

AEWA Conservation Guidelines No. 8

Guidelines on reducing crop damage, damage to fisheries, bird strikes and other forms of conflict between waterbirds and human activities



Introduction

In Article II of the Agreement on the Conservation of African-Eurasian Migratory Waterbirds, Parties agree, as a fundamental principle, to take co-ordinated measures to maintain migratory waterbird species in a favourable conservation status or to restore them to such a status. To this end, the Parties agree to apply within the limits of their national jurisdiction a number of general conservation measures prescribed in Article III of the Agreement, as well as a number of more specific actions determined in the Action Plan appended to the Agreement. In paragraph 7.3 of the Action Plan, the Agreement Secretariat is required to co-ordinate the development of a series of Conservation Guidelines to assist the Parties in the implementation of their obligations under the Agreement. These Conservation Guidelines, which should be prepared in co-ordination with the Technical Committee and with the assistance of experts from Range States, were submitted to the First and Second Meetings of the Parties, which recommended publication after minor amendment, and further recommended regular review (Article IV, paragraph 4 of the Agreement). The Technical Committee keeps the guidelines under review, and formulates draft recommendations and resolutions relating to their development, content and implementation for consideration at sessions of the Meeting of the Parties (paragraph 7.6 of the Action Plan).

Paragraph 7.3 of the Action Plan gives a list of some of the topics that should be covered by the Conservation Guidelines. These are as follows:

- (a) single species action plans;
- (b) emergency measures;
- (c) preparation of site inventories and habitat management methods;
- (d) hunting practices;
- (e) trade in waterbirds;
- (f) tourism;
- (g) reducing crop damage;
- (h) a waterbird monitoring protocol.

Preparation of the Conservation Guidelines was identified as a major activity in the *International Implementation Plan for the Agreement of the Conservation of African-Eurasian Migratory Waterbirds 1997-1999*, prepared by Wetlands International in April 1997 with financial support from the Ministry of Agriculture, Nature Management and Fisheries in The Netherlands. Activity 3 of the *Implementation Plan* involved the preparation of nine sets of conservation guidelines, following the list in paragraph 7.3 of the Action Plan, but treating site inventories and habitat management methods as two separate topics. These Guidelines were accepted by the first Meeting of the Parties in Cape Town, South Africa, in November 1999, subject to minor amendment. The necessary amendments were made after discussion by the Technical Committee, and the amended version of the Conservation Guidelines was accepted by the second Meeting of the Parties to the Agreement in Bonn, Germany, in September 2002.

The nine sets of guidelines, as set out in the *Implementation Plan* and presented here, are as follows:

1. Guidelines on the preparation of Single Species Action Plans for migratory waterbirds

In paragraph 2.2.1 of the Action Plan, Parties are required to co-operate with a view to developing and implementing international single species action plans for populations listed in Category 1 in Column A of Table 1 as a priority and also for those populations listed with an asterisk in Column A of Table 1. Furthermore, in paragraph 2.2.2, Parties are required to prepare and implement national single species action plans for all those populations listed in Column A of Table 1 with a view to improving their overall conservation status. The Agreement Secretariat is required to co-ordinate the development, harmonisation

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and implementation of these plans. The present guidelines focus on national single species action plans. They outline a standard procedure for the preparation of such action plans, and identify the priority species and populations occurring in the Agreement Area.

2. Guidelines on identifying and tackling emergency situations for migratory waterbirds

In some situations, populations of waterbirds can suddenly be subjected to much higher levels of mortality than normal. These emergency situations can arise as a result of natural phenomena, such as periods of exceptionally cold weather or prolonged droughts, or as a result of man-made disasters, such as major pollution incidents. International co-operation is required to address these situations without delay. In Article III, paragraph 2 (f) of the Agreement, Parties agree to co-operate in emergency situations requiring international concerted action and in identifying the species of migratory waterbirds, which are the most vulnerable to these situations. Furthermore, Parties agree to co-operate in developing appropriate emergency procedures to provide increased protection to these species in such situations. In paragraph 2.3 of the Action Plan, Parties are required, in close co-operation with each other whenever possible and relevant, to develop and implement emergency measures for populations listed in Table 1, when exceptionally unfavourable or endangering conditions occur anywhere in the Agreement Area. At its third session, the AEWA Technical Committee adopted criteria to define emergency situations, which require urgent conservation measures, and determined the modalities for assigning responsibility for action to be taken (Article VI, paragraph 7 (e) of the Agreement). The present guidelines identify many of the possible emergency situations that may arise, and outline procedures for establishing early warning systems and tackling these situations at national level.

3. Guidelines on the preparation of site inventories for migratory waterbirds

In Article III, paragraph 2 (c) of the Agreement, Parties are required to identify sites and habitats for migratory waterbirds occurring within their territory. More specifically, in Paragraph 3.1.1 of the Action Plan, Parties are required, in liaison where appropriate with competent international organisations, to undertake and publish national inventories of the habitats within their territory, which are important to populations listed in Table 1. Parties should endeavour, as a matter of priority, to identify all sites of international or national importance for populations listed in Table 1 (Paragraph 3.1.2). These guidelines develop a step-wise approach to the inventory process, which takes full advantage of existing regional and national wetland inventories and lists of sites important for migratory waterbirds.

4. Guidelines on the management of key sites for migratory waterbirds

In Article III, paragraph 2 (c) of the Agreement, Parties are required to encourage the protection, management, rehabilitation and restoration of sites and habitats for migratory waterbirds occurring within their territory. More specifically, in Paragraph 3.2.1 of the Action Plan, Parties are required to endeavour to continue establishing protected areas to conserve habitats important for the populations listed in Table 1 of the Action Plan, and to develop and implement management plans for these areas. These guidelines set forth the basic procedures for the design and implementation of management plans, with special reference to sites of importance for migratory waterbirds.

5. Guidelines on sustainable harvest of migratory waterbirds

If populations of migratory waterbirds are to be maintained in a favourable conservation status, it is essential that any exploitation of these populations be carried out on a sustainable basis. Article III, paragraph 2 (b) of the Agreement requires that Parties ensure that any use of migratory waterbirds is based on an assessment of the best available knowledge of their ecology, and is sustainable for the species as well as for the ecological systems that support them. In paragraph 4.1.1 of the Action Plan, Parties are required to co-operate to ensure that their hunting legislation implements the principle of sustainable use as envisaged in the Action Plan, taking into account the full geographical range of the waterbird populations concerned and their life history characteristics. The present guidelines promote the establishment of 'harvest frameworks' at both international and national levels, and identify a series of

steps to assist Range States in adopting a sustainable approach to the harvesting of waterbirds.

6. Guidelines on regulating trade in migratory waterbirds

Paragraph 7.3 of the Action Plan requires that guidelines be provided on the regulation of trade in waterbirds. Although it seems that there is relatively little international trade in migratory waterbirds in the Agreement Area, national (or domestic) trade can be very high, involving annual harvests of many thousands of birds for sale as food in local markets. In some areas, such trade may be of considerable importance to the local economies. These guidelines concern both international and domestic trade, and offer practical advice on how trade in waterbirds can be regulated within the framework of sustainable harvests.

7. Guidelines on the development of ecotourism at wetlands

The development of ecotourism based on spectacular concentrations of migratory waterbirds can not only increase support amongst the general public for waterbird conservation, but can also, if properly managed, provide a valuable source of income for local people with negligible harm to the environment. In Paragraph 4.2.1 of the Action Plan, Parties are required to encourage, where appropriate, the elaboration of co-operative programmes to develop sensitive and appropriate ecotourism at wetlands. Furthermore, in Paragraph 4.2.2, Parties are required, in co-operation with competent international organisations, to endeavour to evaluate the costs, benefits and other consequences that can result from ecotourism at wetlands with concentrations of waterbirds. The present guidelines examine a wide range of issues relating to nature-oriented tourism in general, and offer practical advice for the sensitive development of ecotourism at wetlands important for migratory birds.

