

Social and Economic Aspects of Raptor Conservation in Portugal

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ABSTRACT

Over the past twenty years, Portugal has experienced various social and economic transformations, which have resulted in extensive land use alterations and urban/tourist pressures.

Nature conservation has become a necessity in the country. Nevertheless, regular studies on raptors have only recently been carried out, including the analysis of some species' distribution and numbers. As a consequence, the Portuguese scientific community and some sectors of public opinion have now begun to be concerned about birds of prey, their conservation and the measures necessary to minimize the negative impacts of rapid economic development. This paper summarises the work that has been conducted, especially along the rocky littoral, where the increasing number of projects connected with tourism has been significant during the last few years.

HISTORICAL PERSPECTIVE

Portugal is a small country (*ca.* 89,000 km²) situated at the SW extremity of Europe. Despite its small size and long history of human settlement, information regarding the distribution and numbers of its different raptor species is quite recent. Due to the socio-economic and political situation in the country during the period from the late 1920s to mid-1970s, Portugal failed to reach the level of knowledge acquired by other European countries in the scientific field. For the same reason, during this period the country did not experience the massive problems of environmental degradation faced in other parts of Europe. Nevertheless, three major problems affected the populations of raptors in Portugal:

- * The "Campanha do Trigo" (Wheat Campaign), which commenced in 1928 (Palma *et al.* 1985) and continued until late in the '40s (Palma 1985). In this campaign, substantial areas of "maquis", holm and cork oak were

converted to extensive cereal cultivation;

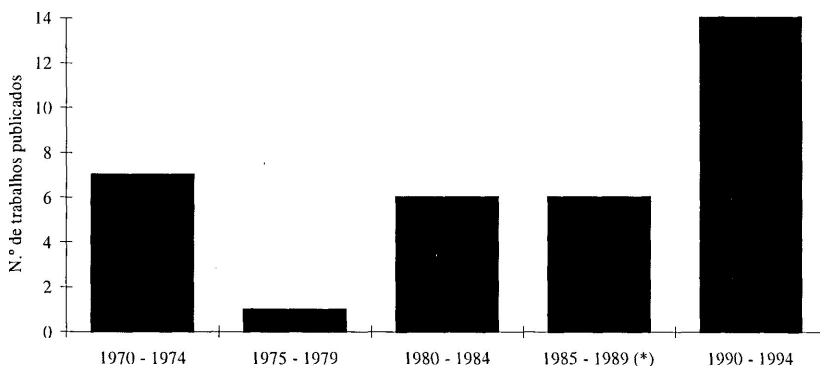
- * The "controlo de nocivos" (persecution of predators) began in the Iberian Peninsula during the 1950s and continued until 1973. This programme promoted the general destruction of predators, including birds of prey;
- * The afforestation since the 1950s of extensive and continuous areas in North and Central Portugal, based on *Pinus pinaster* and *Eucalyptus globulus*; a major consequence of which are the fires (followed by soil erosion) that every year affect these regions.

In the early 1970s, with the end of the dictatorial regime and a major opening up to foreign trade, Portugal began to invest heavily in developments for tourism, especially along the Algarve coast. Meanwhile a small movement by people interested in the situation of raptors in the country led to the publication of the first papers exclusively devoted to birds of prey and a growing concern culminated with the establishment of the first Protected Natural Area (Parque Nacional da Peneda-Gerês).

During the "revolutionary period" from 1974 until 1980, very little was done in the ornithological field due to the major political, social and economic transformations taking place.

From 1980 on, Portugal entered an era of political stability and significant improvement in social and economic conditions. The growth of the economy was followed by a general concern over environmental quality. The extensive debates between developers and "environment-minded technicians" were fundamental in arousing the awareness of the general public, the younger generation in particular. A significant increase in the number of birdwatchers was observed and the number of papers published regarding birds of prey in Portugal increased considerably (Fig. 1).

Figure 1. Number of works on raptors published by Portuguese authors in journals or conference proceedings.



