An assessment from the BirdLife Partnership

STATE OF THE WORLD’S BIRDS 2004

Indicators for our changing world
How to use this book

Each double-page spread of this book has been written so that it makes sense on its own and thus can also be read independently of the other pages. Where issues are developed further, there are cross-references within the text to relevant additional pages.

Boxes
These provide the scientific evidence or case studies that support the points made in the text, and may include charts or maps. Each box is numbered (starting with “1” on each new double page spread) and is referred to at an appropriate point in the page text. Scientific names of birds follow BirdLife usage (see http://www.birdlife.org/datazone/search/species_search.html)

Box titles and figure legends
These give additional messages or quick explanation and complement the subheadings in the page text

Main message
This tells you what this double-page spread is largely about

Page text with subheadings
This provides an easy-to-read narrative of the issues, and is divided into several different sections, according to the main issues

Summary text
This gives a quick summary of the key points

Picture credits
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This is where you can download the pages in this book, see full citations for sources, or get further information online from BirdLife’s Data Zone and World Bird Database

Charts and maps
These illustrate one or more key points made in the box. Colours are chosen to help to convey the message

Sources
These are the key abbreviated sources for the scientific evidence cited

Acknowledgements
These are the people who contributed analyses, figures and/or text shown in the box (see opposite page for full list)

Page tab and colours
This tells you quickly which section of the report you are in: State (amber), Pressure (red) or Response (green)
State of the world’s birds 2004
indicators for our changing world

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There is a growing realisation that genuinely sustainable development depends on conserving the Earth’s biodiversity. Biodiversity underpins our lives, providing many vital goods and services to people. There are also strong ethical and aesthetic arguments why we should care for it well.

Given the fundamental importance of biodiversity, we know surprisingly little about it. We are sure that it is disappearing fast, yet at present we cannot even measure progress (or otherwise) towards the 2010 target set by world leaders for slowing this loss. This BirdLife assessment examines what the best-known group of living things, birds, can tell us about the state of biodiversity (see box 1), the pressures upon it (box 2) and the solutions that are being, or should be, put in place (box 3). It is a synthesis of our knowledge in 2004 and provides a benchmark against which we can assess our efforts to conserve biodiversity in future.

Why birds? They have a special place as environmental indicators for many reasons, not least because of their enormous public appeal. A global network of birdwatchers and ornithologists continues to provide a huge amount of information about birds—information largely lacking for other species.

Birds are sending us some important messages that should not be ignored. They show that our global environment is under serious strain, with a massive and still increasing haemorrhage of biodiversity. They show that these losses are caused directly or indirectly by our expanding demands on the biosphere, driven by deeper problems that include widespread social inequities and distorted value systems. They show that there are solutions to both the immediate threats and their deeper causes. They show also that there is no time to waste: our options for conserving biodiversity are narrowing fast.

The BirdLife Partnership is working to tackle these issues in more than 100 countries around the world. The companion publications to this document, Working together for birds and people and A strategy for birds and people, respectively set out the current actions of the BirdLife Partnership, and BirdLife’s strategy until 2015. Birds help to create positive change, through a public that understands and values biodiversity conservation. They thus play a vital part in bringing about the social and political solutions that we need for a more sustainable world.

Biodiversity is rapidly being eroded. Threatened species are becoming more threatened and many common ones are in decline. Many species are confined to small ranges or distinctive habitats, or congregate at particular sites. Threatened and geographically-concentrated species map out a network of key biodiversity areas within the wider landscape.

In many parts of the world, the familiar species around us are in decline. Some of these declines are very rapid and severe. Although most of these species are still relatively common, their declines highlight wider environmental problems. Current extinction rates are exceptionally high. Without concerted action these rates will continue to rise. In total, 1,211 bird species (12% of the total) are globally threatened. Of these, 179 are now Critically Endangered—facing imminent extinction. Only for birds do we have comprehensive information on global trends over recent decades. The Red List Index for birds shows that they have become more threatened since 1988, with more species slipping closer to extinction. Seabirds and Asian forest birds have shown particularly severe declines.

Threatened species occur across the world, but they are concentrated in the tropics and especially in moist tropical forests. Many other species are geographically concentrated, and often confined to distinctive habitats. More than one-quarter of bird species have very small breeding ranges. Most of these occur together in places called Endemic Bird Areas—mainly in the tropics and sub-tropics—that cover just 5% of the Earth’s land surface. A further 19% of bird species congregate in large numbers at a few special sites at particular times in their life cycles.

Species that are threatened and geographically concentrated can be used to locate key biodiversity areas—critical sites for conservation. For birds, over 7,500 Important Bird Areas (IBAs) have so far been identified in nearly 170 countries. They are crucial strongholds for maintaining species’ overall ranges and populations, and a set of vital stepping stones for migrants. IBAs are also effective at conserving biodiversity other than birds.
People cause the immediate pressures on biodiversity. Habitat destruction, driven especially by agriculture and unsustainable forestry, is the worst threat at present, but climate change will have major impacts in future. Threats are intensifying and often interlinked. They are rooted in difficult human problems—including a consistent undervaluation of biodiversity.

The immediate threats to species, sites and habitats are nearly always caused by people. Very often, these threats are interconnected and reinforce each other. Habitat destruction—with the degradation and fragmentation that go with it—is by far the biggest immediate problem, impacting 86% of Globally Threatened Birds. In particular, unsustainable forestry and expanding and intensifying agriculture are the paramount threats.

Many other factors are also significant, including our ever-spread, infrastructure. When poorly planned and managed, this destroys natural habitat and brings with it damaging human activities, including logging, agriculture and fire. Environmental pollution of air, land and water often has a direct impact on birds—an indication of the wider, costly problems it creates for biodiversity and society.

Seabirds continue to be drowned on the hooks of long-line fishing boats, causing devastating population declines and disrupting ocean ecology. Unsustainable hunting and trapping remain a critical issue for many species. Global travel and trade and changing climate encourage the spread of invasive species of animals, plants and microbes, including new diseases. Invasives are a particular threat on islands, but increasingly a problem on continents too.

Climate change is taking place because of human activities, especially the burning of fossil fuels. We can already see many impacts on biodiversity, and more severe effects—including bird extinctions—are predicted. Whether we lose a few species or very many will depend critically on the degree of warming.

The immediate threats to birds and other biodiversity are rooted in some of humanity’s most serious problems. These include continuing strong growth in human population and material consumption, widespread poverty, inequitable access to resources, and an unfair global trade regime. Ignoring or undervaluing biodiversity in our economics undermines sustainability. So long as our accounting is inadequate, we will continue to destroy the resources on which we depend, and short-term gains will be massively outweighed by long-term losses.

Investment in biodiversity needs to be much larger and more strategic. Priorities can help to target efforts, but existing commitments must be made effective and resources massively scaled up. Time is short, but birds provide a focus for positive change and can help us to monitor progress.

