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A method for defining the value of breeding birds

ABSTRACT

A synthetic methodology is proposed in order to define the intrinsic specific Value (Vs) of the regularly breeding birds species in Italy, also required for the studies of environmental impact assessment, landscape planning and recovery. To build an algorithm of the kind $Vs=Ki.Ei$, we used 15 different parameters concerning geographic distribution, population status and dynamics, presumed level of vulnerability, present scientific interest and availabiity for human activities. Each one these has been built through a suitable score and then weighed in relation to all the other ones, through a pair comparison in matrices. This in according to a partial adaptation of the Habitat Evaluation Procedure (H.E.P.) for the environmental impact studies.

INTRODUCTION

The necessity to attribute a value as objective as possible to animai species, and to birds in particular, was initially originated in England and in United States, especially for the definition of models of management and conservation of protected areas, or for the establishment of intervention priorities in the preservation of rare species.

Many researchers have therefore conducted investigations in order to elaborate models taking into account a larger numbers of parameters, related to habitat use and human culturai elements (Adamus & Clough, 1978; Fuller & Langslow, 1986).

Starting from Eighties also in Italy some researchers have tried to define priorities for species protection or the use of birds as environmental indicators for management and evaluation models (Bogliani & Fasola, 1985; Bogliani, 1986 e 1990; Mingozzi & Brandmayr, 1991).

In particular, considering the recent remarkable development of the studies on environmental impact assessment, a more urgent need to objectify subjective judgements has developed in order to evaluate areas or animal species before and after planned interventions (Malcevschi, 1989). Here comes the necessity to define some models of intrinsic evaluation for each species at national level, in such a way to allow reliable adaptations to each local case and to different aspects of intervention on the territory. We propose a preliminary synthetic methodology in order to define a value-list of breeding birds in Italy; our aim is to test the method applicability and to create a reliabie classification of the species. As concerns the application of the used parameters only regulariy breeding species have been taken into account.

METHODS

In order to define the specific value, we have used an algorithm of the kind Vs = Ki.Ei (where Vs = synthetic value of the ith species), including 15 different parameters, relative to geographic distribution, population status and dynamics, presumed level of vulnerabiity, present scientific interest, availability for human activities. Each one of these parameters has been built through a Paired Comparison Procedure, in matrices, according to a partial adaptation of the U.S. Habitat Evaluation Procedure (1980) for enviromental impact studies. Scores, which are proportional among themselves, are not the same ones for each parameter; generally speaking, parameters of biological type (Ta, Tp, C, etc.) have received much higher values than the "anthropic" ones (Vs, Vv, Vall., etc.).
Finally, the total score has been standardised as regards the maximum theoretical value, in order to obtain a scale comprised between 1 and 100, easier to manage for a practical use in future. Therefore the value of the specie (Vs) has been obtained from the formula:

$$Vsi = Kp. (Vi+Vvul+Va)$$

where

Vs = value of the ith species

Vi = intrinsic value (Vb+Vdr+Vdp+Ta+St+R+C+Tp+Ip)

Vvul = level of vulnerability

Va = anthropic value (Vn+Vs+Vf)

Kp = constant of correction specific for each single parameter "weighted" in relation to other ones

Specifying the parameters used and their relative scores we bave:

Biogeographic value (Vb): obtained using the recent corological classification proposed by Boano and Brichetti (1989) and Boano et al. (1990), with endemic species reaching the highest value, and the cosmopolitan species reaching the lowest one.

Value of national distribution (Vd): is the result of the combination of two additional parameters (N. of occupied Italian Regions = Vdr, and % I.G.M. maps 1:50.000 occupied = Vdp).

Trend of distribution area (Ta): express the present tendency (if known) to extend or contract the distribution area. Highest scores bave been given to decreasing species. Species established recently (e.g. Spoonbill) are included in the class of fluctuating species.

Level ofterritoriality (St): expresses the link degree with the sorrounding territory, as regards: strict sedentariness, same environments used for feeding and breeding, frequented habitat at the maximum level of naturality (p = 1 high; p = 0,5 medium; p = 0).

Ecological rarity (R): is connected with the availability, within the national territory, of those environments which are considered as preferential for breeding. The lowest scores bave been assigned to the man-used environments; in case of several preferential environments we have calculated an average with possible rounding to the higher half-mark.

Consistence (C): expressed as number of breeding pairs, divided into 5 classes, with the highest scores assigned to those species breeding with less than 50 pairs.

Population trend (Tp): is evaluated upon a period of 10-15 years (on the basis of available

data); in this case too decreasing species are favoured.

Naturalistic-aesthetic value (Vn): is the first of the "anthropic-cultural" parameters and expresses the interest which unspecialized, but stimulated people shows for the species in question. The parameter has been calculated on the basis of the frequency of articles devoted to the species and published in the magazines "Oasis" and "Airone".

Scientjtìc value (Vs): similar to the previous parameter, but is an expression of the interest shown by the technical and scientific community; it is expressed by the frequency of articles published in the specialized periodicals and congress proceedings within the last 15 years.

Value of availability (Vf): obtained from the addition of Venatorial Value (Vv) to the Value of possible rearing (Valla), fot which Vv has been calculated on the basis of frequency of articles published in the periodical "Diana" (number of references divided into 3 classes with corresponding scores from 1-0; 5-0; 25-0, from most abundant to not mentioned; for the species of hunting interest the minimum score is 0.25, even though not recorded by the venatorial literature). Vall has been calculated on the basis of those species at present available for rearing, used for reintroduction or repopulation schemes, or for aesthetic reasons.