(* excluding papers presented at the V International Conference on Mediterranean Raptors)

PRESENT SITUATION

Two aspects will be analysed, since they exemplify the state of affairs in Portugal regarding raptor conservation. The first reports on data recorded in the eastern part of the country regarding raptor populations (*Gyps fulvus* in particular). The second describes the situation in the rocky coastal areas.

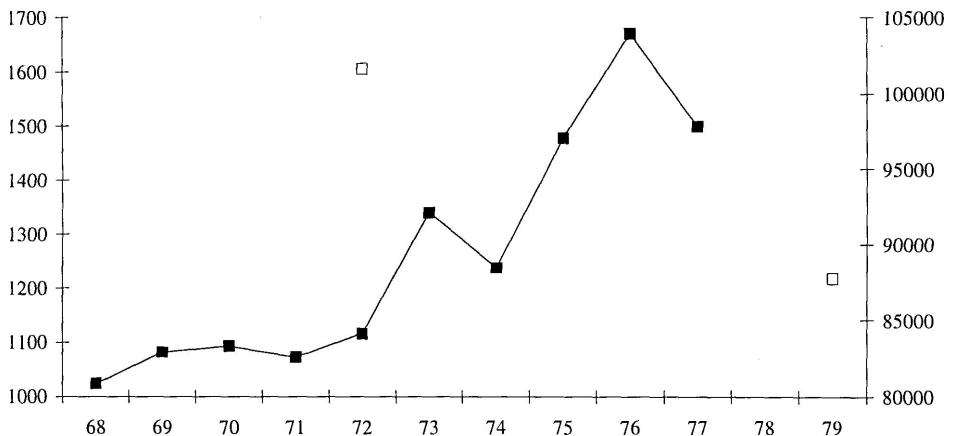
The interior (Portuguese eastern border, northern sector)

In 1983, Oliveira & Palma (*in litt*) stated that 60% of the *Gyps fulvus* population resident in Portugal were situated on the Douro Internacional. Several reasons were then given for the sharp decrease in numbers recorded for this species. Coupled with poisoning and hunting, the reduction of food resources was proposed as a major factor since these birds were almost completely dependent on human activities related to sheep, goats and cattle rearing (Vulture Study Group 1985). This proved to be extremely negative for the vulture population: it was established that the numbers of free-roaming stock present in Douro Internacional had decreased by 13.7% (Fig. 2), 22.7% of which was due to a reduction in the number of goats (Oliveira & Palma, *in litt*). It is believed that the increase in slaughtered animals then recorded resulted from a significant improvement in the Portuguese economic situation following the political events of 1974.

According to Oliveira and Palma (*in litt*), advances in the sanitary control of cattle resulted in the burning or burying of dead animals, which further contributed to the reduction in vulture food resources.

Sports such as mountaineering and climbing also became very popular, giving rise to strong negative impacts in the vulture nesting areas. In

Figure 2. Animals slaughtered in the Douro Internacional region and number of cattle in this area between 1972 and 1979 (Oliveira & Palma *in litt*)



the Douro region, in one of the climbing areas, at least two juvenile Griffons prematurely deserted the nest (Oliveira 1985).

By this time the necessity of implementing measures to protect this population had become obvious. One of the measures undertaken was the establishment of feeding areas, near the Spanish border. This was undertaken through the initiative of government authorities and ecologists. The slaughterhouses in the region donated rejected meat for these feeding places, which never exceeded four in number. Unfortunately, a large number of these small slaughterhouses have now been closed and the difficulty in procuring meat for the Griffons is now great.

In 1986, a complete census of the nesting population of *G. fulvus* was conducted for Portugal (Araújo 1994). The results then obtained (199 occupied nests) were above all expectations (100 to 150 pairs, according to Rufino *et al.* 1985). Araújo (1994) states that this difference may be due to the higher number of areas prospected. Nevertheless, this author acknowledges the possibility that this increase may be the result of socio-economic changes in the region: a rise in the number of wild pigs; implementation of legislation concerning nature conservation; implementation of a policy of subsidies for sheep breeding.

