CONTRIBUTION TO FAUNA CONSERVATION IN THE MEDITERRANEAN ISLANDS. THE RED LIST OF BIRDS

Pierandrea BRICHETTI[1] & Bruno MASSA[2]

[1] Centro Italiano Studi Ornitologici, Via V. Veneto 30, Verolavecchia (Brescia), Italy
[2] Istituto di Entomologia Agraria, V.le delle Scienze 13, 90128 Palermo, Italy

New criteria have been suggested to include animal species in red lists; for example BIBBY *et al.* (1989) propose the following ones for birds : 1) nesting or wintering species of international importance (if more than 20% of the population of western Europe nest or winter in the country); 2) nesting species which are rare because of the scarcity of their habitat or because they are on the edge of their distribution area (if in the country less than 300 pairs nest); 3) decreasing nesting species (with at least 50% of decrease as from the 60s); 4) nesting or wintering species confined to vulnerable habitats, with more than 50% of the population confined to about ten sites. TUCKER (1991) believe that a 20% decrease in the last twenty years is an objective risk for a species, but also their habitat vulnerability (species confined to few or small habitats or vulnerable sites) or some absolute values (less than 10.000 pairs nesting in Europe) can be useful to reckon the risk. Besides it can also be evaluated only in Europe; e.g.: some species, whose the most important populations live outside Europe, but less than 50% (and more than 5%) of the total known population lives in Europe and is in urgent need of conservation; or some species whose populations are mainly distributed in Europe that has therefore an international resposibility for them. The latter should be extended to those areas that are important for their concentration of migrant species. GRIMMET & JONES (1989) have used the following criteria to inventory the important bird areas in Europe: 1) sites of concentration for breeding, migration or wintering (with the so-called criterion of 1% of biogeographic or European population); 2) sites in which there are species threatened on a large geographic scale; 3) sites in which there are species or subspecies that are threatened only in Europe; 4) sites for species which have a small world distribution and important European populations.

Mediterranean area covers very many countries and consequently criteria for red lists must include parameters of biologic and biogeographic nature as well as distributional trend; we propose an objective method for birds which takes into consideration the following ones, weighing each of them with a value between 1 and 3 :

- a) endemism degree : endemic species = 3; subspecies very characterized and geographically restricted = 2; subspecies distributed over than one single island = 1;
- b) population insularity : 76-100% of species distribution lies in the islands = 3; 26-75% = 2; 1-25% = 1;
- c) rarity :< 100 pairs in the islands = 3; 101-500 = 2; > 500 = 1;
- d) insular distribution : apart from continental distribution, the species is present in 1-25% of the islands = 3; in 26-75% = 2; in 76-100% = 1;
- e) population trend : much decreasing = 3; decreasing = 2; stable or fluctuating = 1;
- f) distribution area trend : distribution area much decreasing = 3; decreasing = 2; stable or fluctuating = 1;
- g) extinction : if the species has become extinct in one or more islands = 3;
- h) vulnerability :sedentariness, habitat specialisation, feeding specialisation, threatened from human presence, impossible to reintroduce when become extinct = 1 for each parameter.

In accordance with the sum of these figures calculated for the 99 bird species living in the Mediterranean islands, we put them in order of increasing threat.

I

REFERENCES

BIBBY C., HOUSDEN S., PORTER R. & THOMAS G., 1989. Towards a bird conservation strategy. *RSPB Conservation Review*, 3: 4-8.

GRIMMETT R.F.A. & JONES T.A., 1989. Important Bird Areas in Europe. *ICBP Techn.Publ.*, 9, Cambridge.

TUCKER G., 1991. The ICBP Dispersed Species project, a new initiative for bird conservation in Europe. *Bird Census News*, 4 (1): 13-18.