8. Guidelines on reducing crop damage, damage to fisheries and other forms of conflict between waterbirds and human activities

Changes in population levels and distribution of waterbirds, combined with an intensification of agriculture and aquaculture, have led to increased conflicts between some waterbird species and human activities, notably agriculture, aquaculture, and commercial and recreational fisheries. With the great increase in air traffic in recent decades, many large waterbirds now pose a serious hazard to aircraft. In Paragraph 4.3.2 of the Action Plan, Parties are required to endeavour to gather information on the damage, in particular to crops, caused by populations listed in Table 1, and report the results to the Agreement Secretariat. In paragraph 4.3.3, Parties are required to co-operate with a view to identifying appropriate techniques to minimise the damage, or to mitigate the effects of damage, in particular to crops, caused by populations of waterbirds listed in Table 1. The present guidelines examine the major causes of conflict between migratory waterbirds and agriculture, fisheries and aviation, outline procedures for investigating the problems, and suggest a number of measures that can be taken to reduce the damage.

9. Guidelines for a waterbird monitoring protocol

Populations of all migratory waterbirds in the Agreement Area should be monitored on a continuous basis to determine population trends and to provide an early-warning system for species in difficulty. This will enable appropriate measures to be implemented before the populations fall to dangerously low levels. Paragraph 5.2 of the Action Plan requires that Parties endeavour to monitor the populations of waterbirds listed in Table 1, and make the results of such monitoring available to appropriate international organisations, to enable reviews of population status and trends. Paragraph 5.3 requires that they co-operate to improve the measurement of bird population trends as a criterion for describing the status of such populations. In Paragraph 5.8, Parties agree to co-operate with relevant international organisations to support research and monitoring projects. The present guidelines examine the value of monitoring in the conservation of migratory waterbirds, review existing monitoring practices, and provide guidance on the development of national waterbird monitoring schemes that are most appropriate for international conservation efforts.

Acknowledgements

These conservation guidelines were produced with financial support from the Ministry of Agriculture, Nature Management and Fisheries/ Department of Nature Conservation, the Swiss Agency for the Environment, Forests and Landscape/Division of Nature, and the DLO-Institute for Forestry and Nature Research (IBN-DLO, now Alterra, Wageningen) of the Netherlands.

Guidelines 1 to 9 were drafted by Albert Beintema, the late Dineke Beintema, Allix Brenninkmeijer, Simon Delany and Jeff Kirby and edited by Simon Delany and Derek Scott.

Drafts of five guidelines were discussed in Workshop 2 during the 2nd International Conference on Wetlands and Development in Dakar, November 1998. Many workshop participants gave useful comments.

The following people, in alphabetical order, provided information used for these guidelines, or commented on various drafts: Rachel Adams, Mindy Baha El Din, Sherif Baha El Din, Carlos Bento, Olivier Biber, Gerard Boere, Joost Brouwer, Luit Buurma, John Caldwell, John Clorley, Luis Costa, Earle Cummings, Elijah Danso, Nick Davidson, Bernard Deceuninck, Tim Dodman, Bob Douthwaite, Paul Eagles, Bart Ebbinge, Augustine Ezealor, Lincoln Fishpool, Vincent Fleming, Scott Frazier, Umberto Gallo-Orsi, Mariano Gimenez-Dixon, Andy Green, Patrick Green, Ward Hagemeijer, Elizabeth Halpenny, Jens Haugaard, René Henkens, John Harradine, David Hill, Baz Hughes, Alan Johnson, Tim Jones, Heribert Kalchreuter, Elena Kreuzberg-Mukhina, Namory Keita, Alexander Kozulin, Tony Laws, Yves Lecocq, Vicky Lee, Aivar Leito, Bert Lenten, Peter Leonard, Alison Littlewood, Heidi Luquer, Sonja Macys, Jesper Madsen, Gernant Magnin, Jamshid Mansoori, David Melville, Charles Mlingwa, Jérôme Mokoko Ikonga, Jean-Yves Mondain-Monval, Johan Mooij, Mike Moser, Wim Mullié, Dan Munteanu, Paul Murphy, Stephen Nash, Kike Olsder, John O'Sullivan, Michael Oneka, Dwight Peck, Stephan Pihl, Jim Porter, Crawford Prentice, David Pritchard, Rivo Rabarisoa, Marc van Roomen, Paul Rose, Rui Rufino, Luc Schifferli, Valentin Serebryakov, Marcel Silvius, Jan Willem Sneep, David Stroud, Barry Taylor, Wolf Teunissen, Graham Tucker, Janine van Vessem, Zoltan Waliczky, George Wallace, Rob van Westrienen, Johanna Winkelman, Marja Wren, Henk Zingstra.

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Prepared by Wetlands International

and

Adopted by the Meeting of the Parties to AEWA at its second session
(September 2002, Germany)

Last update 19-4-2005

Step chart

To reduce crop damage, damage to fisheries, bird strikes and other forms of conflict between waterbirds and human activities, each country should take the following steps:

Step 1: Identify the problem of damage to crops, fisheries, aircraft or other forms of conflict between waterbirds and human activities.

Step 2: Organise a multidisciplinary team to tackle problems.

Step 3: Develop an action plan for the reduction of damage to crops, fisheries or aircraft.

Step 4: Implement action plan and follow up with project activities.

Introduction

Reducing damage by birds to crops, fisheries or aircraft can be a complex, lengthy and expensive process. Solutions will vary greatly between species, sites and countries. These guidelines should therefore be interpreted as a flexible code of conduct.

General problem

In many parts of the AEWA area, local reductions in hunting pressure, the creation of bird sanctuaries and the expansion of rubbish tips have led to increased survival rates amongst some species of birds, and this has allowed several populations of waterbirds to undergo dramatic increases in recent decades. These increases, coupled with the intensification of human activities in agriculture, aquaculture, commercial and recreational fisheries, and aviation, have led to greater conflict between some waterbird species and these and other human activities. Furthermore, populations of migratory waterbirds that are increasing as a result of increased protection in one country may cause damage to crops or fisheries in one or more other countries. International co-operation is therefore required to address these conflict situations. It is important to note that critically small populations of waterbirds may become threatened as a result of the loss of individuals due to collisions with aircraft or accidental capture in fishing nets, as well as through measures taken to reduce damage caused by the birds.

Although the Red-billed Quelea *Quelea quelea* is known to cause more damage to crops in Africa than any other wetland-related bird, the problems with this species are not considered in these guidelines for two reasons. Firstly, the birds are not migratory waterbirds and are therefore not covered by the AEWA, and secondly, the problems are of a very different magnitude, involving concentrations of up to tens of millions of birds.

Definition

It is possible to distinguish three main types of damage to human interests caused by waterbirds.

1. *Crop damage* is the degradation by waterbirds of crops cultivated for objectives other than the conservation of waterbirds. Crop damage involves consumption of the crops by waterbirds, but it may also involve damage to the crops through trampling. The most frequently recorded damage in Europe occurs through grazing of cereal crops and pasture by ducks, geese and swans during the winter and spring periods. In some limited circumstances, other crops such as vegetables may be involved. In Africa, most crop damage is caused by ducks and waders in rice fields (see Box 1).
2. *Damage to fisheries* is defined as the consumption of fish, crustaceans or bivalves by waterbirds, especially from aquaculture ponds. It may also involve damage to aquaculture ponds through water pollution from defecation. Consumption of free-living stocks of fish, crustaceans or bivalves by waterbirds is also included in this definition. Cormorants, pelicans, herons, saw-billed ducks and gulls are the most important problem species (see Box 2).
3. *Bird strikes* are defined as collisions between single birds or flocks of birds and fixed-winged aircraft or helicopters. Bird strikes pose a great danger to both birds and aircraft. Jet propulsion engines are especially vulnerable to bird collisions. A wide variety of species may cause bird strikes, but the most important species are gulls and other large waterbirds (see Box 3).