In the present author's opinion both situations are probably true: a fictitious population growth may result from a preliminary census limited by the small number of participants¹); a real population growth may have occurred as was recorded for Spain - according to Donazar (1993), the population of Griffons in that country increased by 80% to 90% between 1979 and 1989. This bird's population is distributed along the Portuguese-Spanish border and is marginal in relation to its area of distribution in the Iberian Peninsula (*cf.* Donazar 1993).

The foregoing culminated with the publication in 1990 of the only Portuguese law strictly aimed at the protection of birds of prey: regulations for the establishment and administration of vulture feeding areas. Unfortunately, the demands imposed on the creation of such areas renders them impossible to operate and relieves the central administration of any responsibility in the conservation of Portuguese Griffons.

The rocky coastline (southwest Portugal)

The rocky coastal areas are the system far most studied as regards diurnal raptors in Portugal. All the changes occurring on this type of coast for the past 25 years are a reflection of the socio-economic transformations that took place in the country during that period. The Portuguese littoral presents the

¹This aspect was registered for *F. peregrinus*

highest urban growth rates in the country. This, in association with the increase in tourism infrastructures and activities, together with all the commerce associated with the leisure industry, was recognised as the main cause for the negative impacts observed on the raptor populations. Two types of impact were mentioned: land use alteration and the disappearance of the traditional human activities to which the birds were adapted.

Figure 3. Probable evolution of the number of pairs nesting on the Portuguese rocky coast, for three species of raptors, during the past twenty years. The dark arrow indicates the year when it became forbidden to hunt in the area.

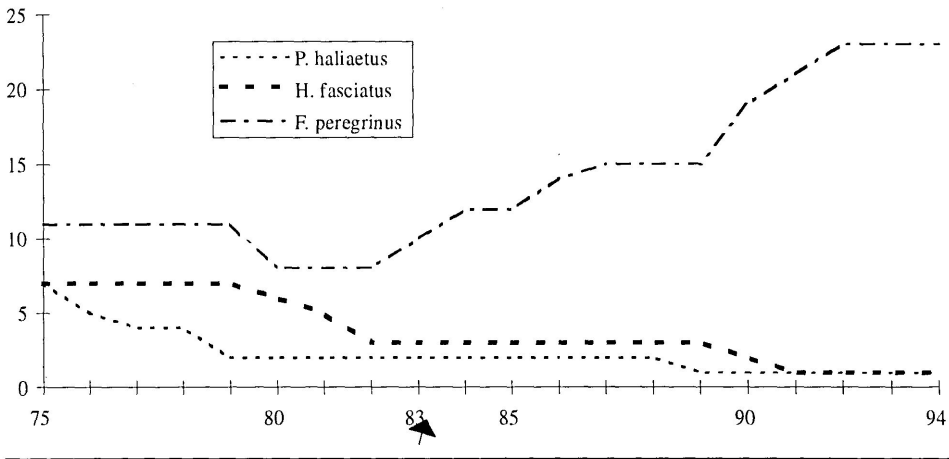


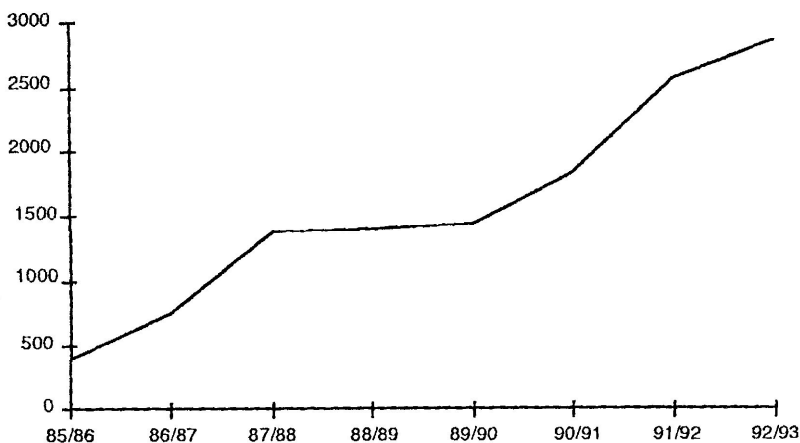
Figure 3 represents a hypothetical evolution of *Hieraaetus fasciatus*, *Pandion haliaetus* and *Falco peregrinus* nesting on the rocky coast of Portugal during the past twenty years. The decrease in the number of pairs of these three species from 1975 onwards appears obvious. Several authors attribute this decline to the disturbance of nesting sites and the killing of individuals and their prey (e.g. *Columba livia*, cf. Cancela da Fonseca 1994).