Value of vulnerabilìty (Vvul): obtained on the basis the inclusion of the various species in the "Red list" of threatened birds, as well as in the EEC and national legislations. In case of species included in more than one class, the one with highest score is taken into account. Endangered and threatened species are favoured.

Importance of the population and of the distribution area (Ipa): is perhaps the most subjective parameter but, so far, also the least considered one, even for the scarcity of available data. As a matter of fact we consider the importance of the distribution area in Italy in connection with range in the Palearctic (position, degree of dispersal/concentration of the range in the Palearctic consistence of the Italian population in connection with the western palearctic population), regularity of nesting the presence of ascertained subspecies or endemisms. Endemic populations and those the range of which in Italy is placed centrally in comparison with the Palearctic are favoured, as well as the populations which in our Country number more than one third of the total population estimated for the Western Palearctic region.
Trophic level (Lt): expresses the prevailing composition of the diet and the position of the species within the food web (division in 4 class).
Degree of anthropophily (Ga): indicates the sensitivity of the species to the presence and to the interventions of man, as well as its adaptativeness to nest in modified and man-inhabited environments (4 classes).

Table I - Value (Vs) of Italian breeding avifauna: list of the first 20 species.

Griffon Vulture (Gyps fulvus) 90.7
Bittern (Botaurus stellaris) 90.5
Red-crested Pochard (Netta rufina) 86.6
Bonelli's Eagle (Hieraaetus fasciatus) 84.5
Ferruginous Duck (Aythya nyroca) 80.8
Shelduck (Tadorna tadorna) 80.3
Dotterel (Eudromias morinellus) 80.2
Storm Petrel (Hydrobates pelagicus) 77.1
Black Tern (Chlidonias niger) 76.8
Glossy Ibis (Plegadis falcinellus) 76.0
Oystercatcher (Haematopus ostralegus) 75.2
Egyptian Vulture (Neophron percnopterus) 74.7
Little Bustard (Tetrax tetrax) 73.7
Sedge Warbler (Acrocephalus schoenobaenus) 73.0
Whiskered Tem (Chlidonias hybridus) 73.0
Red Kite (Milvus milvus) 72.0
Slender-billed Gull (Larus genei) 70.8
Spoonbill (Platalea leucorodia) 70.7
Little Crake (Porzana parzana) 70.1
Eleonora's Falcon (Falco eleonorae) 70.0

RESULTS AND DISCUSSION

The detailed examination of the 237 species regularly nesting in Italy has allowed us to prepare a "classification" of the Italian Avifauna. At the highest positions we find almost exclusively non-Passeriformes species (Table I), with the notable exception of the Sedge Warbler (Vs = 73); on the contrary, most Passeriformes appear at the lowest levels (Table II). Such a difference in "weight" is reflected by a greater value of non-Passeriformes, approximately +31% than Passeriformes. Very eterogeneous species, such as the Tawny Owl (Vs = 42.6), the Coot and the Sparrow Hawk (Vs = 42.9), the Grey Woodpecker (Vs = 47.3) or Grey Heron (Vs = 47.5), are situated around average values. Quite predictable, however, is the presence of stenotopic species at the top of the list, while those more generalist are placed at bottom. Among the first 20 species, only one, the Ferruginous Duck, is legally hunted.

Table II - Value (Vs) of Italian breeding avifauna: list of the last 20 species.

Robin (Erithacus rubecula) 32.3
Serin (Serinus serinus) 31.9
Woodpigeon (Columba palumbus) 31.4
Italian Sparrow (Passer italiae) 31.1
Magpie (Pica pica) 31.0
Nightingale (Luscinia megarhynchos) 31.0
Greenfinch (Carduelis chloris) 31.0
Sky Lark (Alauda arvensis) 30.2
Chaffinch (Fringilla coelebs) 29.8
Jackdaw (Corvus monedula) 29.6
House Sparrow (Passer domesticus) 29.4
Blackcap (Sylvia atricapilla) 28.6
Goldfinch (Carduelis carduelis) 27.9
Great Tit (Parus major) 27.8
Pheasant (Phasianus colchicus) 26.0
Three Sparrow (Passer montanus) 24.7
Hooded Crow (Corvus corone cornix) 24.6
Collared Dove (Streptopelia decaocto) 22.5
Blackbird (Turdus merula) 22.1
Starling (Sturnus vulgaris) 21.8

The analisys of three species grouped into families stresses how those including one or two taxa are placed at the top (Haematopodidae, Hydrobatidae, Otididae) and at the bottom (Troglodytidae, Oriolidae) of the scale: therefore their significance concerning more numerous families, such as Sternidae, Laridae, Anatidae, Accipitridae and Ardeidae, notable, their global value, is more obvious. On the contrary Turdidae, Corvidae and Fringillidae are the families with less specific value.
At the first global examination the methodology proposed by us stersses how many species which have been considered always as of "higher value" are placed as a matter of fact at the topmost of the scale (Griffon Vulture, Bonelli's Eagle, Little Bustard), together with other ones which have not received the due attention up to now (Bittern, Sedge Warbler, Little Crake). In general species linked with aquatic ecosystems seem to be reappraised, while other groups, such has nocturnal and diurnal raptors, are less concentrated at the top of the list, but are more regularly distributed in a medium-high zone of values.
It's important to notice that the total value has been influenced only a little from the "weight" of the anthropic parameters.
As a conclusion we stress once more the importance of calibrating this method on the basis of every single local reality, both on regional or provincial scale, and according to wide geographic and environmental subdivisions.
The possible introduction of additional parameters - for instance, of ecological plasticity, biological or genetic type - although desiderable, is definitely complex, both for the difficul keeping of a sufficient level of objectivity, and for the still scarce availability of complete data updated for the italian situation.

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