Objectives

The principal objectives of these guidelines are to maintain the conservation status of migratory waterbirds while minimising or preventing damage to agricultural crops, fisheries or aircraft.

Box 1: Examples of crop damage

Negative effects of grazing

Ducks and geese in northern Tanzania damage up to 10% of the rice nurseries by foraging and up to 30% of the newly replanted plots by trampling, uprooting and fouling (Birkan *et al.*, 1996).

Over two million geese, swans and ducks in Europe cause damage to grassland and cereal crops through grazing on pasture and arable land in winter and spring (Fox *et al.*, 1991; Van Roomen & Madsen, 1992; Birkan *et al.*, 1996; Van Eerden, 1997).

In Southern Europe, trampling of recently planted rice by storks, flamingos, herons and waders is frequently reported (Luis Costa & Rui Rufino, pers. comm.). Purple Swamphens *Porphyrio porphyrio* and Common Moorhens *Gallinula chloropus* are also said to be responsible for a 'considerable' loss of the rice harvest and other crops in Spain, at least on a local scale (Andy Green, pers. comm.).

Hypothetical negative effects of grazing

Species of *Anatidae*, especially geese, may compete with livestock for critical pasture resources around water holes, ponds and lakes in the Sahel zone of Africa. There is also a potential for the transfer of epizootic pathogens when livestock feed on the droppings of birds concentrated around these ponds and lakes.

Neutral effects of grazing

Several species of *Anatidae*, e.g. Garganey *Anas querquedula* and Fulvous Whistling-Duck *Dendrocygna bicolor*, commonly forage in rice fields in West Africa (Senegal and Mali), and yet do not eat important quantities of rice (up to 3-6% of the annual production). Waders, e.g. Black-tailed Godwit *Limosa limosa* and Ruff *Philomachus pugnax*, in West Africa (Senegal, Mali, Guinea-Bissau and Nigeria) forage mainly on spilt rice after the harvest, and are not generally regarded as pests on the rice crop (Tréca, 1990; Birkan *et al.*, 1996; Ezealor & Giles, 1997; Leo Zwarts, pers. comm.).

The damage caused by grazing geese to cereal harvests in Europe may vary from no effect to a 30% loss in yield. Early winter grazing by geese on arable land often causes no damage (Fox *et al.*, 1991; Van Roomen & Madsen, 1992; Birkan *et al.*, 1996).

Positive effects of grazing

Early winter grazing on wheat in Europe may actually increase the harvest. Grazing by geese and swans on waste, such as waste potatoes, waste sugar-beet or spilled grain after harvest, may help in preventing the dispersion of diseases, such as potato-root eel worms (Fox *et al.*, 1991; Van Roomen & Madsen, 1992; Birkan *et al.*, 1996).

In Southern Europe, rice crops may benefit from the predation on non-native American Crayfish by storks and herons (Luis Costa & Rui Rufino, pers. comm.).

Box 2: Examples of conflict between waterbirds and fisheries

Terns, e.g. Caspian Tern *Sterna caspia*, and gulls *Larus* spp. are hunted in Romania to protect fishponds (Glutz von Blotzheim & Bauer, 1982).

In Israel, egrets *Egretta* spp. that become trapped under the netting over fishponds are killed by the fishermen (Thor Veen, pers. comm.).

In Canada and Scotland, Red-breasted Mergansers *Mergus serrator* and Goosanders *M. merganser* feed on salmon and trout, and thus come into conflict with sport fishermen (Murton & Wright, 1968).

In The Netherlands and the U.K., Common Eiders *Somateria mollissima* and Eurasian Oystercatchers *Haematopus ostralegus* feed on commercial stocks of mussels *Mytilus edulis* and cockles *Cerastoderma edule* (Murton & Wright, 1968; Piersma & Koolhaas, 1997).

Great Cormorants *Phalacrocorax carbo* at Lake IJsselmeer in The Netherlands forage on the young of commercial fish species. The total amounts (kg/ha) of Perch *Perca fluviatilis* and Pike-Perch *Stizostedion lucioperca* consumed by the cormorants are of similar magnitude to the amounts caught by the commercial fishery. However, the total quantity of Eels *Anguilla anguilla* consumed by the cormorants is less than 5% of the commercial catch (Van Dam *et al.*, 1995; Van Eerden, 1997).

Gulls often carry bacteria, such as *Salmonella*, *Campylobacter* and *Listeria*, which may cause enteric disease (Monaghan *et al.*, 1985). Defecating Herring Gulls *Larus argentatus* and Lesser Black-backed Gulls *L. fuscus* infect shellfish ponds with bacterial contamination in the Delta Area in The Netherlands.

Box 3: Examples of bird strikes

The first reported crash of an aircraft as a result of a bird strike was in 1912 in the USA, when a gull was caught in the control cables of a Model EX Wright Pusher.

In 1960, at Boston in the USA, an Electra flew into a flock of Common Starlings *Sturnus vulgaris* soon after take-off, and three engines were damaged. The aircraft crashed, and 62 persons were killed.

In 1975, at J.F. Kennedy Airport in the USA, a DC-10 crashed during take-off, after colliding with several feral Canada Geese *Branta canadensis*. The aircraft was subsequently destroyed by fire, but none of the 139 persons on board was seriously injured.

Also in 1975, at Dufold in the UK, a HS125 Viper flew into a flock of Northern Lapwings *Vanellus vanellus* during its initial climb. Birds were sucked into both engines, and the plane crash-landed on a passing car. The nine occupants of the aircraft escaped, but the six occupants of the car were killed.

In 1988, at Bahar Dar in Ethiopia, a Boeing 737-200 sucked numerous pigeons into both engines during take-off, and crashed at the airport. Thirty-one passengers were killed.

In 1991, in Masai Mara in Kenya, the windshield of a Piper PA31 was penetrated by a White-headed Vulture *Trigonoceps occipitalis*. The crash killed all nine people on board.

In 1992, also in Masai Mara in Kenya, a Cessna 401 at cruising altitude struck a Marabou Stork *Leptoptilos crumeniferus*, lost a wing tip fuel tank and crashed. All seven occupants of the aircraft died in the crash.

In 1996, at Eindhoven Airport in The Netherlands, a Lockheed C-130 Hercules aircraft crashed during its approach as a result of flying into a small group of migrating Common Starlings *Sturnus vulgaris*. Thirty-four people were killed in the crash.

(Sources: Linell *et al.*, 1996; Murton & Wright, 1968; <http://www.airsafe.com>).

Step 1: Identify the problem of damage to crops, fisheries, aircraft or other forms of conflict between waterbirds and human activities

General

Once a problem of damage by waterbirds has been reported, the first step should be to document all those sites at which the problem occurs and to identify the species of waterbird concerned. The status, trends, migratory routes and ecological requirements of the species should then be determined. Where the survival of a species or population of waterbird is at risk, measures should be taken to minimise this risk. A case history should be developed: has there always been this conflict, and what has caused it? are there any similar cases in the literature, and if so, how was the problem solved? (See Boxes 1, 2 and 3).

The socio-economic and legal aspects of the problem should also be investigated. The national policy, if any, regarding waterbird conservation and damage reduction should be assessed. This might include checking existing provincial, national and international legislation and regulations, and provision of new measures as necessary. Socio-economic studies should be carried out to assess the impacts, costs and benefits of the damage reduction measures to the people concerned, such as farmers (see Box 4) and fishermen. A thorough assessment should be made of the attitudes of the local people, especially the affected farmers or fishermen, to the proposed measures. The measures should be fully understood, accepted and supported by the local people concerned. Damage reduction must take place with the full permission and involvement of all relevant government agencies. It should be noted that damage reduction measures are often long-term projects that require the commitment of long-term financial, local and political support.