COASTAL CONSERVATION PROBLEMS : PROTECTION OF WASTEWATER TREATMENT PLANTS FROM TOXIC INDUSTRIAL EFFLUENTS

G. CASSAR[1], V. AXIAK[1] and V. GAUCI[2].

[1] Marine Ecotoxicology Laboratory, Depart. of Biology, Univ. of Malta, Msida, Malta
[2] Department for Environmental Protection, Ministry of Environment, Floriana, Malta

Limited freshwater resources as well as densely populated coastlines which have to be protected from the discharge of untreated sewage and wastewaters have led to the widespread use of wastewater treatment plants in many islands in the Mediterranean. Nonetheless the efficiency of such wastewater treatment plants depends very much on the quality of effluents they have to act upon. Certain stages in the bio-treatment processes such as nitrification are quite sensitive to toxic industrial effluents. Nitrification, or the conversion of ammonia to nitrate by autotrophic microbial activity, is essential in the treatment of wastewaters for a number of reasons, namely :

a) nitrification prevents the discharge to receiving waters of ammonia. This is toxic to fish at concentrations as low as 0.5 mg l^{-1}, especially at high pH conditions.
b) nitrification in the receiving water exerts a significant oxygen demand and thus can deplete the dissolved oxygen resources of the surface waters
c) nitrification can have also financial implications where disinfection at the sewage treatment works is achieved by maintaining a trace of free chlorine in the final effluent. In the presence of high concentration of NH_3, the chlorine dose required to reach breakpoint chlorination would be several times the NH_3 concentration and thus would be prohibitively expensive.

The above reasons have led to an increasing tendency towards the requirement of some degree of nitrification at sewage treatment works. However nitrification is an extremely sensitive process which is influenced by factors such as dissolved oxygen concentration, pH and temperature. The engineer has control over these factors. In contrast , the engineer does not have control over the presence of toxic compounds in the sewage that may inhibit the nitrification process. In fact a wide variety of organic and inorganic compounds that inhibit nitrification are present in industrial wastewaters.

In Malta, presently all industrial wastewaters are discharged into the municipal sewer system. No analytical information as regards the quantity and the quality of industrial wastewaters generated by industries in Malta is available. The only indication regarding the nature of the effluents can be inferred by consideration of their activities and the products manufactured. In this respect, the scope of this work was to investigate a biological assessment method to assess the degree of inhibition to nitrification by industrial wastewaters, and thus to determine whether a particular industrial wastewater can be discharged to sewage treatment works, so as to protect the treatment plant from upsets and reduced nitrification rates.

The potential nitrifying ability of the activated sludge sampled from the Sant Antnin Wastewater Treatment Plant was assessed by centrifuging, washing and recentrifuging the sludge to remove any oxidized nitrogen and any inhibiting toxins. The sludge was mixed with a standard medium containing an excess of ammonium salts at pH 7.4 and the mixture was incubated with adequate aeration for four hours. The specific rate of nitrification was then calculated from the concentration of suspended solids and the decrease in the concentration of ammonia. This was carried out routinely in order to assess the variability in the nitrification performance which is to be expected within treatment plants even under optimal working conditions.

The degree of inhibition of nitrification by industrial wastewaters was calculated by assessing the decrease in concentration of ammonia nitrogen after parallel aeration of a nitrifying sludge obtained from Sant Antnin Sewage Treatment Plant, in the presence of different dilutions or absence of the particular industrial effluent. Effluents from three types of local industries were sampled on various days throughout 1992 and investigated. These were a tannery, galvanising and electroplating complexes. Effect on nitrification was expressed as that dilution of effluent which causes a 25% reduction in nitrification (25% Effective Concentration: EC25).

Effluents from the galvanizing factory failed to exhibit significant reduction in nitrification. On the other hand, effluents from the tannery showed an EC50 of 0.28 ml per 100 ml. This dilution factor is approximately equal to that found at the sewers. This implies that a 25% reduction in nitrification performance would be expected at the treatment plant if such effluents reach it at this dilution.

The biological test investigated has several advantages that favour the adoption of this protocol as a screening method for the discharge of industrial effluents in the sewerage system.

Standards for effluent quality should continue to be directed towards the regulation of the amount of toxicant and physical changes. However, a biological test procedure such as the one investigated, should also be carried out. Even if the effluent conforms to all limitations imposed by present standards for discharge of toxic materials, there is a high probability that a number of deleterious effects will result on the sewage treatment works from both synergistic actions and enhancement of toxic effects. Effective protection of the coastal environment often depends on the efficient operation of wastewater plants. The use of this biological test for effluent quality may help ensure such desired efficiency.