It is interesting to note that the population of *F. peregrinus* has stabilized, while that of *H. fasciatus* is still decreasing. It has been proved that the sites abandoned by the latter have been almost immediately reoccupied by *F. peregrinus* (Oliveira 1994).

With the creation of the National Hunting Reserve (NHR) ⁽²⁾, in 1993, *F. peregrinus* is the only raptor that appears to be recovering from the reduction in its numbers. Velhinho and Oliveira (1989) allude to the benefits resulting from the formation of such special areas. Figure 4 traces the evolution in the number of rabbits killed in a cultivated area north of Lisbon, included in the NHR. The upward trend in all probability reflects an increase in other types of prey, namely *Columba livia* and *Alectoris rufa*, species for which population

² Note: hunting is a forbidden activity in the NHR.

Figure 4. Number of rabbits killed for population control purposes in an area north of Lisbon (Reserva Permanente de Caça das Arribas).



control measures do not exist. These aspects may have contributed to the increase in *F. peregrinus* numbers.

² Note: hunting is a forbidden activity in the HNR.

The combination of all these facts suggests that *F. peregrinus* is a species with a high tolerance of human presence. Effective conservation measures may only be successfully implemented if the factors enabling the three species considered to subsist in adverse conditions are fully understood. In the following paragraphs these aspects are analysed.

Pandion haliaetus

In Portugal, *P. haliaetus* appears to nest exclusively in rocky coastal areas, as is characteristic of the Mediterranean population (Bagur 1993). During the past twenty years this species has shown an 86% decrease in numbers (cf. Palma 1984). The hypotheses of pesticide and PCBs poisoning as the main cause for this decline was discarded by Barros *et al.* (1984). According to Cancela da Fonseca (1994), *P. haliaetus* breeding on the coast uses inshore waters 33.6% of the time (fishing mainly over small dams (Beja 1988) and brackish waters in 33.5% of the cases (especially when sea conditions are adverse)). This author considers *P. haliaetus* to be extremely sensitive to human activities. Carrillo and Delgado (1991) assume a strong correlation in the Canary Islands between the desertion of nests by *P. haliaetus* and development for tourism.

Data collected by Palma (1984), completed by personal findings, point to the fact that, from 22 initial pairs (minimum estimated value), 18% of the

nests were located on islets more or less distant from the rocky shoreline. The only known pair now nesting on the Portuguese coast occupies the highest (50 m) and most distant (200 m from shore) of these small islands.

Hieraaetus fasciatus

A recent study of nesting diurnal raptors recorded a higher number of observations in a cultivated area of the only pair of *H. fasciatus* nesting on cliffs near the sea, than were obtained in a natural area of identical size (Fig. 5). This pair, like the other raptors present in the zone, hunted in the more open area (agricultural terrain), crossing the other territory in the process. It must be appreciated that both areas are located in the middle of the largest urban region of Portugal, with a population of over two million people.

Figure 5. Number of observations of birds of prey in two different landscape areas of 1000 ha each (AÇOR 1993).

