*Elanus caeruleus*)
Probably the only raptor whose population is expanding. It occupies almost all parkland habitats in the southern and east-central lowlands. These consist of open cork and holm oak woodland, although the bird also occurs in denser cork oak woodland provided that it has open areas in which to hunt, such as cropland, pasture or rice fields.

Formerly, *Elanus* seemed scarcer and more localized (Coverley, n.d.). Even in the period 1960–70 this species was considered rare by Bugalho (1970). This author considers it now much more common (Bugalho, pers. comm.). In fact, it is difficult to believe that this assessment is due only to increased field work, as maintained by Sacarrão (1975) and, to a certain extent, also Collar (1978). Garzõn's opinion (1977) is that the kite is expanding in Spain. Spanish ornithologists familiar with both central Spain and southern Portugal (Francisco Purroy and Mario Rodero, pers. comm.) consider it much more common in our country than in Spain. The population estimate for Portugal is 100–150 pairs (Rufino & Araújo, op. cit.). It is expanding towards the north into open areas with chestnut trees and deciduous oaks, and apparently increasing in numbers in some areas of the south. Its increase may be related to the clearing of the woodland understorey in southern lowlands, as Garzõn (1977) states for Spain.

Black Kite (*Milvus migrans*)
Although this kite may have slightly decreased in the last ten years, it is still abundant in suitable habitat, particularly in some southern areas and along the Mondego and Zêzere river valleys.

Egyptian Vulture (*Neophron percnopterus*)
This species is not very widespread (Rufino & Araújo, in litt.) but seems stable in its breeding areas in the north-east and central-east, most of which are along river canyons.

Short-toed Eagle (*Circaëtus gallicus*)
Generally present in most areas with suitable habitat, especially in the south, it has apparently been stable in the last ten years. It is somewhat strange that Bugalho (1970) considers it rare, since it is rather common in areas the author knows quite well, such as the cork oak woodlands in southern lowlands, where the minimum distance between occupied nests may often be as little as 3260m.

Buzzard (*Buteo buteo*)
At present this is the commonest and most uniformly distributed raptor in Portugal. The cork oak woodlands of western Alentejo seem to be the area where it is most abundant, its density in some areas reaching one pair per 300ha. In spite of being the species most often shot, along with the Kestrel, the Buzzard is holding its own quite well.

Bonelli's Eagle (*Hieraaetus fasciatus*)
Like the previous species, this eagle seems to be quite stable and is generally present in suitable areas, though limited by availability of nesting sites. An interesting feature is the existence of six pairs nesting on coastal cliffs and feeding on coastal prey. A similar situation is only found, so far as I know, in three pairs in southeast Spain which nest, not on the coastal cliff itself but very close to it (Francisco Amores, pers. comm.).

Booted Eagle (*Hieraaetus pennatus*)
Although less evenly distributed than the Short-toed Eagle, it often reaches, in cork oak woodland, densities twice as high, with a minimum distance between occupied nests of 1750m. Apparently stable in the last ten years, though it does not seem to be increasing as in Spain (Garzõn 1977).

Hobby (*Falco subbuteo*)
The Hobby is difficult to detect in extensive woodlands, so its numbers may be higher than thought. In the south it seems to have similar densities to the Short-toed Eagle, while in some northern areas its densities may be similar to those of the Sparrowhawk.

SPECIES OF UNKNOWN STATUS

Honey Buzzard (*Pernis apivorus*)
In the 1940s the Honey Buzzard was breeding south of the river Tejo (Coverley, n.d.) at a latitude higher than the presently recognized southern limit of its range in Spain (Cramp & Simmons 1980). Those authors considered it not uncommon in the area. Bugalho (1970) also studied it there in the breeding season.

Although it is now certainly uncommon, some sightings in the breeding seasons of 1978, 1981 and 1982 led to the belief that it still breeds throughout that area. The habitat is dense plain cork oak woodland with pines and open patches of farmland and pasture. The species also exists in the north-east and central east, where it seems rather scarce. However, it is a difficult bird to locate, so it is possible that further field work will reveal it to be more widespread and common than thought in both areas.

Eleonora's Falcon (*Falco eleonorae*)
An adult which I saw on 4 September 1981, on the southwestern rocky coast, was the first record for the country. This coast seems to be a good breeding habitat and, as the species breeds in the Atlantic—Canary Islands and Morocco—and its migration starts only in October (Cramp & Simmons 1980), further investigation should be undertaken to ascertain whether or not it breeds there.

OWLS

Objective knowledge on owls is less than on diurnal raptors. It is difficult to tell whether each species is increasing or decreasing, and what the cause may be. At any rate, it can be stated that *Athene noctua* and *Tyto alba* are the most common species, followed by *Strix aluco* and *Otus scops*. *Bubo bubo* and *Asio otus* are distinctly scarcer.

All these owls, except for *Otus scops* which is absent during the hunting season, are too often shot by hunters for taxidermy. This practice surely has a significant negative effect, particularly on the Eagle Owl, whose breeding rate is lower.