Box 4: Damage assessment.

Assessment of loss in yield due to grazing by geese is complicated. Many methods have been used in an attempt to assess the extent of crop damage (Van Roomen & Madsen, 1992; Bruggers & Elliott 1989).

1. The yield of grazed parts of a field can be measured and compared with the yield of ungrazed parts of the same field. This is a rapid method, but as most fields are not homogeneous, it may result in under-estimation or over-estimation of the damage, depending on the productivity of grazed and ungrazed parts.
2. The extent of the damage can be measured by comparing fields with different grazing pressures. Grazing pressure is expressed as numbers of goose-hours, based on regular counts of the numbers of geese utilising the area. This method can be quite inaccurate, because of the unreliability of estimates of grazing pressure, especially if these are based only on weekly counts.
3. The most common method of calculating grazing pressure is to relate the cumulative number of goose droppings to the yield. Enclosures can be used as control plots to assess the loss in yield.
4. Experimental methods that expose vegetation to extremely high grazing pressures by captive geese are of limited value, as they do not reflect the natural situation.
5. The simulation of grazing by clipping and artificial trampling can be used to exclude variables that may influence yield. However, natural grazing can differ considerably from this simulation.

The impact of goose grazing on yield is much greater in spring than in winter, especially after a severe winter. Other factors, such as soil condition, may also be important.

Crop damage

In cases of crop damage, an inventory should be made of the extent of the damage (actual and potential), through both desk and field studies (see Box 5). The financial damage should be estimated by calculating the actual or potential loss of harvest due to grazing or trampling by waterbirds (see Box 4).

Box 5: Crop damage statistics

In Canada, the government spends \$3 million a year on a crop damage prevention plan and \$10 million a year on a programme of compensation. This is only 1.3% of the estimated \$1 billion a year that is generated by activities related to waterfowl hunting, viewing and tourism. Compensation is paid at a rate of 80% of the value of the crop that has been lost. This, in effect, constitutes 100% compensation, as there are no harvesting expenses associated with a destroyed crop (Van Roomen & Madsen, 1992).

In the European Union, losses in yield of cereals range from 0 to 56% and losses in yield of grass from 0 to 40%. Although the annual loss to the individual farmer may be as high as £402 per hectare, the loss to the EU is less than this because of the resulting reduction in agricultural surpluses. In this way, grazing by geese can save the EU up to £69 per hectare. Furthermore, geese may benefit the local economy by attracting bird-watchers who spend money in the area, create employment and extend the tourist season (Van Roomen & Madsen, 1992).

The extent of the damage to crops caused by waterbirds in Europe, and the national policies and management measures used to alleviate the problem, are indicated by country in Appendix I in Van Roomen & Madsen (1992). In The Netherlands, the Game Fund and the Government have paid between Dfl 1 million and Dfl 3 million (€450,000 – 1,350,000) annually in compensation to farmers for damage to grassland and arable land. Damage caused by geese and swans is fully compensated; damage caused by ducks is only compensated under exceptional circumstances. In Germany, the annual damage to crops has been estimated at DM 2 to 3 million (€1,000,000 – 1,500,000), of which DM 1 to 1.5 million is paid in the form of compensation or nature management contracts.

Damage to fisheries

In cases of damage to fisheries, various complementary investigations are required. The nature of the problem should be determined by identifying the fish habitats (fishponds, fishery areas, foraging areas for waterbirds) and the species of waterbirds involved. The status, trends and ecological requirements of the fish species should be identified. If possible, the composition of the diets of both the waterbirds and the fish species should be determined, to establish the ecological food chain. An estimate should be made of the quantities of fish taken by industrial and artisanal fisheries, by fish farmers, by waterbirds and by predatory fish. The financial damage should be estimated by: (1) calculating the carrying capacity of the area for fish (stocked or free-living) and fish-eating waterbirds; and (2) calculating the loss of fish harvest due to predation by waterbirds or predatory fish (see Box 6). However, this can be difficult because of a lack of funding, time and local expertise.

Box 6: Statistics on damage to fisheries.

In the USA, the damage to fisheries caused by cormorants *Phalacrocorax* spp. has been estimated at \$20 million annually, in an aquaculture industry worth \$174 million. To reduce the damage, cormorants are being scared away to refuge areas, and are being shot (92,400 birds annually, or 5-10% of the total population of 1-2 million birds).

State fish farms in Poland have estimated the annual loss of both fish and fish food due to waterbirds to be 240 million Zloty (Van Roomen & Madsen, 1992).

Bird strikes

Bird strikes can be very dangerous to both humans and birds (see Box 3). Measures should be taken to maximise human safety both inside the aircraft and outside in the vicinity of airstrips and other potential bird strike areas. The financial and social damage that would be incurred in the event of a plane crash should be estimated (see Box 7). In order to minimise or prevent bird strikes, potential bird strike areas should be identified. Most bird strikes occur in the vicinity of the following:

- Airports and runways. The risk of air strikes is highest during take-off and landing.
- Important bird sanctuaries (especially wetlands). Aircraft flying at altitudes of less than 1,000 ft (330 m) over wetland reserves are especially susceptible to bird strikes because of the regular movement of large waterbirds between feeding and roosting areas.
- Large rubbish tips. These may create a high risk of bird strikes because of the considerable numbers of birds that they attract, especially gulls, vultures, kites and herons.
- Migratory corridors.
- Other places where large concentrations of birds are known to occur.

Box 7: Bird strike statistics.

Annual losses in the USA due to bird strikes have been estimated at \$200 million in damage to civilian aircraft, and \$45 million in damage to military aircraft. There has been an average of seven human fatalities a year (Linell *et al.*, 1996).

A risk assessment suggests that between 1997 and 2006 there is a 25% probability of a bird strike event in the USA or Canada causing a fatal accident in jet transportation, involving the loss of 9.2 lives, 1.3 aircraft and \$149 million.

Since 1960, over 370 people have been killed world-wide as a result of bird strikes.

Between 1990 and 2000, over 33,000 bird strikes involving civil aircraft were reported world-wide.

Of an estimated 11,000 bird strikes per year, about 2,200 (20%) are reported by civil aircraft in the USA. In Canada, it is estimated that only about 30% of all bird strike incidents are reported.

UK registered aircraft of over 5700 kg (12,500 pounds) strike a bird about once every thousand flights.

More than half of all bird strikes occur at less than 30 metres (100 feet) above ground level

The parts of an aircraft most frequently damaged by bird strikes are engines (22%), wings (21%), noses (19%) and windshields.

About 6-7% of all bird strikes result in aircraft damage.

Bird strikes can involve over 100 birds at a time.

Gulls (30%) and waterfowl (13%) are the most commonly reported birds struck by civil aircraft in the USA. In recent decades, populations of Double-crested Cormorants *Phalacrocorax auritus* (around the Great Lakes), American White Pelicans *Pelecanus erythrorhynchos* and Canada Geese *Branta canadensis* have increased dramatically in the USA, resulting in higher risks of bird strikes involving these species.

Over 99% of all bird strikes in the USA involve species that are protected at federal level under the Migratory Bird Treaty Act .

While any airport may have bird strikes, airports near migration routes or adjacent to wetlands or wildlife reserves are at a higher risk of having a significant bird strike hazard.

(Sources: <http://www.birdstrike.org> and www.airsafe.com)

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An inventory should be made of all those bird species that are potentially dangerous to aircraft. The risk of bird strikes should be estimated for various densities of flying birds at different altitudes through a combined field study and literature review of the aerial, breeding and migratory behaviour of the birds (see Box 7). The density, maximum and preferred flight altitudes, and seasonal occurrence of each species should be determined. At most major airports, there is a universal, scaled radar list with bird migration/activity intensities, varying from 0 (no birds on the radar screen) to 8 (radar screen completely filled with birds). The complete scale is: 0 - no risk of bird strikes; 1 - extremely small risk; 2 - very small risk; 3 - small risk; 4 - fairly small risk; 5 - fairly great risk; 6 - great risk; 7 - very great risk; 8 - extremely great risk. Note that no attempt has been made to translate this scale into a measure of the actual intensity of bird migration or other bird activity.