Awareness of biodiversity, its value to humanity and the need for its conservation has been growing steadily, supported by better data than ever before. Yet global investment in conservation does not come close to matching what is needed, either in the amount available or where it is spent. Because resources are still so scarce, immediate action must focus on priorities—and the information we have on birds can help to set these.

Since 2000, key actions have been identified for all Globally Threatened Birds. Action at sites will protect most, but not all, species. Many actions are underway but there are still crucial gaps. Examples show that, with the right measures, individual species can be saved from extinction. Important Bird Areas (IBAs) urgently need recognition, nationally and internationally, as priority sites for conservation—the backbone of a larger network of key biodiversity areas. These sites must be effectively safeguarded. The best approach for this will differ from site to site, involving a range of governance mechanisms. For many IBAs, local Site Support Groups should have a significant role.

The future of IBAs, and of many dispersed and nomadic species, also depends crucially on conservation of the wider environment, where most people live and work. It is here that sustainable development must be achieved if biodiversity loss is to be halted.

Commitments made under existing international agreements have enormous potential to achieve biodiversity conservation. However, they need to be activated in national legislation and made effective in practice. Most importantly, political will must be manifested in a dramatic scaling-up of the resources available for conservation. This is required both nationally and internationally, drawing from a much wider range of sources than at present—including the private sector.

As these responses are put in place, birds can provide a key part of a global system to monitor progress. The data come from the rapidly growing number of people who care deeply about birds. For many such people, birds are a gateway to understanding and caring for the environment. Effective biodiversity conservation is unlikely to happen unless demanded by an informed and concerned public. Birds can help to create this constituency for positive change and thus bring about, eventually, a genuinely sustainable world.

One in eight of the world’s birds—1,211 species in total—faces extinction (p. 14)

The farmland bird index for Europe has declined by 34% since 1966 (p. 8)

Over 7,500 sites in nearly 170 countries have been identified as Important Bird Areas (p. 24)

Agricultural expansion and intensification threaten 50% of Important Bird Areas in Africa (p. 31)

64% of Globally Threatened Birds, most of them in the tropics, are threatened by unsustainable forestry (p. 31)

Alien invasive species impact 67% of Globally Threatened Birds on oceanic islands (p. 44)

Scaled conservation investment is over 20 times higher in developed than developing countries (p. 54)

43% of Africa’s Important Bird Areas have no legal recognition or protection (p. 60)

Conservation actions are underway for 67% of Globally Threatened Birds (p. 56)
Biodiversity underpins our lives, but is rapidly being eroded.

We all depend on biodiversity—yet we are losing it fast. We also know surprisingly little about it. This report looks at what the best-known group of organisms, birds, can tell us about global biodiversity, why it is being lost and how we should conserve it. Birds provide us with a particularly good window on these issues, thanks (among other things) to their fascinating diversity and remarkable migrations and economic importance.

Biodiversity is fundamental to human well-being

Biodiversity—the variability among living things and ecological systems—is the world’s natural wealth. Our lives depend on it, both in obvious ways and in ways that we are only just starting to understand. Governments around the world are now coming to recognise that a sustainable future really does depend on biodiversity conservation (see box 1).

It is clear that biodiversity provides us with many vital goods and services, and maintains the life-sustaining systems of the biosphere. However, there is still more to it than this. The amazing complexity and beauty of nature, product of a vast span of evolutionary time, are recognised and celebrated in many societies. Experiencing and understanding wild nature fulfils deep aesthetic and intellectual human needs. Conserving species and ecosystems can be seen as a moral duty, both because of their intrinsic right to exist, and because they are part of our natural and cultural heritage—at least as precious and important to us as great works of art and architecture.

We are losing biodiversity fast

The need for action has never been so pressing. The world is changing fast as humans appropriate more and more of its resources—there are many more of us than ever before, and each of us is more demanding too. We are now overdrawing on the earth’s renewable supplies and eating heavily into natural capital.

Already, we have cleared half the world’s natural habitats. A third of what is left will go within a human generation, if current trends continue (box 2). Human-induced climate change is set to cause far-reaching impacts on global biodiversity. Spurred on by climate change, alien invasive species are damaging and impoverishing ecosystems around the world. Because of these and other pressures, species are vanishing rapidly—at many times their natural extinction rate.

Birds can help us understand the problems and find the solutions

There is little dispute that global biodiversity is declining, but accurate measures are very hard to come by. This also makes it hard to plan the best responses to the problem, and to see whether conservation efforts are having any positive effect. This report shows how birds—the best-known major group of organisms—can help us understand the problems and piece together the solutions.

Birds are found almost everywhere on Earth, from the oceans to the mountaintops, from tropical forests to the polar ice-caps (see p. 7, box 3). Their extraordinary migrations knit the world together and provide us with a particularly good window on these issues, thanks among other things to their extraordinary migrations and the importance of the Convention on Biological Diversity, CBD: see p. 66), biodiversity conservation directly affects issues such as health, water, sanitation and many aspects of livelihoods. At the 2002 World Summit on Sustainable Development, the MDGs were reaffirmed and the UN Secretary-General proposed water, energy, health, agriculture and biodiversity (WEHAB) as an organisational framework for moving forward. In addition, the nations of the world agreed to pursue more effective implementation of the three objectives (conservation, sustainable use, and benefit sharing) of the CBD, and specifically to achieve, by 2010, a significant reduction in the rate of loss of biodiversity.

BirdLife International’s own strategic objectives, also running up to the year 2015, are designed to contribute significantly to achieving the MDGs, as well as maintaining the many wider values of biodiversity recognised by the CBD. Thus BirdLife aims to:

- conserve the diversity and distribution of wild bird SPECIES world-wide as an integral part of nature
- identify, conserve and promote a global network of internationally important SITES for birds and biodiversity
- maintain, manage and restore the diverse HABITATS that maintain vital ecological services
- empower, mobilise and expand a world-wide constituency of PEOPLE caring for birds and their natural environment.

BirdLife’s strategy for 2004–2015, and examples of the BirdLife Partnership’s work around the world to achieve biodiversity conservation and sustainable development, are set out in two companion publications to this one: A strategy for birds and people and Working together for birds and people.

2 Human impacts on the planet are growing—to the extent that we are compromising our own future

There are now more than 6.2 billion people in the world, a figure that is increasing by c.77 million per year. To be sustainable in the long term, humanity’s consumption of renewable natural resources must stay within the limits of the Earth’s biological capacity. Consumption depends on the number of consumers and the amount each consumes; capacity depends on the efficiency of production systems. Estimates of our current use of the biosphere—the area needed for growing crops, grazing animals, harvesting timber, fishing, accommodating infrastructure and sequestering the carbon released by burning fossil fuels—show that we are living unsustainably. By 1999, humans were already using 120% of the Earth’s long-term productive capacity. Per person, this ecological ‘footprint’ was around six times bigger in high-income countries than in low-income ones—reflecting the fact that the richest 20% of the world accounts for 88% of material consumption, while 1.2 billion people remain in ‘absolute poverty’.