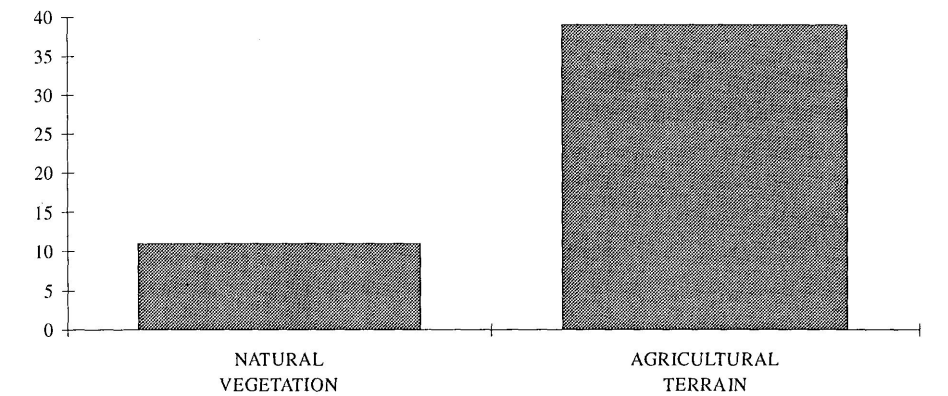
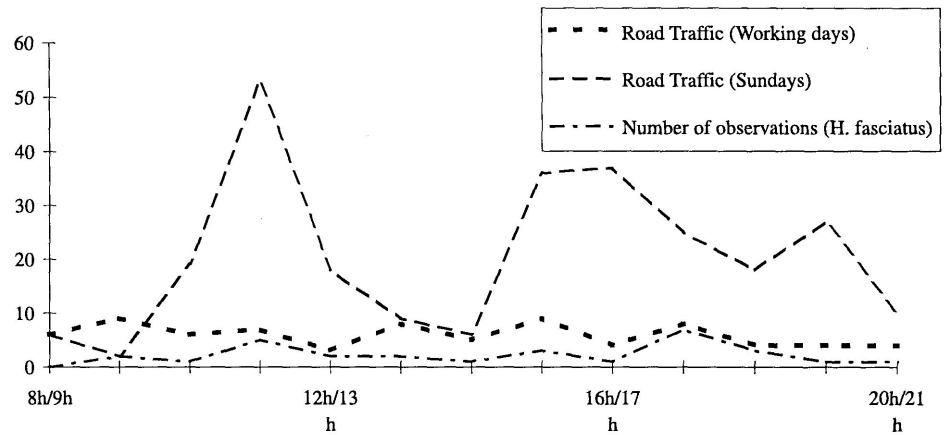


Figure 6. Traffic volume on a road serving a cultivated area at Arrábida during a typical working day and a holiday in relation to the number of observations of *Hieraaetus fasciatus* recorded on working days.



In this study, the volume of traffic was established for a road crossing the cultivated area. Counting included the number of trucks serving a nearby quarry. Figure 6 represents the traffic volume variation during a typical working day and on a Sunday. As should be expected, on Sundays the traffic intensity reaches its peak shortly before and after luncheon; during the morning it consists mainly of leisure cyclists. In the same graph it is possible to compare the traffic movement with the average number of observations of *H. fasciatus* (periods of 1 hour) recorded, for the same area during working days.

No correlation was proved between observation of the eagles and the intensity of traffic ($r^2 = 0.12$, $p > 0.05$). It appears that, at least during the period considered, these eagles fly independently of the intensity of traffic. The human pressure exerted during the week-ends does not appear to have a direct influence on the behaviour of this pair either. Nevertheless, a number of visitors tend to walk along the cliff tops (maximum height of 380 m).

Figure 7. Relation between cliff height and distance from cliff top of *Hieraaetus fasciatus* nests.

