SCI. MAR., 67 (Suppl. 2): 3-6 SCIENTIA MARINA 2003

MEDITERRANEAN SEABIRDS AND THEIR CONSERVATION. *E. MÍNGUEZ, D. ORO, E. DE JUANA and A. MARTÍNEZ-ABRAÍN (eds.)*

Mediterranean seabird conservation: what can we do?*

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SUMMARY: Human activities in the Mediterranean determine, to a large extent, the availability of food and breeding sites for seabirds, the two most important ecological requirements for breeding seabirds. Food availability is highly dependent on fisheries activities and the availability of breeding sites is largely related with tourism pressure. Conservation plans necessarily need to incorporate the fact that Mediterranean seabirds and human activities are forced partners. However, solutions are complex because fishing policies are not commonly designed by environmental agencies and also because seabirds are organized in metapopulations which do not coincide with administrative borders. In this monographic volume, several authors describe the main characteristics of the Mediterranean seabird community, identify its conservation problems and suggest a number of technical solutions.

Key words: conservation, seabirds, Mediterranean, management, fisheries, tourism.

RESUMEN: LA CONSERVACIÓN DE LAS AVES MARINAS MEDITERRÁNEAS: QUÉ PODEMOS HACER? – Las actividades humanas determinan en el Mediterráneo, en gran medida, la disponibilidad de alimento y lugares para la reproducción, los dos principales requerimientos ecológicos de las aves marinas. La obtención de alimento se ve muy influenciada por las actividades pesqueras y la disponibilidad de sitios de cría depende de la presión turística. Los planes de conservación han de contemplar necesariamente esta realidad con la que las aves marinas están obligadas a coexistir. Las soluciones son complejas porque las competencias en materia pesquera no suelen estar en manos de las agencias ambientales y porque las aves marinas se constituyen en unidades metapoblacionales, transgrediendo fronteras administrativas. En el presente volumen diversos autores ponen de relevancia las particularidades de la comunidad de aves marinas del mediterráneo, identificando los principales problemas para su persistencia en el tiempo y sugiriendo algunas medidas paliativas.

Palabras clave: conservación, aves marinas, pesquerías, turismo, gestión.

INTRODUCTION

Nowadays, the most important ecological limiting resources for seabirds, food and breeding sites, mainly depend on industrial fishing policies, and on availability of non altered coasts and islands. Therefore, Mediterranean seabird conservation needs to consider, at least, fishery activities and the protection of breeding habitats. Both issues seem, however, to be quiet difficult to manage by environmental institutions, usually not very influent in regional, national or international policies. First, because the socio-economic importance of fishing, and second, because seabird populations seem to be strongly mediated by conservative life-histories and complicated metapopulation systems.

*Received January 23, 2003. Accepted April 3, 2003.

Attempting to find solutions for both aspects of seabird conservation, a disperse legislation, and numerous administrations implicated, increases the disorder: the sea, the place where fisheries and seabirds exploit fish, is a traditional "no-man's land" legally depending on different non-related administrations. On the other side, seabird breeding metapopulations over-limit the administrative frontiers within and between countries, and management is usually performed locally and without co-ordination. Again, would not it be desirable to follow the slogan "think globally, act locally". Or even, act globally?

Diagnosing conservation problems in the Mediterranean

In this volume, several authors illustrate the particularities of the Mediterranean seabird community, suggesting different conservation problems that could be addressed by using different approaches. Fisheries can affect seabirds by changing the availability of food. Most of the Mediterranean seabird populations currently exploit resources also associated with human fisheries. A high proportion in biomass of the resources obtained by yellow-legged gulls, Audouin's gulls, Cory's shearwaters, Balearic shearwaters, and probably Mediterranean shearwaters, is associated with the activity of fisheries. Only two Mediterranean breeding species, the Mediterranean Shag and the European storm-petrel seem not to be largely dependent on industrial fisheries. Mediterranean fishery activities affect breeding success, rates of predation upon eggs and chicks (González-Solís, 2003; Martínez-Abraín *et al.*, 2003; this volume), and presumably distribution of colonies (Abelló *et al.*, 2003). Fishery policies differ between northern and southern Mediterranean coasts, countries and even regions.

As well as causing changing in food availability, fisheries may have adverse effects by incidental mortality of birds. Accidental capture of seabirds in longlines and fishing nets occurs in the Mediterranean Sea, and it seems to seriously affect some local seabird breeding populations (see Cooper *et al.*, 2003; Valeiras and Camiñas, 2003; this volume). Most seabirds share a set of demographic values characteristic of a 'K' strategy. They have high adult survival rates, deferred maturity and low fecundity (see Furness, 2003; Moreno, 2003; this volume). As a result, any factor increasing adult rate mortality will have a particularly strong negative influence on population dynamics.

Fortunately, some monitoring programs permit some approach to spatial-temporal population dynamics, suggesting very high links among colonies. Evidence clearly shows one thing, at least: local population changes may affect other local populations, even quiet far. Therefore, local actions (as breeding facilitation of endangered species or culling of considered pest species) need to consider the global effect (see Oro, 2003). Outside the reproductive season, most Mediterranean seabirds move to the Atlantic Ocean (see in this volume Mouriño *et al.*, 2003; Valeiras, 2003; Yésou, 2003; see also Le Mao and Yésou, 1986) where only international fishing convenes would permit conservation measurements. The application of the stable isotope technique, or tagging data loggers to track the movement of Mediterranean breeding seabirds across isotopic gradients, can provide information on the location of feeding areas outside the Mediterranean Basin (see Forero and Hobson, 2003, Aguilar *et al.*, 2003, this volume).