Asio otus is a secretive species, which may account for the scarcity of breeding records in Portugal. Oddly considered absent from the country as a breeder in recent field guides (e.g. Bruun & Singer 1978), it in fact seems to breed all over the country, as shown by increasing breeding records (Rufino & Araújo, in litt.). The first confirmed record was published by Magalhães (1974).

THREATS

Problems affecting birds of prey in Portugal are naturally similar to those pertaining throughout the Iberian Peninsula. At the ICBP World Conference on Birds of Prey in Vienna (1975), Garzõn outlined the main factors endangering Spanish raptors and these are also valid for Portugal. Some differences exist, however, particularly as regards the relative importance of each negative factor and the stage of development reached by the conservation and educational movements.

Economic development is lower in Portugal than in Spain. Thus its environmental effects do not generally reach such intensity, although since Portugal is a much smaller and more highly populated country, these factors have significant consequences in any case. On the other hand, the evolution of conservation and education is also less developed in Portugal.

Habitat changes

These are the most dangerous factors for raptor populations. The invasion of Mediterranean hill vegetation by afforestation with pine and eucalyptus is a well-known threat to raptors breeding in these habitats (Garzõn 1974, 1977; Meyburg 1976). In the next five years 150,000ha of poor farmland and wasteland will be planted for commercial purposes; 91,000ha with pines, 45,000ha with eucalyptus and only 13,500ha with broad-leaved trees, in a project financed by the World Bank.

Only two areas of Mediterranean vegetation are now protected, but neither is very rich in raptors. However, studies conducted on ecological sensitivity in Algarve (Barreto 1980), in which rare fauna were taken into account, contributed towards getting this area set aside, thus sparing the habitat of several species such as Lynx and Imperial Eagle. (The faunal elements were based on specific reports, later collected and included in Rosário *et al.* 1982.) Nevertheless, the situation is not completely safe, as state forestry departments continue to plant eucalyptus in this area, albeit on a reduced scale.

Older continuous pine afforestation in the northern and central mountains reduced the amount of habitat for Golden Eagle, Montagu's Harrier and possibly Hen Harrier in these areas. These extensive pine forests are also extremely prone to fires. Hundreds of thousands of hectares burned over the last few years have affected several tree-nesting species such as Buzzards and Accipiters.

Shooting and destruction of nests

Illegal shooting affects all resident species, especially in the south where it is more widespread and deep-rooted in popular tradition, resulting from systematic and rewarded persecution until 1974. This was worsened by the opening up, justified by social and political aims, of the former private hunting preserves to large numbers of hunters. Persecution is also common in the north-west, especially of the Golden Eagle, accused of taking lambs.

Only in the last four to five years have I sensed some decline in deliberate persecution, except that for taxidermy. This is the main reason for shooting birds of prey at present, and in some areas it can be a significant factor. For example, in a single taxidermist's which I visited in 1981, the following raptors were stuffed: 2 *Circus pygargus*, 9 *Accipiter nisus*, 1 *A. gentilis*, 18 *Buteo buteo*, 3 *Falco tinnunculus*, 18 *Tyto alba*, 2 *Bubo bubo*, 4 *Asio otus*, 1 *Otus scops*, 9 *Athene noctua* and 6 *Strix aluco*, making a total of 73 specimens.

Destruction of nests is no more widespread than it used to be; nevertheless it is still common in some areas, especially during cork and resin extraction. Outside the cork oak and pinewood areas, destruction is less intense.

Diminishing food supply

Shortage of carcasses due to the decrease in sheep- and goat-herding, the mechanization of farming, new animal husbandry and improvement in sanitary measures affect the vultures, though apparently not yet very acutely. Shortage of rabbits caused by myxomatosis affects the larger eagles and to a lesser extent the Eagle Owl. Peregrines are affected by the general decrease in bird numbers inland; only on the coast do their food resources seem abundant.

Pesticides, PCBs and poisons

Birds of prey have probably not been severely affected by the bioaccumulation process, as some persistent compounds—DDT and Dieldrin—have been prohibited since 1972. Heptachlor and Toxaphene have never been used in Portugal. PCBs have been restrictedly used for closed circuits, being forbidden in plastics, paints, etc. since 1977. Nevertheless, highly toxic compounds with low persistence, such as Endrin, Parathion and Lindane, are used. Apart from some possible cases of acute poisoning, these compounds may have an indirect effect on some species by reducing their food supply, mainly insects.

