Waterbirds around the world

A global overview of the conservation, management and research of the world's waterbird flyways

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Cover photography: Whooper Swans *Cygnus cygnus* arriving at Martin Mere, England. Photo: Paul Marshall. (www.paulmarshallphotography.com)

Site networks for the conservation of waterbirds

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ABSTRACT

In a flyway approach to the conservation of waterbird populations, the sites used throughout the year provide us with one of the tangible conservation tools with which we can work. Sound management of these sites can safeguard waterbird populations as they move from breeding grounds to staging sites and on to wintering sites. All these sites have a role to play in the birds' annual cycle. The network of critical sites (or critical network of sites) is the minimum network that needs to be maintained to support waterbird populations indefinitely. The functions of the sites and the functional links between sites are important attributes of this critical site network, which is more than just a list of important sites. A lot of information exists on the numbers of birds using sites at various times of the year, particularly in mid-winter (January), but knowledge about the function of sites for waterbirds and their role in the annual cycle is rather poor, and needs to be improved. One of the aims of the UNEP-GEF African Eurasian Flyways Project is to bring together these various strands of information to compile a network of critical sites for waterbirds in African and Western Eurasia.

INTRODUCTION: FLYWAY CONSERVATION

Migratory waterbirds can range over thousands of kilometres in their movements between breeding and non-breeding areas, relying on the availability of suitable habitat throughout their range. Most species are highly migratory, covering large distances and concentrating in large numbers at often a small number of places, making them vulnerable to external influences but at the same time attractive for bird-watching and ecological tourism. They are often an important resource for traditional sustainable use (Kanstrup 2006).

The definition of a flyway is generally understood to mean the entire range of a migratory waterbird species (or group of species, or distinct population of a single species) from the breeding grounds to the wintering areas, including the intermediate resting and feeding areas and the often relatively narrow corridor within which the birds migrate (see, for example, Scott & Rose 1996). The concept was first developed in North America, and is now widely used when attempting to define the overall problems that a migratory waterbird encounters in its life cycle and determine which countries should co-operate to protect and manage the populations on a sustainable basis.

The term "flyway" is to some extent a theoretical concept. It is not the same as a "migration route", which may be defined as the travel lanes of individual birds on their way from any particular breeding area to their winter quarters. Flyways, on the other hand, may well be conceived as those broader areas in which related migration routes are associated or blended in a definite geographic region. In addition, they have also become to have an administrative meaning (http://www.birdnature.com/flyways.html).

The term flyway can be used at various taxonomic, geographic and political "scales", as described in Boere & Stroud 2006, this volume.

The conservation of migratory waterbirds along a flyway poses a great challenge to international environmental co-operation. This is because of the vast distances covered by many species of waterbirds in the completion of their annual cycles and the large number of range states involved. Inadequate or inappropriate management measures by just one range state can jeopardize the conservation status of one or many species throughout the flyway. Thus, a high degree of international co-operation is essential throughout the areas used by the populations of the species involved: this is called the "flyway approach". Such co-operation requires international co-ordination at the levels of research, planning and monitoring, common standards for legislation, protected area designation and management, sustainable use, sharing of information and transfer of know-how. In this regard, the role of international conventions and agreements, such as the Convention on Biological Diversity (CBD), the Ramsar Convention on Wetlands, the Convention on Migratory Species (CMS) and the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) under the CMS, is essential.

Besides functioning at international, regional and national levels, an effective conservation programme for migratory waterbirds needs to focus right down to the site level, covering all scales in time (when are the sites used and by what) and space, and should provide tools to help the implementation of conservation actions at all appropriate levels.

At the species level, a flyway is in fact the entire ecosystem needed for a migratory waterbird in order to survive, including all the habitat types needed to accommodate breeding, resting and wintering during the whole annual cycle. As such, the concept fully supports the ecosystem approach required under the CBD.

Flyway conservation is the holistic approach to conservation of waterbirds and the systems they use – with their specific habitats – for the benefit of people and biodiversity. It evolves along four main axes: species, sites, habitats and people. A site network is one of the tools that bring together all four axes, and as such is a very important component of flyway conservation.

The flyway concept, by definition, requires close co-operation between all the Range States involved. It can strongly stimulate co-operation between states to build up networks of scientists, conservationists and reserve managers, and stimulate a wealth of small-scale initiatives in all fields of biodiversity and habitat conservation. Migratory waterbirds are a biodiversity resource shared by all countries of the world; conserving migratory waterbirds and using them on a sustainable basis helps to protect the biodiversity of many countries at the same time.