Step 2: Organise multidisciplinary teams to tackle problems

If there appear to be problems involving conflict between waterbirds and human activities (agriculture, fisheries, aviation), multidisciplinary teams should be assembled to investigate measures for reducing these conflicts. A national focal point, responsible for co-ordinating all activities relating to conflicts between waterbirds and human activities, should be identified. This focal point should define any project to be carried out, and should appoint a project leader and a multidisciplinary team for the duration of the project.

Team composition

The project leader and team members may all be selected from government sources, or they may include:

- stakeholders (*e.g.* farmers, fish farmers, fishermen or air traffic controllers);
- representatives of responsible agencies (*e.g.* individuals from national and international bird strike committees, managers of nature reserves, or experts from international organisations such as the Food and Agriculture Organisation of the United Nations-FAO);
- biological or technical specialists (*e.g.* biologists, ornithologists, specialists in the assessment of crop damage, radar specialists or hunters);
- professional advisers (*e.g.* socio-economists, representatives of national conservation agencies such as NGOs and research institutes, and representatives of international conservation agencies such as BirdLife International and Wetlands International).

The project leader and team members should be given sufficient government support (financial and logistical) to fulfill their task. The AEWA Secretariat could facilitate international co-ordination of the national teams.

Step 3: Develop an action plan for the reduction of damage to crops, fisheries or aircraft

Preparation

A multidisciplinary team should be assembled, with access to expert technical advice at all stages in the project. The duration of the project should be predicted, within the context of the agreed aims and objectives. A monitoring programme should be designed to measure the extent of the damage (to crops, fisheries or aircraft) before and after the project. Public awareness of the problem should be raised in all those Range States where it occurs. The approval of relevant governmental agencies, landowners, fish farmers and fishermen should be obtained, and co-ordination with national and international conservation organisations established. Indicators of damage reduction (to crops, fisheries or aircraft) should be identified.

Action plan

An action plan should be developed on the basis of the damage inventory, the review of comparable cases and the assessment of socio-economic and legal requirements carried out in Step 1. The action plan should take into account the fact that many waterbirds and their natural habitats are accorded protection under various international treaties and conventions. Various general measures and precautions can then be taken to avoid or minimise the damage. It should be remembered that birds might become accustomed to certain measures, *e.g.* scarecrows, with the result that these measures can lose much of their effectiveness in controlling damage. If possible, a 'win-win' scenario should be pursued, in which benefits accrue to both humans and waterbirds. Adequate funding should be secured for all measures to be taken.

General measures

- Crops, fish, or aircraft may be protected by keeping birds away from sensitive areas through the creation of physical or ecological barriers. Examples include erecting exclosures to protect valuable crops, stringing wires or nets over fishponds, changing water levels or the height of the vegetation to make the habitat unsuitable for waterbirds, and covering up potential food supplies.
- Crops, fish, or aircraft may be protected by scaring birds away from the site through the use of aerial predators (*e.g.* birds of prey), ground predators (*e.g.* foxes, dogs and cats), scarecrows, hunters, guards or loud noises (*e.g.* calls of predators, calls of birds in distress, and gun shots).
- Crops, fish, or aircraft may be protected, if keeping birds away from sensitive areas through the creation of physical or ecological barriers or by scaring birds away doesn't work, by controlling the populations of the bird species causing the damage through trapping, shooting of adults or destruction of eggs and nests, as far as national and international legislation allows.
- The birds may be provided with alternative feeding and roosting areas (secure refuges) at a considerable distance from the sensitive areas.
- Financial compensation can be paid to companies or individuals suffering damage (see Box 5).
- Damage may be reduced or prevented by adopting alternative forms of land use in areas especially prone to damage from waterbirds.

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Measures to reduce crop damage

- Damage to crops can be reduced or eliminated by growing crops that are unattractive to birds.
- The damage caused by migratory birds can often be reduced by changing the planting or harvesting times or by other husbandry practices.
- Land that is especially prone to crop damage by waterbirds could be purchased from the farmers and incorporated within protected areas.

Measures to reduce damage to fisheries

- Aquaculture ponds (fish and shellfish) may be protected from waterbirds by erecting netting over the water surface.
- Damage may be reduced or prevented by taking care in the selection of a location for aquaculture development (*e.g.* it would not be sensible to construct fishponds in the vicinity of a large cormorant colony).
- Free-living fish stocks may be protected from over-harvesting by limiting commercial fisheries and/or intensive artisanal fisheries through legislation or restrictions on catch. The regulation of extensive artisanal fishery catches by legislation and the control of fish-eating birds by reduction of bird populations do not normally have a large positive impact on the stocks of free-living fish, although there are great variations from case to case.
- In some cases, the removal of small fish by waterbirds actually enlarges the total fish yield. Control of waterbirds in these situations would be counter-productive.
- Seabirds that are used by fishermen to locate fish shoals at sea should be protected.

Measures to reduce bird strikes

- The incidence of bird strikes around airports can be reduced by clearing the area of large bird roosts, breeding colonies of waterbirds and rubbish tips, using one or more of the general measures listed above.
- Physical protection should be added to aircraft to minimise the damage when collisions do occur.
- A standard procedure should be followed during bird migration.
 1. Bird movements should be recorded on a network of radar stations.
 2. An international bird movement warning system should be developed through this radar network.
 3. Whenever a major bird movement is recorded on radar, bird intensity warnings should be sent out to other radar stations. These warnings should contain details of the observation station, observation method, observation time, species involved (if known), intensity of movement, flight direction, flight speed, flight altitude, and validity. If the intensity of the movement reaches 7 or 8 on the intensity scale, warnings should be issued to all aircraft in the vicinity to fly at a minimum altitude of 660 metres (2000 feet) above ground level. Measurements of the intensity of the movement should be stepped up, and the minimum altitude of 660 metres should remain in force until the intensity falls below 7. Warnings of movements of intensity 7 or 8 at one airport should apply equally to neighbouring airports in the close vicinity.
- No-fly zones for low-flying aircraft should be declared in particularly sensitive areas. These are especially relevant to military aircraft, helicopters and small private planes that commonly fly at low altitudes. Large civilian aircraft usually fly at altitudes well above the maximum altitude of most birds.
 1. Aircraft should try to avoid flying at low altitude over bird sanctuaries, large rubbish tips or other areas harbouring large concentrations of birds.
 2. If this is inevitable, aircraft should not be permitted to fly at altitudes of less than 330 metres (1,000 feet) or preferably 500 metres (1,500 feet) over bird sanctuaries, large rubbish tips and other known bird haunts.

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3. The minimum altitude should be increased or low-level flights banned completely during particularly dangerous periods, *e.g.* over major roosting sites during the migration season, and over large breeding colonies during the breeding season.

Some solutions for reducing the risk of bird strikes are discussed in Box 8.

Box 8: Potential solutions for damage reduction

The following techniques should be used in combination because most waterbirds quickly become accustomed to any single technique.

Modify the landscape

Many geese and ducks require short, green grass for food. Allow grass to grow longer to make it unpalatable to waterbirds, or plant less attractive vegetation along the edge of the water. Waterbirds prefer to build their nests on islands, peninsulas and undisturbed grounds. Make this favourable breeding landscape unfit for waterbirds. Weed control in rice fields reduces the attractiveness of this habitat for waterbirds that feed on small weed seeds.

Prevent nesting

An easy way to control nesting waterbirds is to destroy their eggs or nests. However, before interfering with nesting, check local and national regulations concerning permits.