Few analyses have been made on birds of prey, but organochlorines and PCBs have generally been found in small amounts (Barros 1971). One exception concerns two eggs of *Elanus caeruleus* from 1976 which revealed 24.22ppm (wet weight) and 18.85ppm DDE (dry weight) respectively (Margarida Barros, pers. comm.). Another egg from the same clutch, analysed in England, contained 7.1ppm DDE, which is on the borderline at which shell-thinning can occur (Collar 1978). In 1980 and 1981 a study on the contamination of the Osprey's diet in its breeding area did not reveal high levels of Chlordane, Dieldrin, DDE, TDE, pp'DDT and PCBs (highest values—0.03ppm pp'DDT in liver of *Liza aurata* and 0.236ppm PCBs in liver of *Diplodus vulgaris*). Lindane was not detected. Thus contamination of Ospreys by such products in the breeding area does not seem to be responsible for their decline (Barros *et al.*, in litt.).

Dangerous poisons such as strychnine, arsenic and thallium are forbidden in Portugal. In spite of this, strychnine has been used illegally in the north-east in carcasses set out for wolves. This constitutes a danger to Griffons, Egyptian Vultures and kites. In the rest of the country, such practice is rare.

Disturbance of nest sites

This particularly affects raptors breeding on the coast, as tourism spreads. These areas, where Ospreys, Bonelli's Eagles, Peregrines, Kestrels and Lesser Kestrels breed, were until recently outside intense tourist demand, but are now in danger of rapid change. Recreational and tourist activities are responsible for the disappearance of these species over large areas and, so far as the Osprey is concerned, account for an 80–90 percent decrease over the last 50 years. The remaining pairs will surely succumb to the rising tourist 'development' of the last wild stretches of coast.

Another kind of disturbance stems from increasing forestry work in remote areas, which has been responsible for the disappearance of the last Black Vulture nests and the inhibition from nesting of Imperial Eagles in otherwise suitable places.

NECESSARY ACTIONS IN THE FUTURE

Education on the reasons for the legal protection of birds of prey is far from satisfactory, although some leaflets and posters have been distributed. Large-scale action is an important task which needs urgent development. Simultaneously, special programmes for particular classes of the public having direct contact with raptors, e.g. hunters, peasants and forestry-related workers, at least in important bird of prey areas, are especially urgent.

Law enforcement

Transportation of live and dead specimens, keeping of raptors as pets, and taxidermy have a negative effect and are not included in current legislation. Transport and keeping should be prohibited, and taxidermy has to be suitably regulated with the registration of birds stuffed prior to a fixed date and prohibition beyond that date, as happens in other countries.

Also regulations on cork and resin extraction should include special articles on respect for nests, which would be an important help to large nesting birds too often affected by these activities. Much heavier fines are necessary to generally support application of the law.

Until recently, falconry has been little practised in Portugal. It is now, however, the object of support by game authorities, in spite of signature by the Portuguese Government of the Council of Europe's Convention on Conservation of European Wildlife and Natural Habitats. Peregrine Falcons and other raptors have accordingly been taken from the wild in the absence of specific regulations.

Research

Research is particularly needed on the status and conservation of the Imperial Eagle, conservation of the Osprey, the population status of the Black-shouldered Kite, and the effect of modern farming methods (and minimizing of their impact) on Montagu's Harrier. Also species with little-known status such as the Honey Buzzard, Hen Harrier, Goshawk and Hobby need to be studied, the first two particularly in their supposed southern breeding grounds.

Ecosystems

Concerning habitats, the upper Douro valley, the plain and hilly cork oak woodlands and the southwestern coast may be considered, at present, the most important areas for birds of prey and therefore should be more closely studied with a view to being submitted to special management plans.

A preliminary ecological evaluation has been conducted on the southwestern coast for its tourist and overall management, and stemming from this a simplified natural classification system has been included in one of the local government land plans (Cancela da Fonseca *et al.* 1982). A Natural Reserve in the upper Douro valley, the main area for nesting Griffons, Egyptian Vultures and Golden Eagles, and an important area for other species, is planned for the near future.

The cork oak woodlands support the most diverse and abundant tree-nesting raptor communities among the forest and semi-forest ecosystems of the country. Cork oaks occupy 654,900ha in Portugal, of which 608,960ha are in the south. Part of this covers hilly country in the southern 'serras', but the major part spreads over some 400,000ha with minor gaps in the lowlands of the western half of Alentejo. These are the last areas where Imperial Eagles may survive in the future, provided that management can be enacted, incorporating protection of actual and potential

breeding sites, establishment of game reserves in key areas, regulation of timber, resin and cork exploitation, and development of public education. These considerations are partially valid for the other species.

In general terms, forestry activities should be concerned with conservation of birds of prey and other species, sparing in particular a significant number of old and well-located tall trees which, as a rule, constitute good breeding sites. Also, the establishment of a network of reserves for birds of prey, especially in rocky and forested habitats, is an important action needed on a country-wide scale.

General subjects

Other desirable actions include contamination monitoring; inventories of taxidermists, and of stuffed and captive specimens; studies on the causes and processes of habitat degradation, and a supplemental feeding programme for vultures (at the moment only one feeding place has been constructed for Black and Griffon Vultures). A final step is the organization of a recovery centre. These and the foregoing actions should be organized by the State, as the only institution capable of acting quickly and decisively.

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