These pressures are causing rapid biodiversity loss. Data are still very inadequate, but the best estimates are that we are losing between 0.5–1.5% of wild nature (natural habitats and species populations) each year. Some habitat types, such as temperate forests, are increasing in area, but these are exceptional. For example, loss of moist tropical forest (the primary reservoir of terrestrial species diversity) was c.0.4% per year from 1990–1997, with another 0.2% ‘visibly degraded’. Population losses for vertebrate species in this habitat were considerably higher, at 1.1% per year between 1970 and 1999, probably reflecting high levels of exploitation for food.

A loss of 1.5% per year may not seem like much. Over a human generation, however, this adds up to roughly a third of what is remaining—and we have already cleared around half the world’s natural habitats. We are thus compromising the biodiversity that maintains biological productivity and ecosystem services, on which we and future generations depend.


on the environment. Birds are just one component of biodiversity—and far from the most significant in species numbers or biomass—but they have a substantial role in many economies. In the United States, for example, birdwatching generated an estimated $58.5 billion in overall economic output in 2001. The economic contribution that birds make through ecological services such as pest control, pollination, seed dispersal and carrion consumption has never been quantified, but must, in many cases, be enormous.

This report sets out where we stand and where we need to go Although many information gaps remain, we know an exceptional amount about birds. This report is based on data provided by the many, many people—experts and enthusiasts alike—who study and observe birds across the world. It draws most heavily on the combined efforts and knowledge of the BirdLife Partnership in more than 100 countries. It is a summary assessment for 2004 of the status of birds world-wide (‘STATE’), the threats that affect them (‘PRESSURE’) and the measures being taken—or that need to be taken—to conserve them (‘RESPONSE’). Some of the analyses and case studies provide ‘snapshots’ of where we are in 2004; others will be updated regularly with new data (and made available on www.birdlife.org) so that trends can be tracked. More background and details for many of the analyses can also be found on the BirdLife website.

3 Migrating birds know no boundaries

Birds are arguably the most mobile creatures on Earth, rivaling even humans. They show morphological, physiological and behavioural adaptations that allow them to fly high, fast and for extended periods during their epic journeys. For distance travelled, Arctic Tern Sterna paradisaea reigns supreme, being the only bird known to migrate between the Arctic and Antarctic, a staggering 30,000–40,000 km round trip. Other migrant species are not outdone. Bobolink Dolichonyx oryzivorus flies more than 9,600 km, from the prairies of Canada to the pampas of Argentina. Far Eastern Curlew Numenius madagascariensis travels the length of East Asia from its breeding grounds in Siberia to the coasts of Australia, with female birds continuing even further south to wetlands in south Australia. Short-tailed Shearwater Puffinus tenuirostris undertakes an incredible figure-of-eight circuit of the Pacific Ocean, the circumpolar Cape Petrel Daption capense ranges extensively across the Antarctic region, while Amur Falcon Falco amurensis makes a massive loop between East Asia and South Africa. European Bee-eater Merops apiaster winters exclusively in Africa with west European birds moving to west Africa and east European ones heading down the Nile to southern Africa—one individual ringed near Moscow was recorded in Zimbabwe, nearly 8,000 km away. These seven species illustrate some of the major migration pathways flown by the thousands of long-distance migrant bird species (see figure).

Besides their aesthetic value, migratory birds are important in numerous cultures (e.g. as harbingers of season shift), provide a major resource when managed sustainably for food or sport, are environmental indicators, and link developed and developing countries. Common concerns for the threats faced by migratory birds, plus the recognition that conserving them is an international duty, underpin collaborative international legislation and conventions. For instance, the Convention on Migratory Species aims to conserve terrestrial, marine and avian migratory species throughout their ranges. By fostering bonds among nations, migratory birds act as valuable ambassadors for our shared natural heritage.


The spectacular migration pathways of seven migrant bird species (see text)—similar routes are followed by many others

We know a lot about birds

Birds are useful indicators, helping us to locate important places and alerting us to environmental change. While biodiversity as a whole is expensive to monitor, it is easy to count birds. And because birds are so popular, we already know a lot about them.

Birds are useful indicators

Biodiversity as a whole is very expensive to measure and monitor. Although birds cannot be full representatives of all biodiversity, the evidence shows that they are an excellent starting point (Box 2). Most importantly, the amount of information that we already have on them makes them uniquely useful.

Birds are barometers for change in the wider environment. Our knowledge of birds’ ecology allows us to interpret changes in their populations and distributions. Changes in the overall threat status of the world’s bird species reflect changes in the underlying threats to biodiversity (see pp. 16–17). Birds are found all over the world (Box 3); on

Watching birds is tremendously popular. For example, c.46 million people in the United States (around one in five) spend time observing and identifying birds1, and 20 million people (around one in three) in the United Kingdom are birdwatchers or regularly feed birds in their gardens2. In 2001, the month-long World Bird Festival organised by the BirdLife Partnership attracted well over 300,000 people to more than 1,450 birding and cultural events in 86 different countries across the world, with 3 million bird sightings being logged in Europe alone. Scientific research on birds is intensive, and increasing. Between 1981 and 2002, there were 13,123 articles in mainstream academic journals with the word ‘bird’ in the title or abstract, c.600 a year on average—in 2003, there were 1,4111. Many birdwatchers are skilled observers, and able to contribute high quality data. Information on breeding and non-breeding bird distribution, migration, ecology and behaviour is collected from all over the world, through the hard work of thousands of individuals and organisations. For example, The Atlas of Southern African Birds involved 7.3 million records collected by 5,000 observers1. In many countries, data on migration and longevity are gathered through extensive bird-ringing programmes. In the UK alone over 800,000 birds are ringed each year3. Population surveys such as the Breeding Bird Survey (BBS) of North America provide up-to-date information on bird populations and trends: over 3,700 routes are surveyed annually, each with 50 counts4.

Popular interest in birds is reflected in the sheer volume of articles, field guides and other books that have been published about them. The largest natural history book distributor is currently marketing 3.5 times more books about birds than about mammals. There are guides to bird identification covering the entire globe, with individual guides produced for the majority of countries, and many others that focus on particular groups of birds. A literature survey of the birdlife of Australasia and Oceania alone reveals over 4,600 books and reports5.

This huge array of information is also being brought together in a meaningful way for conservation. Since 1980, BirdLife International (and its precursor the International Council for Bird Preservation) has published Red Data Books, presenting comprehensive information on all Globally Threatened Birds (GTBs). The latest in this series, Threatened Birds of Asia, cites over 7,000 references. BirdLife’s World Bird Database (WBD), initiated in 1994, manages extensive information on some 10,000 species (including 1,211 GTBs), over 7,500 Important Bird Areas (IBAs) and 218 Endemic Bird Areas (EBAs): currently it has some 150 data tables covering over 1,400 unique attributes.