Install barriers

Most species of *Anatidae* prefer to land on water and walk onto adjacent grassy areas to feed and rest. The most effective but expensive tools for controlling the movements of waterbirds are nets, wires, fences, hedgerows and other physical barriers (Van Roomen & Madsen, 1992).

Using scaring devices

Large helium-filled balloons, tricycles with balloon tyres, strobe lights, scarecrows with movable parts, bird-scaring reflecting tape, Mylar flags, screamer sirens, whistle bombs, shell crackers and automatic exploders will help to keep most waterbirds from feeding and resting properly. Scaring devices are only effective when several types of device are used alternately. Before using any scaring device, check local and national regulations concerning permits (Van Roomen & Madsen, 1992)

Utilise dogs

A very effective method of scaring waterbirds is the use of free-ranging dogs trained to chase waterbirds as soon as they land. However, local leash laws may prevent the use of such dogs.

Relocation

Small numbers of birds that constitute a particular nuisance can be moved to another area (e.g. a nature reserve) by live-trapping or tranquillising (e.g. with alpha-chloralose; Pimentel, 1991). Be sure to relocate the birds far enough away, so that they do not return to the original site. Check also to ensure that the relocation will not create a similar problem at the other site.

Financial compensation

If waterbirds still cause damage to crops or fisheries, the payment of compensation to farmers and fishermen can be another solution. An adequate system for estimating the damage in monetary terms is then required. Ensure that adequate funding is available (Van Roomen & Madsen, 1992).

Hunting

Hunting can be used to help manage crop damage problems, sometimes in combination with other measures (See also Guidelines No.5: *Guidelines on sustainable harvest of migratory waterbirds*). Such use can increase the level of tolerance of waterbirds among landowners, farmers, fisheries managers, etc., while also providing them with alternative income. However, hunting to control the numbers of waterbirds should be licensed and only permitted when other measures have failed.

Refuges

An effective way of keeping waterbirds away from an area where they may cause damage is to create a refuge for the birds, possibly with lure-crops such as barley seed, sugar beet or fodder beet. Hunting should be banned in such refuges. In Denmark and Ireland, this method has proved to be effective in combination with the use of scaring devices. In the EU, acquisition of refuge areas can be partially financed by set-aside regulations. About half of the most important areas for geese in Denmark have become reserves. Ensure that adequate funding is available (Van Roomen & Madsen, 1992).

Netting over fishponds

Fish-eating birds can be kept away from fishponds by covering the ponds with netting. Waterbirds sometimes get caught under the netting, either by slipping under the edges or falling through holes. Pond owners usually kill these birds, but a more acceptable approach would be to catch, ring and release the birds, and improve the effectiveness of the netting.

Action stages

- Individuals involved in the measurement of bird damage to crops, fisheries or aircraft should be given professional training.
- Successful examples from elsewhere should be implemented wherever possible.
- An overview of the success and relative usefulness of measures for the control of bird damage should be maintained at an international level (*e.g.* at the International Bird Strike Committee), so that countries know whom to contact about their problem.
- Local people should be involved in the programme wherever possible.
- Public awareness should be raised through the mass media and amongst local communities.
- A long-term programme of conservation education should be developed.

Step 4: Implement action plan and follow up with project activities

General

As soon as project activities for damage reduction have been initiated, a monitoring procedure should be established to measure the success of the project. Future damage to bird populations, crops, fish stocks or aircraft should be determined or estimated, and the cost-effectiveness of the project should be evaluated. The project should be revised, rescheduled or discontinued when necessary. Implementation of the project should be linked to public awareness activities, including education programmes and coverage by the mass media. The progress and results of the project should be published in both the scientific and popular literature, and the effectiveness of the project should be reported to the AEWA Secretariat by the national focal point.

Crop damage

Farmers and hunters should be convinced of the necessity of the project, especially when the recommended actions do not include direct control of bird populations.

Damage to fisheries

Fishermen should be convinced of the necessity of the project, especially when the recommended actions include limiting their catches or doing nothing to control the birds. In some instances, the introduction of an effective system to control illegal fishing will have greater benefits to the fishery as a whole than control of fish-eating birds.

Bird strikes

Pilots and aircraft mechanics should report all instances of bird strikes (*e.g.* to the project leader) to increase knowledge of bird strikes and to permit measurement of any changes in the frequency of bird strikes (see Box 7). Changes in the intensity of aircraft activity in areas prone to bird strikes should be monitored, and pilots who deliberately violate the regulations pertaining to minimum flight altitude should be sanctioned. The project leader should analyse any failure of measures taken to control bird strikes, suggest modifications for future efforts, and notify the AEWA Secretariat of these suggestions. If all precautions have failed and an aircraft crashes, the airport disaster guidelines should be followed.

References and useful web sites

1. ACTION PLANS

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- AEWA Action Plans can be found at:
http://www.unep-aewa.org/publications/technical_series.htm
- Action Plans for EC Birds Directive Annex 1 species can be found at:
<http://europa.eu.int/comm/environment/nature/directive/birdspriority.htm>
- IUCN Species Survival Commission Specialist Groups
<http://www.iucn.org/themes/ssc/sqs/sqs.htm>
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Botulism

<http://www.pnr-rpn.ec.gc.ca/nature/migratorybirds/avianb/ce00s02.en.html>

Diseases

<http://www.avianbiotech.com/diseases/newcastle.htm>

Algal blooms

<http://www.epa.gov/OWOW/estuaries/piesteria/>

<http://www.whoi.edu/redtide/>

Lead poisoning

<http://www.unep->

[aewa.org/publications/other_publications.htm](http://www.unep-aewa.org/publications/other_publications.htm)<http://www.britishcolumbia.com/Wildlife/wildlife/information/Lead%20Poisoning%20of%20Water%20Birds.htm>

Oil spill in Wales

<http://www.swan.ac.uk/biosci/empress/news.htm>

Oil spill in the Russian Federation

<http://www.american.edu/projects/mandala/TED/KOMI.HTM>

Oils spill in South Africa

<http://web.uct.ac.za/depts/stats/adu/oilspill/>

Cyanide pollution of river Tisza

<http://nfp-hu.eionet.eu.int/cyanide.html>

Heavy metal pollution of Coto Doñana

<http://www.yale.edu/ynhti/curriculum/units/1999/6/99.06.01.x.html>

National Response Center

<http://www.nrc.uscg.mil/nrchp.html>

Emergency Response Notification System

<http://www.nrc.uscg.mil/nrchp.html>

National Response Team

<http://www.nrt.org>

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Useful web sites

- Ramsar sites directory
<http://www.wetlands.org/RDB/Directory.html>
- Ramsar Information Sheet
http://www.ramsar.org/key_ris_index.htm
- Ramsar Information Sheet explanatory notes and guidelines
http://ramsar.org/key_ris.htm#note
- Ramsar criteria
http://ramsar.org/key_criteria.htm
- UNESCO World Heritage List
<http://fp.thesalmons.org/lynn/world.heritage.html>

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- New guidelines for management planning for Ramsar sites and other wetlands
http://ramsar.org/key_guide_mgt_new_e.htm
- Ramsar wise use guidelines
http://ramsar.org/key_wiseuse.htm
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http://ramsar.org/key_add_guide.htm
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<http://www.face-europe.org/>

The Game Conservancy Trust (UK)

<http://www.gct.org.uk/>

International Council for Game and Wildlife Conservation (C. I. C)

<http://www.cic-wildlife.org/>

Lead poisoning

<http://www.npwrc.usgs.gov/resource/othrdata/pbpoison/pbpoison.htm>

International Wildlife Rehabilitation Council

<http://www.iwrc-online.org/>

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IUCN Species Survival Commission Specialist Groups