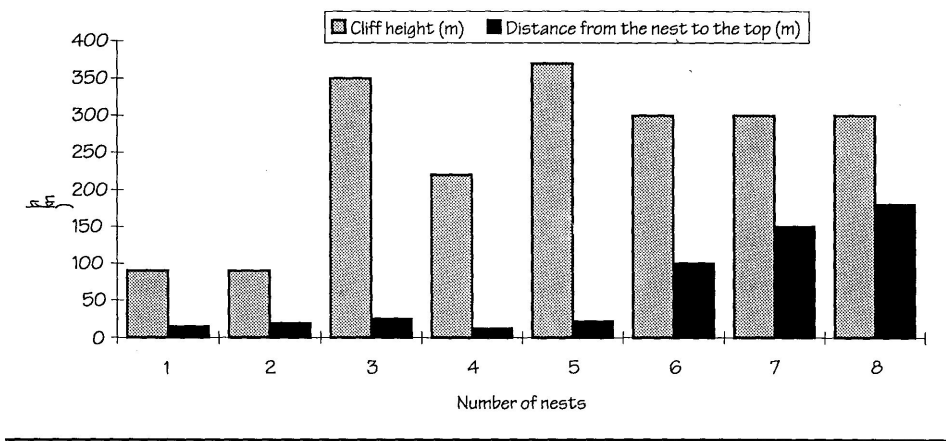
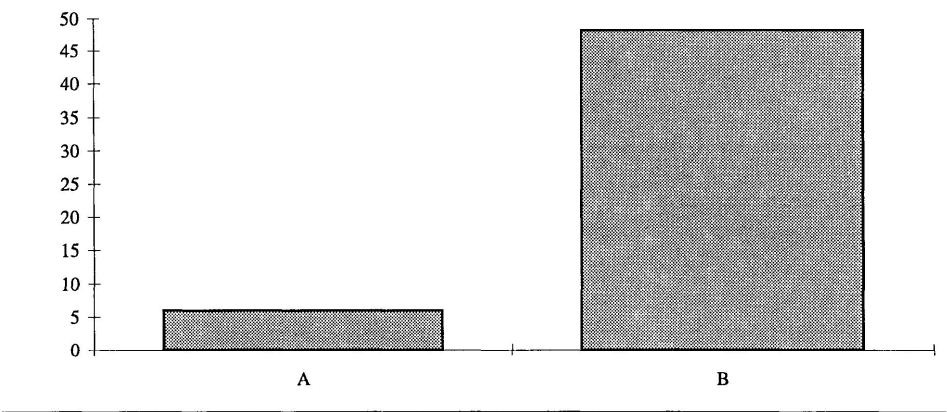


Figure 7 represents the vertical distance from each of the eight *H. fasciatus* nests to the cliff top and the corresponding cliff height. The nests built on the lower cliffs (nests 1 and 2) are situated 2.5 km from the others, in an area of intense climbing activity. At the present time, these nests are occupied by *F. peregrinus*. Analysis of the distribution of the remaining six nests points to the existence of two distinct groups of nest site: one closer to the cliff tops and therefore more susceptible to human depredation; the other situated at much lower levels.

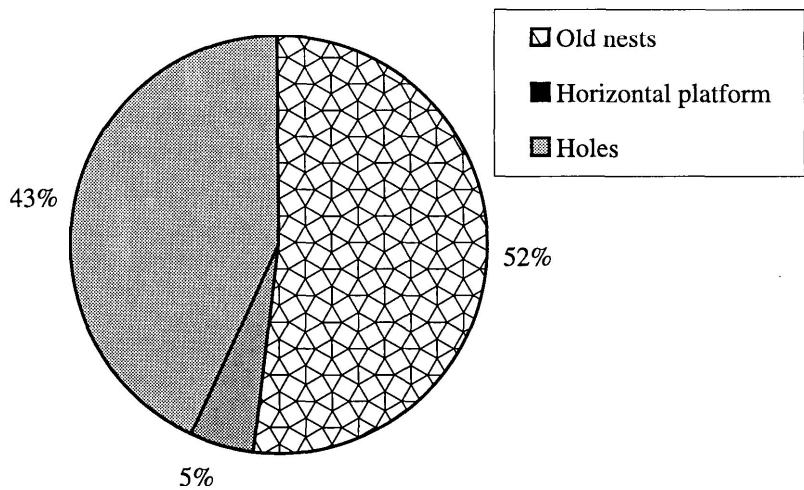
From examination of Figure 8 it is possible to compare the Nest Height

Figure 8. NHI (average) for two groups of three nests each.



Index [NHI] ⁽³⁾ for the two groups. It is known that the eagles experience great difficulty in taking flight from lower levels. Nevertheless, in this particular study area there is a zone (500 m in extent) where the combined action of prevalent winds and rising air currents facilitates the eagles' movements. In 67% of the cases, these birds cross the ridge line over this specific zone (AÇOR 1994).