Birds are also beacons for sites. Important Bird Areas (IBAs) form a global network of sites that effectively pinpoints much other terrestrial biodiversity (see pp. 28–29). IBAs are an excellent starting point for identifying a full set of key biodiversity areas (see pp. 60–61), especially where information for other taxa is scarce or patchy.

2 Birds are good (though not perfect) indicators

The expense of comprehensively assessing biodiversity is enormous. One estimate is that an all-taxa inventory of just one hectare of tropical forest might take 50–500 scientist-years to accomplish. This has led to much interest in finding proxy taxa that can act as indicators for biodiversity as a whole.

There is no perfect indicator taxon, but some are much better than others. The kind of indicator taxon that works best depends on whether the purpose is to track environmental changes, or clarify biodiversity patterns; on the scale involved; and on the kind of habitat being looked at.

Birds score very highly on many of the broad criteria defined for selecting indicator taxa. Their most significant advantage is that we, relatively speaking, so much information about them—and their biology and life-histories—are so well understood. Birds are also taxonomically well-known and stable, and their populations are readily surveyed and manipulated. Birds are widespread, occurring almost everywhere (see box 3). Bird families and genera often occupy a breadth of habitats and have broad geographical ranges, yet many individual species are specialised in their requirements and have narrow distributions. Birds are mobile and responsive to environmental changes. There are enough bird species to show meaningful patterns, yet not so many as to make identification itself a challenge. Birds have real economic importance in their own right—a useful attribute in an indicator.

However, birds are generally less specialised within micro-habitats than, say, insects or plants. Importantly, the extent to which they reflect patterns in unrelated taxonomic groups remains disputed. The evidence so far suggests that:

- on a local scale, patterns of bird distribution may not always match well the distribution patterns of other taxa; nevertheless a network of sites selected as important for birds will capture most other biodiversity; (see pp. 28–29).
- Birds are likely to work better as biodiversity indicator taxa in terrestrial habitats (especially well-vegetated ones) than in either freshwater or marine habitats.
- on a larger scale, birds are very useful (although still imperfect) indicators of species richness and endemism patterns.
- changes in bird populations tend to integrate a set of ecological factors. Given adequate ecological knowledge, they can provide a useful indication of environmental change.

For instance, the UK government has adopted an index based on wild bird populations as one of its 15 headline Quality of Life indicators (see p. 71, box 2).

3 Birds are found almost everywhere in the world, from the poles to the equator

Around 10,000 different species of birds currently inhabit the Earth, the majority (83%) occurring in continental regions, the remainder on islands; most (97%) are landbirds, the rest seabirds. Birds are found from the lowest altitudes on earth to the highest mountains—an Alpine Chough Pyrrhocorax graculus has been recorded at 8,080 m on Mt Everest. This great diversity of bird species is distributed across the world, and even the smallest nations have their own bird fauna.

The state of the world’s birds therefore tells us a lot about the state of the world. However, the distribution of birds is uneven: the different biogeographic realms vary substantially in terms of the numbers and types of bird species they hold (see figure). By far the richest is the Neotropical realm, which holds 36% of all known landbird species (c. 3,370 species). This is followed by the Afrotropical (21%, c. 1,950 species), Indomalayan (18%, c. 1,700 species), Australasian (17%, c. 1,590 species), and then the Palearctic (10%, 937 species), Nearctic (8%, 732 species) and Oceanic (2%, 187 species) realms. Though they have relatively few species in total, the Pacific islands in the Oceanic region are unusually rich for their size; together they hold 20 times more species per unit area than South America, the richest of the continents. Country by country, the richest territories for avian diversity are Colombia, Brazil, Peru, Ecuador and Indonesia (each with more than 1,500 species), followed by Bolivia, Venezuela, China, India, Mexico, the Democratic Republic of Congo, Tanzania, Kenya and Argentina (all over 1,000).

These big geographic differences in bird species diversity result from the differing conditions experienced over evolutionary time. Particularly influential is the variety (and area) of different habitats present. Tropical forests are especially rich in species—hence the particularly high avian diversity found in the equatorial regions. Other major influences include physical barriers such as impassable oceans and mountain ranges, climatic events such as the recent glacial cycles, biotic constraints such as natural enemies and competing species and, more recently, expanding and pervasive human impacts. The distributions of other taxa are less well-known than those of birds, but they are also determined by these fundamental biogeographic factors. This makes birds a useful starting point for mapping broad-scale patterns in species richness and endemism.

Sources:

The distribution of the world’s bird species by biogeographic realm and country.

Sources
Bird declines warn us of wider environmental problems

Birds have long been used to provide early warning of environmental problems. The decline of bird populations in many parts of the world is of considerable concern, indicating a fundamental flaw in the way that we treat our environment.

1 Europe-wide monitoring schemes highlight declines in widespread farmland birds

An assessment in 1994 estimated that 25% of all European bird species were undergoing substantial population declines. Recently, the Pan-European Common Bird Monitoring Scheme has been launched by the BirdLife Partnership in Europe and the European Bird Census Council to provide regional indicators for common bird populations in Europe. Annual breeding bird survey data collated from 18 European countries are used to calculate regional indices for species, taking into account the proportion of the population occurring in each country. These indices are then combined across suites of species to produce multi-species indicators that show trends in bird populations in key European habitat types. One such indicator has been produced by combining data for 23 abundant and widespread bird species breeding in, and characteristic of, farmland. The results show that the European farmland bird index declined by 34% between 1966–2002, with decline rates greatest in the late 1970s and early 1980s (see figure). It is widely accepted that these declines have been driven by agricultural intensification and the resulting deterioration of farmland habitats, and it is likely that the trends observed are mirrored by other farmland taxa.

2 Grassland birds are declining in North America

In North America, many common grassland and shrubland birds are declining, apparently in response to ongoing changes in agricultural land use. One recent analysis of state-level Breeding Bird Survey (BBS) data highlighted the plight of 63 species breeding in the open-country habitats of the agricultural landscape of eastern and central USA. Birds breeding in grassland habitats are faring particularly badly, with 15 of 25 species (60%) showing significant negative trends over the period 1980–1999, and an average decline of 1.1% per year. Although long-distance migrants exhibited the sharpest declines (1.8% per year), residents and short-distance migrants also showed negative population trends, indicating that changes on the breeding grounds are likely to have driven the declines.

Some 78% of grassland and shrubland species showed one or more statistically significant correlation between state-level BBS trends and changes in farmland landscape. Of particular note were declines in the total area of ‘rangeland’ (lightly grazed grassland) of 1.0% per year, which were positively correlated with population declines in 12 species. One striking example is Red-winged Blackbird Agelaius phoenicus, one of the most familiar and abundant birds in North America. This species has declined at rates of 1% per year in eastern and central USA, with even greater declines observed in Canada. Although direct control programmes have probably also played a significant role in its decline, changes in the extent of rangeland cover accounted for 30% of inter-state variation in BBS population trends (see figure).