<http://www.iucn.org/themes/ssc/pubs/sscaps.htm>

CITES

<http://www.cites.org>

<http://international.fws.gov/cites/cites.html>

EU wildlife trade regulations

http://europa.eu.int/comm/environment/cites/legislation_en.htm

<http://www.wcmc.org.uk/species/trade/eu/>

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- Tourism Research and Education Centre 1990. *Towards Serving Visitors and Managing Our Resources*. Proceedings of a North American Workshop on Visitor Management in Parks and Protected Areas. University of Waterloo, Ontario, Canada
- UNEP IE Tourism Programme. Focus numbers and technical reports, e.g.
- Focus No.1, 1995: National Ecotourism Strategy, Australia.
 - Focus No.8, 1997: (Recreational) Carrying Capacity.
 - Technical Report No.29, 1995: Environmental Codes of Conduct for Tourism.
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Useful web sites

- The International Ecotourism Society TES
<http://www.ecotourism.org>
- The World Travel & Tourism Council WTTC
<http://www.wttc.org>
- The World Tourism Organisation WTO
<http://www.world-tourism.org>
- United Nations Environment Programme, Industry and Environment, UNEP-IE: Tourism
<http://www.unepie.org/tourism>

8. REDUCING CROP DAMAGE, DAMAGE TO FISHERIES, BIRD STRIKES AND OTHER FORMS OF CONFLICT

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Useful web sites

Bird strikes

<http://www.birdstrike.org/birds.htm>

www.airsafe.com

Conflict between fisheries and waterbirds

<http://www.cormorants.info/pdfs/WM14.pdf>

http://banchory.ceh.ac.uk/conflict/case_studies/case%20studies.htm

Costs and benefits of managing wild geese in Scotland

<http://www.scotland.gov.uk/cru/kd01/purple/cbmwgs-05.asp>

9. WATERBIRD MONITORING PROTOCOL

References and further reading

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Useful web sites

Wetlands International - International Waterbird Census
IWC brochure (global): <http://www.wetlands.org/IWC/about.htm>

Manuals for IWC coordinators and counters: <http://www.wetlands.org/IWC/Manuals.htm>

AEWA Conservation Guidelines

African Waterbird Census, reports, news, recording forms:

<http://www.wetlands.org/IWC/africa/africa.html>

Western Palearctic and Southwest Asia Waterbird Census, Background information and reports: <http://www.wetlands.org/IWC/wpal&swa/wpal.htm>

IWC publications: <http://www.wetlands.org/IWC/wpal&swa/output/about.htm>

Census procedures and recording forms for Africa, Western Palearctic and Southwest Asia: http://www.wetlands.org/IWC/docs/census_proc.htm

Western Palearctic and Southwest Asia, national site lists (clickable map):

<http://www.wetlands.org/IWC/wpal&swa/output/sites.htm>

Western Palearctic and Southwest Asia, national coverage history, 1967-1996 (clickable map):

<http://www.wetlands.org/IWC/wpal&swa/output/coverage.html>

Western Palearctic and Southwest Asia: National Coordinators of waterbird monitoring:

<http://www.wetlands.org/IWC/wpal&swa/partner/WPaINC.htm>

Asian waterbird Census, information, Coordinators, reports, news:

<http://www.wetlands.org/IWC/awc/awcmain.html>

Avian Demography Unit, University of Cape Town

<http://www.uct.ac.za/depts/stats/adu/>

Patuxent Wildlife Research Center: Colonial Waterbird Inventory and Monitoring

<http://www.pwrc.usgs.gov/>

US Fish & Wildlife Service, Division of Migratory Bird Management, Bird Monitoring

<http://migratorybirds.fws.gov/statsurv/mntrtbl.html>

Useful contacts

General

African-Eurasian Waterbird Agreement
UNEP/AEWA Secretariat
UN-Premises, Martin-Luther-King-Str. 8
53175 Bonn, Germany
Tel: (+49) 228 815 2413
Fax: (+49) 228 815 2450
E-mail: aewa@unep.de
WWW: <http://www.unep-aewa.org>

Bern Convention Secretariat (Secretariat of the Convention on the Conservation of European
Wildlife and Natural habitats)
Environment Conservation and Management Division
67075 Strasbourg Cedex
France
Tel.: +33-3-88413559/2256
Fax: +33-3-88413751
E-mail: gill.steimer@coe.int
WWW: <http://www.nature.coe.int/english/cadres/bern.htm>

BirdLife International
Wellbrook Court
Girton
Cambridge CB4 3QX
United Kingdom
Tel.: +44-1223-277318
Fax: +44-1223-277200
E-mail: birdlife@birdlife.org
WWW: <http://www.birdlife.org/>

CBD Secretariat - Secretariat for the Convention on Biological Diversity
World Trade Centre
393 St. Jacques Street
Office 300
Montréal, Québec H2Y 1N9
Canada
Tel.: +1-514-2882220
Fax: +1-514-2886588
E-mail addresses: <http://www.biodiv.org/secretariat/contact.asp>
WWW: www.biodiv.org

Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
UNEP/CMS Secretariat
United Nations Premises in Bonn
Martin-Luther-King Straße 8
53175 Bonn
Germany
Tel.: +49-228-815-2401 and +49-228-815-2402
Fax: +49-228-815-2449
E-mail: secretariat@cms.int
WWW: <http://www.cms.int>

AEWA Conservation Guidelines

Council of Europe
Environment Conservation and Management Division
Palais de l'Europe
Avenue de l'Europe
67075 Strasbourg Cedex
France
Tel.: +33-3-88412253
Fax: +33-3-88413751
E-mail: infopoint@coe.int
WWW: <http://www.coe.int>

EC - European Commission
Wetstraat 200
1049 Brussels
Belgium
Tel.: +32-2-2351111
E-mail: europawebmaster@cec.eu.int
WWW: www.europa.eu.int/comm/index.htm

ECNC - European Centre for Nature Conservation
PO Box 1352
5004 BJ Tilburg
The Netherlands
Tel.: +31-13-4663240
Fax: +31-13-4663250
E-mail: ecnc@ecnc.org
WWW: www.ecnc.nl

International Council for Game and Wildlife Conservation (C. I. C)
PO Box 74
H - 2092 Budakeszi
Hungary
Tel: 0036 60 444 647
Fax: 0036 60 444 648
E-mail: budapestoffice@cic-wildlife.org
WWW: <http://www.cic-wildlife.org/>

IUCN - the World Conservation Union
28, rue Mauverney
1196 Gland
Switzerland
Tel.: +41-22-9990001
Fax: +41-22-9990002
WWW: www.iucn.org
E-mail addresses at: <http://www.iucn.org/wl/db/sitefeedback.cfm>

IUCN/ELC - Environmental Law Centre
Adenauerallee 214
53113 Bonn
Germany
Tel.: +49-228-2692231
Fax: +49-228-2692250
E-mail: <http://www.iucn.org/themes/law/elc01.html>

Ramsar Convention Bureau
28, rue Mauverney
1196 Gland
Switzerland
Tel.: +41-22-999-0170
Fax: +41-22-999-0169

AEWA Conservation Guidelines

E-mail: ramsar@ramsar.org
WWW: www.ramsar.org

UNEP - United Nations Environment Programme
PO Box 30552
Nairobi
Kenya
Tel.: +254-2-621234
Fax: +254-2-226890 and +254-2-215787
E-mail addresses: <http://www.unep.org/Contacts/>
WWW: www.unep.org

UNESCO/MAB - Man and Biosphere Programme
Ecological Sciences Division
1, rue Miollis
75732 Paris Cedex 15
France
Tel.: +33-1-45684151
Fax: +33-1-40659897
E-mail: mab@unesco.org
WWW: <http://www.unesco.org/mab/>

UNESCO/WHC - World Heritage Centre
Place de Fontenoy 7
75352 Paris Cedex 07
France
Tel.: +33-1-45681443
Fax: +33-1-40569570
E-mail: wh-info@unesco.org
WWW: www.unesco.org/whc