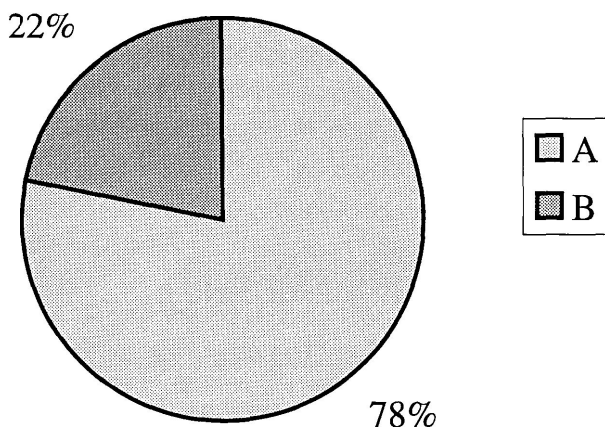
Figure 9. Characteristics of nest location for *Falco peregrinus* in the Portuguese rocky coast (from Oliveira,1994)



³ NHI is the relation between the distance from the nest to the cliff top (D_{nt}) and the cliff height (H_c). This relationship may be expressed as a percentage, the "Nesting Height Index - NHI" (Oliveira 1992):

$$NHI = \frac{D_{nt}}{H_c} \times 100$$

Figure 10. Percentage of *Falco peregrinus* pairs in relation to the intensity of human pressure exerted on the nesting areas.



(A - small to medium pressure; B - high pressure)

Falco peregrinus

In 1992, the estimated number of *F. peregrinus* in Portugal was 37-59 pairs. Of these, 23 had been confirmed (62% of the estimated total) and three were possible. In ten years, an increase of 55% was registered for this species (Oliveira,1994).

This bird of prey does not appear to be very demanding in the selection of nest sites. Roughly 50% of those studied were old nests of other species. Most of the remainder correspond to *F. peregrinus* nests located in natural calcareous holes, with a southern exposure, along the coastal cliffs (Fig. 9).

In 22% of the cases detected, *F. peregrinus* pairs had their nests in areas with a strong human presence: in one situation, the birds were successfully nesting below an important building site; one pair has its nest below a popular fishing spot while another nests only a few metres from a highly frequented road, close to a hang-gliding field. The risks that these birds run are very high: at another site a juvenile was killed, entangled in fishing lines left behind by fishermen (Oliveira,1994).

It is known that this species has good nesting conditions in at least five other areas along the coast; however, these places are not characterized by a high abundance of food. It thus appears that, at present, the selection of nesting areas by the Peregrine Falcon depends mainly on prey abundance and less on nest availability.

DISCUSSION

The two situations just described reflect the present knowledge and conservation status regarding birds of prey in Portugal.

This country registered a rapid economic growth, especially after 1974. However there was no real counterpart at the scientific level, because the necessary funds have been, debatably some will say, channelled to the implementation of infrastructures and the improvement of social aspects.

The river banks of the interior of Portugal are not as well studied as the country's cliffs. This is due to socio-economic reasons: most of the scientific community is located along the coast and travelling to the interior results in high costs. The fact that the vast majority of public opinion is not yet sensitive to the problems associated with nature conservation in general – not to mention the conservation of raptors and their habitats – only aggravates the issue.

The case of *Gyps fulvus* is quite distinct from the other raptors. This vulture is distributed over the Iberian Peninsula but does not nest in its eastern and western regions (cf. Cramp & Simmons 1980; Donazar 1993). This means that in Portugal the only areas where it is possible to find *G. fulvus* are close to the Spanish border. The dynamics of these vultures in Portugal (a marginal population of around 210 breeding pairs (Araújo 1994)) only reflect the dynamics of the Spanish population (near 8.000 breeding pairs (Donazar 1993)).

Although many opinions were expressed regarding the causes of the probable decrease in the numbers of Griffons before 1983 (Oliveira & Palma, *in litt*), no consistent study was ever carried out.