In Botswana, the number of woodland raptors recorded during dry-season point counts (n = 984) declined markedly with increasing distance from the core of protected areas.

The analysis was based on 9,964 records of diurnal raptors of over 40 species. Large (≥2.2 kg), non-migratory eagle species showed the most marked reductions in numbers away from protected areas, but similar (though less extreme) patterns were also observed among various species of smaller raptors (e.g. kites, sparrowhawks, kestrels). For certain species, there was also a clear ‘edge effect’ within protected areas, with the abundance of large eagle species almost 45% lower in the peripheral zone (within 30 km of the boundary) than in the core.

The poor conservation status of raptors in Botswana seems mainly due to widespread depletion of biomass and biodiversity (including potential prey), as a result of structural changes to the vegetation caused by livestock grazing. The relative scarcity of woodland raptors outside protected areas is even more acute in more densely populated regions of southern Africa, with agricultural practices also implicated in these declines.

Declines can be quick and catastrophic

Certain bird species are showing very rapid and severe population declines. This is worrying: history tells us that even formerly abundant species can go extinct if the causes of their declines are not addressed promptly.

Widespread declines in birds are indicative of global problems

Bird populations are declining across many regions and habitats of the world. Indeed it has been estimated that, globally, bird populations have declined 20–25% since pre-agricultural times as a result of conversion of natural habitats by humans. Population declines for suites of species that depend on particular habitat types (such as waterbirds: see box 1), indicate that these ecosystems are deteriorating globally and require conservation attention.

Declines can be precipitous

Population declines are not always slow and gradual, in line with progressive habitat loss or exploitation—on occasions, they can be extremely rapid and dramatic. Such precipitous declines can affect even formerly abundant species (box 2). We need to detect and respond promptly to these declines if we are to address the underlying causes, prevent extinctions and avoid disruption of ecological systems. This requires regular and reliable monitoring of populations, and sufficient resources to identify and implement appropriate conservation measures to halt and, eventually, reverse declines.

Waterbirds are showing widespread declines

Waterbirds form a diverse guild of over 30 families that are ecologically dependent on wetlands. They occur throughout the world, often in spectacular concentrations, and represent one of the most obvious indicators of the health and diversity of wetland ecosystems. A recent analysis found that 41% of the 1,138 populations for which trends are known are in decline, and only 19% increasing1. Reliable trend data are unavailable for 50% of the world’s 2,271 waterbird populations. Nevertheless, data from a well-studied region such as Europe (where estimates are available for 74% of 346 populations) showed a similarly high proportion (39%) of populations in decline.

One of the better-known groups of waterbirds is the Anatidae (ducks, geese and swans), a species-rich family for which trend estimates are available for 75% of populations. Of the 462 discrete populations identified for the 164 species in the family, 13 were considered to be extinct, and a further 130 were found to be declining (see figure). Fewer populations (22%) appear to be increasing2. Partly on the basis of these population declines, 25 species (15%) of Anatidae are currently considered to be globally threatened, with almost half of these estimated to have suffered population declines of 30% or more over the past 10 years or three generations3.

Sources

Apparent slight disturbances can sometimes be catastrophic
Threats need not be direct (e.g. through hunting), nor particularly extreme, to have a profound impact on bird populations. This is particularly so for large-bodied, slow-breeding species, where even quite small increases in mortality among adults may sometimes lead to significant population declines (box 3). For these species, the underlying causes are likely to have been operating for a while by the time declines are detected, and, even if remedial action is taken immediately, recoveries may not be seen for many years.

2 Indian vulture populations have declined precipitously
Griffon vultures of the genus Gyps were formerly very common throughout South and South-East Asia, with White-rumped Vulture Gyps bengalensis considered one of the most abundant large birds of prey in the world. Vulture populations declined across much of the region in the first half of the twentieth century, but they remained common on the Indian subcontinent, where populations were maintained by an abundant supply of livestock carcasses. In the late 1990s, however, the Indian populations of White-rumped Vulture, Indian Vulture G. indicus and Slender-billed Vulture G. tenuirostris crashed, with dramatic declines also observed in Nepal and Pakistan. Survey work in India indicated that populations of these birds had declined by c.95% in less than a decade, between 1993 and 2000 (see figure 1), leading to their classification in 2001 as Critically Endangered 1.

Puzzlingly, non-vultures and other scavengers in these countries remain unaffected, and reductions in food availability, or poisoning through exposure to pesticides, cannot explain the rapid and specific nature of the decline. Findings from examination of vulture carcasses from India were consistent with the agent being an infectious, probably viral, disease 2. However, research in Pakistan implicates an anti-inflammatory painkilling drug, diclofenac, used widely in veterinary medicine in India and Pakistan in recent years 3. Recent results indicate that this drug is a major cause of the observed vulture declines 4. Experiments show that vultures are highly susceptible to diclofenac and are killed by feeding on the carcass of an animal soon after it has been treated with the normal veterinary dose. Modelling shows that only a very small proportion of livestock carcasses need to contain a level of diclofenac lethal to vultures to result in population declines at the observed rates. Additional factors may influence Gyps populations and are subject to ongoing study, but there is no conclusive evidence at present for other causes being involved. Unless the use of diclofenac is urgently controlled, the extinction of these vulture species, all of enormous ecological importance, seems imminent.

The number of Gyps vultures recorded along a standard set of road transects in India declined dramatically between 1991-1993 and 2000 1.

3 Albatross species are declining alarmingly
For long-lived, slow-breeding birds, even apparently slow population declines can have alarming consequences if sustained. Three such species are the Wandering Albatross Diomedea exulans (total population 28,000 mature individuals), Grey-headed Albatross Thalassarche chrysostoma (250,000) and Black-browed Albatross T. melanophris (>1 million), which all breed on islands in the southern oceans 1. At Bird Island (South Georgia), long-term monitoring studies have revealed steady declines of 1%, 2% and 4% per year respectively for these species over the last 25–30 years (see figure 2). These seemingly modest annual declines are highly significant, since albatrosses take many years to produce enough offspring to replace themselves. These albatrosses may have generation lengths of up to 30 years, so these declines equate to population reductions of 30–65% over 65 to 90 years (i.e. three generations). Data from other breeding sites show similar trends, indicating that these declines are likely to be occurring throughout the species’ ranges 1.

Incidental mortality linked to longline fishing is the single greatest threat to albatrosses (see p. 43, box 4). In the southern Indian Ocean, for example, illegal, unreported and unregulated fishing for the Patagonian toothfish Dissostichus eleginoides has killed an estimated 10,000–20,000 albatrosses (mainly T. chrysostoma) annually since 1996 1. Because of these high rates of mortality and population decline, all three albatrosses mentioned above are evaluated as globally threatened: despite still appearing numerous, they face a high risk of extinction if current trends continue 1.