Migratory species really force Range States to work together because of the shared interest in conserving each other's

biodiversity and ensuring that the use of a species in one country is co-ordinated with that in other countries to avoid, for instance, unsustainable use of populations.

For many of these species, wetlands are the most important habitat type[1]. These habitats are usually rather discrete and separated from each other by vast areas of non-wetland habitat, causing waterbirds to concentrate at these sites. Wetlands are highly productive habitats and can therefore support large concentrations of waterbirds, despite their sometimes limited size. One of the ways to indicate the importance of individual sites is by the numbers of birds which habitually use them, year after year (see Scott & Rose 1996).

To complete their annual cycles, migratory waterbirds are dependent on a network of important sites throughout their range. Each site in the network plays a vital role, enabling the individuals that use it to reach the next (or another) site. Loss of one such site in the network could result in the distance between sites becoming too long, or in the location for a certain process (e.g. moult) no longer being available. This would "disconnect" the sites before and after it, and be equivalent to losing a link in a chain.

Wetlands are among the most threatened habitats in the world, having suffered losses exceeding 50% of the original area in many countries during recent decades (Millennium Ecosystem Assessment 2005). Large wetland complexes have been reduced in size, and some isolated wetlands have completely disappeared (Finlayson & Moser 1991). If, as a consequence of these losses, a site disappears from the network, the birds need to be able to find an alternative. The flexibility to be able to do this is determined by a complex of many factors. It is obvious that the network, if thinned beyond the species' flexibility, can no longer support the population, leading to a decrease in numbers and eventually a crash. Waterbirds require the network of sites as stepping stones along their migration routes. This means that there is an absolute minimum size and configuration of this network that needs to be maintained to support waterbird populations indefinitely. This is what is meant by the network of critical wetland areas, or critical network of wetland areas[2]. This network may be considered as a minimum essential to ensure the survival of these species across their ranges should remaining habitat elsewhere be lost. Because all sites are, or may increasingly become, refuges, if any one of them is lost the consequences may be disproportionately large. Any comprehensive conservation initiative for migratory waterbirds should therefore take the safeguarding of this network of sites into account: without these sites, the species will not survive. As such, the network of critical sites is one of the pillars of the flyway approach to the conservation of waterbirds

Waterbirds are not the only users of these wetland sites. In many cases, local communities depend on the goods and services provided by these wetlands. Changes in human activities caused, for example, by increasing population densities are resulting in more and more unsustainable use and in clashes of interest between human activities and waterbird requirements. However, in cases of sustainable use or through targeted intervention aimed at restoration, good conditions for wetland biodiversity, including waterbirds, can be maintained and population levels can stay or become healthy. Site-based conservation should strive at these "win-win" situations.

NETWORK OF CRITICAL SITES AS A TOOL FOR CONSERVATION

From the above, it is clear that the network of critical sites is a powerful tool in an effective conservation programme for the benefit of populations of migratory waterbirds, the habitats on which they depend and the people sharing these habitats. It is a mechanism for incorporating internationally co-ordinated measures for site conservation, species monitoring and conservation, including sustainable use and regulation of any forms of harvest. Defining the network of critical sites sets the geographic priorities for the implementation of these conservation actions. Knowledge of this network is therefore a basic need for the implementation of policy tools such as the Ramsar Convention at the global scale and regional initiatives such as AEWA, Western Hemisphere Shorebird Reserve Network and East Asian-Australasian Flyway Site Network.

Although a list of sites covering a certain area is often referred to as a network, a network in the true sense of the word is more than this. In a network, the functions of sites and the functional links between sites are important attributes. Sites can serve various functions to birds, e.g. as breeding grounds, stopover sites (either for roosting, feeding, moulting or other ecologically important components of the life cycle such as pair bonding), wintering sites, and refuges in severe weather. It is well documented that birds are often quite traditional in their use of sites, not only on the breeding grounds and in the wintering areas, but also at staging areas along the migration routes. These functions of, and links between, sites will differ between and within species and may even change over the years, for example as a result of changing weather conditions. Although most waterbirds seem to be quite flexible in their response to changing environmental conditions, those with more traditional migration strategies and high site fidelity, such as the Lesser White-fronted Goose *Anser erythropus* and certain species of waders, are particular vulnerable. Little is known about these aspects of a site network except in a few cases where in-depth research has been undertaken, e.g. in the case of the Greenland White-fronted Goose *Anser albifrons flavirostris* (Fox *et al.* 1994, Fox & Stroud 2002). For most species, more work is needed before it is possible to identify the critical sites and assess their roles in the annual cycle. In most cases, therefore, it would be too ambitious at the present time to aim at building site networks by relying heavily on knowledge of the functional aspects site linkages.