Newton (1979) states that in some regions the spacing of colonies of cliff-nesting vultures is clearly set by the availability of cliffs; where cliffs and ledges are surplus to needs, the distribution and size of colonies are presumably influenced by food. Donazar (1993) suggests that the great changes in raptors' potential nesting areas may lead to the regional extinction of some species. According to the same author, in the particular case of the Iberian vultures, the loss of breeding habitat appears to be the main reason for the population decline. Nevertheless observations conducted by Oliveira and Palma (*in litt*) at the Douro Internacional point to a different explanation.

Donazar *et al.* (1989) also mentions that, in Navarra, the presence of roads and forest paths near the nests has no effect on *G. fulvus*. However, during the breeding period this species is quite sensitive to visitors (pedestrians or otherwise) (Donazar 1993).

In Portugal, the recovery of the *G. fulvus* population depends on the implementation of measures to halt its persecution, to increase sheep breeding

and to establish adequate feeding areas, as suggested by Abreu (1984) and Donazar (1993). Nevertheless, the maintenance of these areas is difficult under the present circumstances.

Protection of the Griffon Vulture must be considered along with the conservation of other threatened species - an increase in the population of *G. fulvus* may result in a decrease of *Aquila chrysaetos* (Donazar 1993).

In the littoral, the situation of the three raptor species studied appears noticeably different:

Pandion haliaetus

The lack of food may not be the real problem for this species in Portugal (Cancela da Fonseca 1994). Considering the characteristics of this Mediterranean population (*vide* Chiavetta 1981) and the possible causes behind the decrease of nesting pairs along the Portuguese coast, conservation management of this species depends on two aspects: breeding in captivity and the establishment of artificial nests.

Some authors disapprove of measures for population reinforcement (Newton 1979); however it is our opinion that this will be the only way to save the Portuguese *P. haliaetus* population. This species may be considered as the most threatened raptor in Portugal, with only one breeding pair known. It is expected that the implementation of a breeding programme for these birds will generate social and economic problems (closing areas for the release of fledged young is never a popular measure).

The creation and placement of artificial nests generate technical and financial problems: how to install nests in high places on distant islets? What type of building material should be used, resistant to the salt air and strong winds? (Oliveira 1984). It is hoped that the establishment of artificial nests along the Portuguese coast, beginning this year, will answer some of these questions.

Hieraaetus fasciatus

It is considered that the pairs of *H. fasciatus* nesting on the rocky littoral are marginal to the distribution of the species. At least one of these pairs occupied an alternative nest away from the coast.

This species is sensitive to the presence of hikers near the nesting areas; however it appears tolerant of car traffic. In Portugal, three nests are known, located in the close vicinity of important roads (distant 200 m, 1200 m and 2000m, respectively). Parellada *et al.* (1984) refer to this species as showing some tolerance of environmental degradation. *H. fasciatus* appear to prefer cultivated areas as hunting grounds.

The survival of the only pair nesting on the Portuguese coast, or the possible reintroduction of another pair, depends of two types of measures

(vide AÇOR, 1993; 1994; Cancela da Fonseca 1994): a ban on climbing and hiking activities at critical points on the cliff tops which, since the mid-1980s, is connected to the recession in the number of raptors nesting on the coast, like *H. fasciatus* (Cancela da Fonseca 1994; Oliveira 1994).

Falco peregrinus

The Peregrine Falcon may be considered an opportunistic species, in the sense that it immediately occupies nests abandoned by other birds.

The steady increase in this raptor's population is probably associated with the increase in numbers of *Columba livia*, its preferred prey. This last species benefited from the creation in 1983 of an area forbidden to hunting along the rocky coast (cf. Velhinho & Oliveira 1989; Cancela da Fonseca 1994; Oliveira 1994). This suggests that, in Portugal, the limiting factor for *F. peregrinus* is food availability.

With the objective of ensuring a minimum amount of food for this bird population, it is planned for 1995 to create pigeon houses located at carefully chosen sites along the coast. These dovecotes, built for *C. livia*, will be quite inexpensive and easy to maintain. They are specially designed to minimize the risks of predation.

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