Searching solutions

BirdLife International suggests a list of objectives and actions for implementing conservation activities across the Mediterranean (see Gallo-Orsi, 2003; this volume). Without any doubt, these actions are one of the best way for conservation of the endangered Mediterranean seabirds (see the Action Plans for Audouin´s gull, Balearic shearwater and Mediterranean shag). But they usually imply long-term and wide policies. However, the actual implementation of most of these actions involves decision for conservation agencies. Of course, this implementation increases bureaucracy, time and decreases effectiveness in some of the local conservation actions.

The two pillar problems occurring in the Mediterranean need, of course, this kind of actions. However, nowadays, we have in our hands some conservation problems clearly identified. Do we know the solutions? Technical solutions are not abundant in the present volume, but there are abundant suggestions. Conservation biologists may increase effort looking for conservation solutions when conservation problems are well known. Table 1 shows some proximal solutions from a practical point of view. Of course, even if these goals would be acquired successfully, Mediterranean seabirds will not be necessarily free of threats. Some of the actions suggested must be implemented by regional

TABLE 1. – Some technical and management proximal approaches for current Mediterranean seabird conservation problems.

Mediterranean Seabird Conservation Problem	Probably solutions (in practice)
Seabirds are mostly long-lived prudent reproducers	Development of mechanism to reduce adult mortality by some fishing methods such as long line and gill nets
Seabird metapopulations operate in ranges beyond administrative regions	Co-ordination within European administrative regions and among Mediterranean countries
Seabird metapopulations operate in a high number of patches (most of them islands)	To protect suitable breeding habitats (not only currently occupied colonies); reinforcement of the number of local populations
Monitoring programmes focus on breeding numbers and breeding success	Mark-resighting programmes to estimate survival by mark-recapture analyses
Predators introduction risk	Survey programs
Predation by introduced mammals	Elimination programs
Interaction with yellow-legged gull	Selective removal of specialists, nest-boxes and artificial refuges for endangered species
Nets used in fish farms to prevent fish consume by seabirds	To forbid monofilament nets

environmental agencies, but the most important actions regarding fisheries must be co-ordinated by fishing agencies.

Framework for actions

In spite that most of the conservation problems are precisely identified, conservation actions are scarce. Culling of yellow-ledged gull is carried out in some Mediterranean areas, killing high numbers of individuals. Nevertheless, there is not published evidence of the efficacy of this method to enhance population dynamics of endangered seabirds (Brooks and Lebreton, 2001). Neither there is thorough data about population dynamics of yellow-legged gulls in the culled or in distant colonies. Identifying specialised yellow-legged gulls that could compete for nesting sites, and predate on endangered species, is necessary before a selective removal. For some species, nest-boxes and artificial refuges could provide yellow-legged gull predation safe sites for breeding (De León and Mínguez 2003; Prieto *et al.,* 2003; this volume). Artificial increase of nesting sites availability may raise the reproductive fraction of the population. Presumably, the risk of catastrophic extinction (high in scarce endangered species) is reduced if the birds are distributed among several sites. However, some management measures frequently used in conservation as the re-establishment of extinct populations, and reinforcement of the number of local populations (Pulling, 2002), are not common in Mediterranean seabird management plans. This is being attempted with Audouin´s gull at Benidorm Island using hacking and artificial social facilitation for breeding (Conselleria de Medio Ambiente de la Generalitat Valenciana, ined.). Although it is too early to assess its effectiveness, this pioneer manage measure, relatively inexpensive, could improve the metapopulation dynamics of Audouin´s gulls.

One of the main problems, fishery activities, remains difficult to be influenced in a short-term. Perhaps, conservation biologists should focus the problem on palliative mechanisms diminishing by-catch mortality (Ministerio de Medio Ambiente, ined.) or, even, supplementing food during trawling moratoria as an extreme conservation measure (time and funding consuming). Tourism reduces the availability of suitable breeding habitats, but tourists may also demand high environmental quality, including wildlife. As an example, the case of Benidorm Island, visited by c. 100.000 people every year, and holding an important storm-petrel colony, suggests that protection, warding and intense management could buffer possible disturbs. Tourism, fisheries and seabirds are obligated to co-exit in the Mediterranean. Major conservation problems are identified. Thus, there is an urgent need to find practical solutions.

ACKNOWLEDGEMENTS

The "6th Mediterranean Symposium on Seabirds" held at Benidorm (Alicante, Spain) in October 2000 was possible thanks to financial support of *Conselle-*

ria de Medio Ambiente de la Generalitat Valenciana, and UE LIFE project (Contract nº B4-3200/98/447), and collaboration of the Benidorm Council, Institut Mediterrani de Estudis Avançats IMEDEA (CSIC-UIB), MedMarAvis and Seo/BirdLife. The publication of this special issue has been possible thanks to a grant from *Conselleria de Medio Ambiente de la Generalitat Valenciana.* The authors, as invited editors of this supplement of *Scientia Marina,* are indebted to the Chief Editors, Carles Pedrós-Alió and Pere Abelló, and the Journal Secretary, Victoria Martínez de Albéniz, for all their help throughout the several stages in the preparation of this special issue. We thank Ana de León, Juan Jiménez and Toni Zapata for their critical reading and comments.

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