Species are going extinct at exceptional rates
Extinction is permanent and irreversible. Although extinction is a natural process, current and projected extinction rates are estimated to be 1,000 to 10,000 times the natural background rate. Extinctions are difficult to document, but birds are one of the best-known groups of organisms, and we have reasonably comprehensive information on recent avian extinction rates. More than 150 bird species are known to have gone extinct (or are very likely to have done so) in the last 500 years. Most historical extinctions were of species restricted to small islands. However, the rate of extinctions on continents appears to be increasing (see box 1).

We are the cause of these extinctions
Humans have been the cause of the vast majority of recent and historic extinctions. In the last two millennia, over 2,000 bird species on Polynesian islands may have been driven extinct as a result of human activities, often through the introduction of non-native species of rats. The increasing wave of extinctions on continents is a direct result of large-scale habitat destruction and degradation, often combined with hunting. Information from Australia shows particularly clearly how species deteriorated in status until going extinct as a result of human impacts (box 2).

1. We have lost over 150 bird species since 1500
Extinctions have probably been better documented for birds than any other group of animals. In total, 129 bird species have been classified as extinct since 1500, and an additional four species have gone extinct in the wild (with populations remaining in captivity)1. A number of other species currently categorised as Critically Endangered have probably gone extinct too, but cannot be designated as such until we are certain. Eighteen such species have been recently categorised as Critically Endangered (Possibly Extinct)2. Thus, a total of 151 bird species may have been lost in the last 500 years. Extinctions are continuing: 17 species were lost in the last quarter of the twentieth century, and two species have been lost since 2000. The last known individual of Spix’s Macaw Cyanopsitta spixii (classified as Critically Endangered: Possibly Extinct in the Wild) disappeared in Brazil towards the end of 2000, and the last two known individuals of Hawaiian Crow Corvus hawaiiensis (classified as Extinct in the Wild) disappeared in June 2002. Po’ouli Melamprospiza phaeosoma, also from the Hawaiian Islands, looks set to become the next addition to this list: efforts are underway to take the last three known individuals into captivity as they are failing to breed in the wild.

Although most bird species (>80%) live on continents3, the majority of extinctions (88%) have been on islands4. Often, these resulted from the introduction of alien invasive species such as cats, rats and goats, which either preyed upon the native species or degraded its habitat5-7. However, continental species have been far from immune, and those going extinct often originally had extensive ranges. The wave of extinctions on islands may be slowing, perhaps because many of the potential introductions of alien species to predator-free islands have already occurred, and because so many susceptible island species have already gone extinct. By contrast, the rate of extinctions on continents appears to be increasing as a result of extensive and expanding habitat destruction (see figure). If we continue to degrade and destroy vast areas of natural habitats then it will be difficult to prevent a much larger and more devastating extinction wave from washing over the continents.

2. In Australia, the worsening status and extinction of birds can be linked to human impacts
The history of land use in Australia is well documented. This has allowed a retrospective assessment of the IUCN Red List status (see pp. 14–15) of each bird taxon (species and subspecies) at 50-year intervals since 1750. For each taxon in each time period, data on the extent of land clearance, degree of agricultural intensification, presence and abundance of alien invasive species and rate of harvesting were considered in relation to known current habitat requirements, range and ecology and the effects of threatening processes elsewhere in the taxon’s range. The results show how the percentage qualifying as threatened or Near Threatened has increased over time, as mounting pressures caused the status of many taxa to deteriorate. This study is unique in illustrating the steady intensification of human impacts, and the consequent deterioration in status of a region’s avifauna over 250 years. This had resulted in 21 extinctions by the end of the twentieth century and 17.3% of the 1,055 extant taxa being assigned to one of the listed or Threatened categories by 2000.
The wholesale destruction of tropical habitats—most notably forests—is predicted to cause mass extinctions of species from all taxonomic groups. In practice, however, relatively few confirmed extinctions have been documented in the continental tropics, leading some critics to dismiss the postulated ‘extinction crisis’ as exaggerated and alarmist. There is, however, no room for complacency. Numerous procedural and political complications can delay the final declaration of a species as extinct (see box 1). More importantly, there is a time-lag before the last individuals of a species disappear.

The number of extinctions expected as a result of habitat loss can be estimated using the well-established relationship between the number of species found in an area and its size. Few studies have attempted to quantify the time-scales over which such extinctions occur. However, one investigation in Kakamega Forest, Kenya, suggested that the number of species in habitat fragments decreases exponentially after isolation, with a half-life of 23–80 years. In other words, half the number of species that are expected eventually to disappear are lost in the first 23–80 years following isolation (see figure a). The variation is caused by differences in fragment size and degree of isolation.

Further support for the existence of a time-lag is provided by analyses that compare numbers of threatened species with levels of habitat loss in a region. One such study in insular South-East Asia revealed that the totals of threatened bird species in the region’s island archipelagos showed close correlation with the number of extinctions predicted by forest loss data (see figure b). As threatened species are those at high risk of extinction, this correlation lends support to the idea that recent deforestation and habitat fragmentation is having a much greater impact than implied by documented recent extinction rates. The intimate relationship between habitat loss and extinction is further emphasised by data from areas that have been deforested for relatively long periods of time. In Singapore, for example, where forest cover is now less than 5% of its original area, 61 of the territory’s 91 forest-dependent bird species have disappeared since 1923.

These studies help to explain the discrepancy between the numbers of predicted and observed extinctions and highlight the critical time-scales over which conservation actions are required. Without immediate action, many species threatened by habitat loss will indeed become extinct.


Current figures underestimate probable extinction rates

It takes some time for species finally to go extinct as a result of habitat loss and reductions in numbers (box 3). The persistence of tiny populations, doomed in the absence of intervention, means that effective extinction rates could be even higher than suggested by tallies of recent extinctions. Studies show that many species have already been extirpated from large parts of their ranges. In the worst-hit parts of the world, such as the Atlantic Forests of south-east Brazil, some species have lost over 99% of their original range (box 4). Considerable effort is now required to bring such species back from the brink of extinction and to reverse the deteriorating status of many more that are threatened. However, the moral case for doing so is overwhelming, because there are no second chances: extinction is forever.

4 Many species have already disappeared from large parts of their range

In the Neotropics, some 230 Globally Threatened Birds (GTBs)—c.50% of those that occur in the region—have been extirpated from significant parts of their range. On average, c.30% of their total ranges have been lost, varying from <100 km² (c.40 species) to >20,000 km² (c.70 species). This analysis is based on a review of areas or sites where species were recorded historically but not recently, or where habitat loss or other threats seem certain to have resulted in their disappearance.