A temporary solution might be found at an intermediate stage, by subdividing the annual cycle into three main life-cycle components (breeding, passage and over-wintering) and analysing the network on this basis. Traditionally, waterbirds have mostly been counted in the month of January within the framework of the International Waterbird Census (IWC) co-ordinated by Wetlands International. Thus, for many sites information is lacking on their role in the migration seasons. In many cold regions, where most if not all sites are completely frozen over in winter (January), relatively little is known about the importance of sites for waterbirds. The Important Bird Areas (IBA) project and database of BirdLife International have, to some extent, mobilized information about numbers of waterbirds in periods other than mid-winter, and it is therefore important to combine this information with information from the IWC.

[1] It is important to note that some migratory waterbirds may also depend on non-wetland sites for part of their annual cycle.

[2] Both forms of wording contribute to an understanding of the concept: the network aspect as well as the site aspect are critical for the survival of the species

One specific role that sites can play in a site network is that of providing flexibility in case of shifting distributions. Against the background of climate change, this would appear to be an increasingly important characteristic of a site network (Boere & Taylor 2004).

The word "critical" in the strict sense implies that the removal of any one of the sites from the network would have a serious impact on the population of waterbirds that the network as a whole supports. This concept of a minimum configuration of sites is straightforward in itself, but difficult to apply in practice, because it cannot be underpinned by scientific data, and cannot be tested. To date, initiatives to establish conservation approaches based on site selection have therefore taken a pragmatic approach and expressed selection criteria in numerical terms, the most famous being the 1% criterion[3] as used, for example, in compiling lists of important sites under the Ramsar Convention and within the framework of the Important Bird Areas project.

The Ramsar Convention has adopted the following definition of the term "critical site", as given in the *Strategic framework for the List of Wetlands of International Importance* published by the Ramsar Bureau: "Critical sites for mobile or migratory species are those which contain particularly high proportions of populations gathered in relatively small areas at particular stages of life cycles. This may be at particular times of the year or, in semi-arid or arid areas, during years with a particular rainfall pattern. For example, many waterbirds use relatively small areas as key staging points (to eat and rest) on their long-distance migrations between breeding and non-breeding areas. For Anatidae species, moulting sites are also critical. Sites in semi-arid or arid areas may hold very important concentrations of waterbirds and other mobile wetland species and be crucial to the survival of populations, yet may vary greatly in apparent importance from year-to-year as a consequence of considerable variability in rainfall patterns."

Although these criteria for the identification of sites for inclusion in specific lists have been the subject of extensive discussion in the past, they do not consider "complementarity" between sites, or different "roles" of sites in the flyway. It is therefore worth looking at these criteria again, to evaluate whether there is scope for better incorporation of the functionality of sites in a network into the selection criteria.

It should be said that the creation and implementation of new criteria should only be promoted if there is clear indication that this will significantly improve the functioning of the resulting network. In other cases, it is preferable to adhere to existing criteria, to avoid loading additional burden on the shoulders of countries that will have to work with the criteria and to avoid losing the conservation value and credit build up with the existing sites. Instead of replacing existing criteria, it may therefore be necessary to define additional criteria to accommodate the functional component of the network.

There is also a need to look at the efficiency or effectiveness of the selected network. Evaluation of the effectiveness of a proposed network should be undertaken on a species (or species group) basis, and involves bringing together data from various existing data sets to check to what extent the network covers the distribution of the species (or species group) and fulfils the various roles in the annual life cycle.

UNEP-GEF AFRICAN EURASIAN FLYWAYS PROJECT

For the effective conservation of migratory waterbirds, it is important to be able to make the step from lists of key sites to networks of critical sites. Inadequate knowledge and understanding of waterbirds and the way they use sites have, until now, hampered this step forward. UNEP-GEF and several major co-funders, including the German Government and the AEWA Secretariat, have therefore decided to support a flyways project for the African-Eurasian region. This project, entitled "Enhancing conservation of the critical network of sites required by Migratory Waterbirds on the African/Eurasian Flyways" (or UNEP-GEF African Eurasian Flyways Project in short) is being developed by Wetlands International and will run for the period 2006-2011. The project will address the issues mentioned above, and will develop a network of critical sites for the African-Eurasian region. The need for the development of such a network of sites of critical importance to migratory waterbirds is well established and supported by both the Ramsar Convention and AEWA.

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[3] Ramsar Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird. http://ramsar.org/key_guide_list2006_e.htm