UNEP - WCMC - World Conservation Monitoring Centre
219, Huntingdon Road
Cambridge CB3 0DL
United Kingdom
Tel.: +44-1223-277314
Fax: +44-1223-277136
E-mail: info@unep-wcmc.org
WWW: <http://www.unep-wcmc.org/>

Wetlands International
PO Box 471
6700 AL Wageningen
The Netherlands
Tel.: +31-317-478854
Fax: +31-317-478850
E-mail: post@wetlands.org
WWW: www.wetlands.org

WWF-International - World Wide Fund for Nature
Avenue du Mont-Blanc
1196 Gland
Switzerland
Tel.: +41-22-3649111
Fax: +41-22-3642926
E-mail addresses: http://www.panda.org/about_wwf/who_we_are/offices/offices.cfm
WWW: www.panda.org

Species Action Plans

IUCN Species Survival Commission
c/o IUCN (see under **General**)

Wetlands International Specialist Group Co-ordinators
c/o Wetlands International (see under **General**)
<http://www.wetlands.org/networks/SGroups.htm>

BirdLife International (see under **General**)

Emergency situations

No specific addresses. See under **General**, according to circumstances.

Site inventories

MedWet Coordination Unit
Villa Kazouli, Kifissias & Gr. Lambraki 1
14561 Kifissia
Greece
Tel.: +30-210-8089270
Fax: +30-210-8089274
E-mail: info@medwet.org
WWW: www.medwet.org

Ramsar Convention Bureau (see under **General**)

Site management

EUROSITE - European Network of Site Management Organizations
PO Box 1366
5004 BJ Tilburg
The Netherlands
Tel.: +31-13-4678638
Fax: +31-13-4634129
E-mail: eurosite@kub.nl
WWW: www.eurosite-nature.org

Ramsar Convention Bureau (see under **General**)

Sustainable harvest

International Council for Game and Wildlife Conservation (C. I. C) (see under **General**)

FACE - Fédération des Associations de chasseurs de l'EU
82 Rue F. Pelletier
B-1030 Brussels
Belgium
Tel: +32-2-732.69.00
Fax: +32-2-7327072
E-mail: face.europe@infoboard.be
WWW: <http://www.face-europe.org/>

Trade

TRAFFIC International
219c Huntingdon Road
Cambridge CB3 0DL
UK
Tel: (44) 1223 277427
Fax: (44) 1223 277237
E-mail: traffic@WCMC.org.uk

TRAFFIC Europe
Waterloosteenweg 608
1060 Brussels
Belgium
Tel.: +32-2-3470111
Fax: +32-2-3440511
WWW: www.traffic.org

UNEP/CITES Secretariat (Convention on International Trade of Endangered Species,
Washington Convention)
PO Box 456
Geneva Executive Centre
1219 Châtelaine (Geneva)
Switzerland
Tel.: +41-22-9799139 and 9799140
Fax: +41-22-7973417
E-mail addresses: <http://www.cites.org/eng/disc/sec/index.shtml>
WWW: <http://www.cites.org/>

Ecotourism

The Ecotourism Society TES
PO Box 755
North Bennington
VT 05257
USA
Tel: +1-802-447-2121
Fax: +1-802-447-2122
E-mail: ecomail@ecotourism.org
WWW: <http://www.ecotourism.org>

Bird damage

FAO - Food and Agriculture Organization
Forest Resources Division
Viale delle Terme di Caracalla
00100 Rome
Italy
Tel.: +39-06-57053589
Fax: +39-06-57055137
WWW: www.fao.org/fo

IBSC - International Bird Strike Committee
C/o National Bird Strike Committee
Royal Netherlands Airforce Airstaff
P.O.Box 20703
2500 EB The Hague
The Netherlands

Tel: +31-70-3396911

Waterbird Monitoring

International Waterbird Census (IWC) & African Waterbird Census (AfWC)
Waterbird Conservation Officer
c/o Wetlands International (see under **General**)

SOVON
Rijksstraatweg 178
6573 Beek-Ubbergen
The Netherlands
Tel: 024 684 81 11
Fax: 024 684 81 88
WWW: <http://www.sovon.nl/>

The Wildfowl & Wetlands Trust
Slimbridge
Gloucester
GL2 7BT
UK
Tel: +44 1453 890333
Fax: +44 1453 890827
E-mail addresses: <http://www.wwt.org.uk/contact/>
WWW: <http://www.wwt.org.uk/>

British Trust for Ornithology
The Nunnery
Nunnery Place
Thetford
Norfolk
IP24 2PU
UK
Tel: +44-1842-750050
Fax: +44-1842-750030
E-mail: info@bto.org
WWW: <http://www.bto.org/>

The Avian Demography Unit
Department of Statistical Sciences
University of Cape Town
Rondebosch 7701
South Africa
Tel: +27 (021) 650 3219
Fax: +27 (021) 650 7578
E-mail addresses: http://web.uct.ac.za/depts/stats/adu/staff/p_staff.htm
WWW: <http://www.uct.ac.za/depts/stats/adu/>

The European Bird Census Council
WWW: <http://zeus.nyf.hu/~szept/ebcc.htm>

Training facilities

Within the AEWA region, there are many facilities for training at different levels, ranging from three-day courses on various environmental topics for people with no prior knowledge, to Ph.D. level at universities. Many universities and institutes offer courses of varying lengths on wildlife management, site management, wetland ecology, sustainable development, ecotourism development, and many other related topics. UNEP maintains a database listing hundreds of courses. The Ramsar Convention Bureau maintains a list of environmental courses specifically aimed at wetland management. For information contact:

UNEP Directory on Environmental Education and Training Opportunities worldwide:
<http://www.unep.org/unep/products/publicat/education/index.htm>

The Ramsar Convention Bureau
Rue Mauverney 28, CH-1196 Gland, Switzerland
Tel: +41-22-999-0170; fax: +41-22-999-0169
E-mail: ramsar@ramsar.org
WWW: <http://www.ramsar.org>

There are several schools in Africa that specifically offer education in wildlife management and site management. These are attended by wardens and reserve managers from all over the continent. The most important are:

Ecole de Faune de Garoua
B.P. 271, Garoua, Cameroun
Tel/fax: +237-273135

College of African Wildlife Management
Mweka, P.O. Box 3031, Moshi, Tanzania
Tel/fax: +255-55-51113
E-mail: ulgtan@eoltz.com
WWW: <http://www.mwekawildlife.org/>

Kenya Wildlife Training Institute
P.O. Box 842, Naivasha, Kenya
Tel: +254-0311-20267/21329
Fax: +254-0311-20577
E-mail: kwsti@users.africaonline.co.ke

Southern African Wildlife College
Private Bag X3015, Hoedspruit, 1380, South Africa
Tel/fax: +27-15-7932621
E-mail: sawc@iafrica.com
WWW: <http://www.wildlifecollege.org.za/>

Special wetland courses for managers from developing countries and countries with economies in transition are given by the Wetland Advisory and Training Centre (WATC) of the Institute for Inland Water Management and Waste Water Treatment (RIZA) of the Netherlands Ministry of Transport, Public Works and Water Management. For information contact:

WATC
P.O. Box 17, 8200 AA Lelystad, The Netherlands

AEWA Conservation Guidelines

Tel: +31-320-298346; fax: +31-320-298339
E-mail: watc@riza.rws.minvenw.nl

IUCN also regularly organises short courses on wetland management at different levels, both for managers with little prior education and for decision makers at higher levels. These courses are given in the region (*e.g.* in West Africa). For information contact:

IUCN
Rue Mauverney 28, CH-1196 Gland, Switzerland
Tel: +41-22-999-0001; fax: +41-22-999-0002

UNEP/AEWA Secretariat
UN Campus
Hermann-Ehlers-Str. 10
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www.unep-aewa.org