Species in some places have been harder hit than in others. For example, in Cuba 11 GTBs have lost substantial parts of their range across the island owing to widespread habitat destruction and degradation of dry forests, scrub and wetlands. In Argentina, ranges have shrunk significantly for 20 GTBs. These include many that rely on seasonally wet grasslands, which are no longer suitable owing to cattle ranching and drainage. In Brazil, 76 GTBs are affected, particularly in the Atlantic Forests, where there has been extensive destruction of lowland evergreen forest owing to logging, agriculture and urbanisation. In some areas 21 GTBs have disappeared—the highest recorded density of extinctions of GTBs in the world. Losses of range are inevitably associated with a reduction in the total numbers of individuals and hence an increasing risk of extinction. For example, in the Neotropics there are 17 species on the brink of extinction (categorised as Critically Endangered) that have lost over 99% of their former ranges. Declines in range, and hence in population size, are by no means confined to the Neotropic region. In total, 462 GTBs (38%) world-wide have been identified as at risk for this reason.

2. Analysis of data held in BirdLife’s World Bird Database.
One in eight of the world’s birds faces extinction

A significant proportion of the world’s biodiversity now faces extinction. It is not yet possible to quantify exactly how many species are at risk, because we have not even named about 90% of all species on Earth, let alone assessed their status. However, a few groups of organisms are well known, and their threat status has been comprehensively assessed using the criteria of the IUCN Red List. These criteria are the most scientifically objective, comprehensive and internationally recognised system yet devised for assessing extinction risk. Using them, all the world’s birds have been regularly assessed by BirdLife International since the 1980s. The 2004 assessment concluded that 1,211 bird species (12% of the total, or one in eight) are globally threatened with extinction. Of these, 179 species are Critically Endangered, meaning that they face an extremely high risk of extinction in the immediate future (see box 1).

In total, 1,211 bird species are threatened with global extinction

Using the criteria and categories of the IUCN Red List, the 2004 assessment of all the world’s birds judged that 1,211 species (12.4% of extant species, or one in eight) are globally threatened with extinction (see figure a). These comprise 179 species classed as Critically Endangered (meaning that they are considered to be facing an extremely high risk of extinction; see figure b), 344 species assessed as Endangered (very high risk of extinction) and 688 listed as Vulnerable (high risk of extinction). A further four species are listed as Extinct in the Wild and 774 Near Threatened species are assessed as close to qualifying as globally threatened. Only 78 species (0.8% of the total) are considered insufficiently known to be able to assess their threat status, and so are classified as Data Deficient.

Threatened species are not evenly distributed among bird families. There are particularly high proportions of threatened species among albatrosses (95%), cranes (60%), parrots (29%), pheasants (26%) and pigeons (23%)[1][2]. Furthermore, families and genera with few species have disproportionately high proportions of threatened species[2]. Even allowing for these taxonomic effects, larger-bodied species and those with low reproductive rates (owing to small clutch sizes) are also more likely to be threatened[3].

(a) 1,211 bird species are threatened with global extinction[1]
(b) 179 bird species are classified as Critically Endangered[2]

**Sources**
Most Globally Threatened Birds have small populations

Eighty percent (966 species) of Globally Threatened Birds (GTBs) have populations of fewer than 10,000 individuals, while 41% (502 species) are below 2,500 individuals (see figure). In total, 77 species (6.3% of GTBs) have tiny populations that are estimated to number fewer than 50 individuals. For example, there are less than ten pairs of Tahiti Monarch Pomarea nigra left on Tahiti, French Polynesia, and only about 12 Bali Starling Leucopsar rothschildi on the Indonesian island of Bali. For most species with small populations, their numbers are also believed to be declining.

Only 226 GTBs (19%) have populations that are estimated to exceed 10,000 individuals. Most of these species qualify as threatened because their populations are undergoing rapid declines (see box 3).

**All taxonomic groups are under threat**

Although birds are still by far the best-known group, the conservation status of four other groups have now been completely assessed for the first time. The proportion of species threatened with extinction in 2003 was found to be about 23% for mammals, 52% for cycads and 25% for conifers.

Partial assessments for some other groups also show substantial proportions of the assessed species to be threatened with extinction: c.30% for amphibians, 4–62% for reptiles, 3–49% for fish and 0.2–58% for invertebrates. In most taxonomic groups, it is likely that significant proportions of species are threatened with extinction by the intensifying human impacts on the planet.

**Threatened species have small and declining populations and ranges**

Most Globally Threatened Birds (GTBs) are threatened because they have small populations. There are 966 species (80% of GTBs) with populations of fewer than 10,000 mature individuals, and 80% of these are also declining (box 2). Even numerous and widespread birds may be threatened owing to rapidly declining populations. In total, 412 GTBs (38% of the total) have populations that are estimated to be declining at rates of at least 30% in ten years or three generations (box 3). Small range size is also an important factor in raising extinction risk. Altogether, 555 GTBs (46%) qualify as threatened because they have ranges that are smaller than 20,000 km², declining and fragmented or restricted to a few locations, with 647 (53%) restricted to ten or fewer locations, and 182 (15%) known only from a single site (box 4).

**Most Globally Threatened Birds are declining, some catastrophically**

Most Globally Threatened Birds have declining populations: in total 937 species (86% of those with trend estimates) are declining, and 412 (38%) qualify as threatened because the declines exceed 30% in 10 years (or three generations, whichever is longer). Sixteen species are estimated or inferred to have declines that exceed 80% in 10 years or three generations. For example, the population of Montserrat Oriole Icterus oberti is estimated to have declined by up to 52% per year during the period 1997–2000, equating to more than 80% over 10 years, owing largely to habitat destruction by volcanic eruptions. Similarly, Balearic Shearwater Puffinus mauretanicus is currently declining at a rate equating to 98% over three generations (54 years in this long-lived species), owing largely to predation by cats. Only 111 species (10% of those with estimates) have stable populations, and just 38 (4%) have increasing populations, almost all in response to conservation efforts (e.g. St Lucia Parrot Amazona versicolor and Mauritius Kestrel Falco punctatus; see also pp. 58–59).

**Most Globally Threatened Birds have small ranges**

The majority of Globally Threatened Birds (GTBs) have small or very small ranges. Three species (5%) have ranges less than 10 km², mainly on small islands. For example, Floreana Mockingbird Nesomimus trifasciatus is restricted to two tiny islets totalling just 0.9 km² in the Galapagos Islands, Ecuador. Caerulean Paradise-flycatcher *Eurchromyias rivalis* has a total range size of 2 km² on the island of Sangine, Indonesia. Altogether, 682 GTBs (58%) have ranges smaller than 10,000 km², and 555 GTBs (46%) qualify as threatened because they have ranges that are less than 20,000 km², declining and fragmented or restricted to a few locations. In total, 647 GTBs (53%) are known from ten or fewer locations, with 463 (38%) found at five or fewer, and 182 (15%) restricted to a single site. For example, Alagoas Tyrannulet *Phylloscartes ceciliae* is found at just two localities in north-east Brazil, while Colourful Puffleg *Eriocnemis mirabilis* is known only from a single site in south-west Colombia (and even there it has only been found within 300 m of the spot where it was first discovered in 1967). A few GTBs have very large ranges: 36 (3%) have range sizes over one million km², but are considered threatened because they have undergone steep population declines, or because they occur at very low densities and have small declining populations. For example, Lappet-faced Vulture *Torgos tracheliotus* has a range of 8.7 million km² across much of Africa and the Middle East, but it is estimated that only 8,500 individuals remain and this number is declining.

**Population trends of GTBs**

[Diagram showing population trends of GTBs]

**Range sizes of GTBs**

[Diagram showing range sizes of GTBs]
The world’s birds are getting more threatened

The Red List Index for birds shows that there has been a steady and continuing deterioration in the threat status of the world’s birds, as measured by their IUCN Red List category, between 1988 (when the first comprehensive global assessment was carried out for IUCN by BirdLife International) and 2004 (see figure a).4-6 The index is based on the number of species that moved between categories as a result of genuine changes in threat status (it excludes moves resulting from improved knowledge or taxonomic changes). For each assessment, the total number of species in each category is multiplied by a score, increasing stepwise from one for Near Threatened to six for Extinct. The index is then calculated from the proportional change in this value between assessments, with the baseline in 1988 set to zero.

One strength of this index is that it illustrates the overall change in the status of birds in a clear and easily understood fashion, summing together the combined genuine changes in threat status of 60 species during 1988–1994, 146 species during 1994–2000 and 43 species during 2000–2004. It is based on complete assessments of all the world’s birds (c.10,000 species), not—as with many population-based indices—a potentially biased subset.

In the Red List Index, shifts between any two adjacent categories count the same. For example, a species moving from Least Concern to Near Threatened contributes as much to the overall index trend as one moving from Endangered to Critically Endangered. The former may represent very significant losses of biodiversity in terms of numbers of individuals, even if the latter represents a greater increase in a species’ risk of extinction. However, to illustrate overall trends for the most threatened species, the Red List Index can also be calculated for just the highest categories: Critically Endangered and above (Possibly Extinct, Extinct in the Wild, and Extinct; see figure b). For these species the rate of deterioration appeared to level out during 2000–2004. During this period, two Critically Endangered species became Extinct (or Possibly Extinct) in the Wild, and five endangered species became Critically Endangered, but this was offset by seven species that improved in status as a result of conservation efforts.


ACKNOWLEDGEMENT Methodology developed in conjunction with the IUCN Red List programme.

Most threatened birds are deteriorating in status

The Red List Index measures movement between categories of the IUCN Red List. However, these categories are relatively broad: species often have to undergo fairly significant changes in population size, population trend or range size in order to cross the thresholds between categories. To determine qualitative trends between 2000* and 2004 in the status of all Globally Threatened Birds (GTBs), not just those moving between Red List categories, a world-wide network of over 100 experts was consulted. They were asked to judge from their detailed knowledge whether the status of each species had improved, stayed the same, or deteriorated during the period. Assessments were obtained for 72% of GTBs (859 species). Of these, only 14% were judged to have improved in status, 44% had remained the same and 45% had deteriorated in status since 2000 (see figure c). Similar proportions were found for the subset of Critically Endangered species: 14% were judged to have improved in status, 40% had stayed the same, and 46% had deteriorated in status. Of the species for which the experts scored ‘unknown’ status changes or for which no assessment could be obtained, many were also likely to have been declining. In combination with declining trends shown by the Red List Index, this ‘snapshot’ survey indicated that threatened birds are in serious trouble, and that the problem is getting worse.


ACKNOWLEDGEMENT Status assessments kindly supplied by >100 experts.

Species experts judge that almost half of GTBs have declined in status during 2000–2004, and only 11% have improved*

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Ironically endangered birds, although there has been a recent levelling out in the rate of deterioration (box 1, figure b). Species that do not move between categories on the IUCN Red List for genuine reasons (and therefore do not affect the index) are not necessarily stable. For the period 2000–2004, nearly half of threatened species (45% of 859) were judged by species experts to have deteriorated in terms of population or range size (box 2).

**Critically endangered birds**

Despite the conservation efforts of governments and non-governmental organisations across the world, birds as a group are becoming more threatened (see box 1, figure a). Some species have improved in status during 1988–2004, but many more have deteriorated. More species are slipping closer to extinction, as shown by the Red List Index for critically endangered birds, although there has been a recent levelling out in the rate of deterioration (box 1, figure b). Species that do not move between categories on the IUCN Red List for genuine reasons (and therefore do not affect the index) are not necessarily stable. For the period 2000–2004, nearly half of threatened species (45% of 859) were judged by species experts to have deteriorated in terms of population or range size (box 2).

**Trends in some regions and habitats are of particular concern**

Deterioration in the threat status of the world’s birds has not occurred evenly across the world. A regional breakdown of the Red List Index shows that Asia’s birds have undergone the sharpest declines since 1988. This is largely due to the rapid forest destruction in the lowlands of Borneo and Sumatra through the 1990s (box 3). However, Red List Indices for species characteristic of different habitats how that, at a global level, birds in all major natural habitats are suffering (box 4). Comparisons of different species-groups highlight the particularly dramatic declines in the threat status of seabirds, linked with the recent expansion of commercial longline fisheries (box 5) in addition to pressures at nesting colonies. Trends for other groups of organisms cannot yet be quantified in a similar way, but they are likely to mirror the deterioration shown by birds.

**State of the world’s birds 2004**

**Methodology**

Analysis of data held in BirdLife’s World Bird Database.

**Acknowledgement**

Methodology developed in conjunction with the IUCN Red List programme.

**Sources**

1. Butchart et al. (submitted) Measuring trends in the status of global biodiversity: Red List indicators for birds. 2. Analysis of data held in BirdLife’s World Bird Database. ACKNOWLEDGEMENT Methodology developed in conjunction with the IUCN Red List programme.

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3. **Birds have deteriorated in status faster in some regions than others**

The Red List Index for birds (see box 1) can be broken down by region to compare trends in different parts of the world. The results show striking regional variations, with Asia and Europe showing clear differences from the general pattern of steady deterioration (see figure). The index for birds in Asia shows a dramatic decline, particularly between 1994 and 2000. This was a result of the intensifying destruction of forests in the Sundan lowlands of Indonesia, which escalated particularly in the late 1990s and led to predictions of almost total loss of lowland forest in Sumatra by 2005 and in Kalimantan by 2010 (see p. 37, box 3). Such large-scale habitat loss has obvious implications for the extinction risk of the many bird species that are largely restricted to these forests. In Europe there are relatively few globally threatened species (see Red List categories in box 1) and the minor net improvement in the status of birds during 1988–1994 reflected population increases for just one species (Madeira Laurel Pigeon Columba troczo). More recently, the trend in overall status of European birds has been driven downwards somewhat by declines in several species, such as Baltic Shearwater Puffinus mauretanicus and Spanish Imperial Eagle Aquila adalberti. The Middle East also has few GTBs, and the steeper deterioration during 1994–2000 reflects declines in just three species: Houbara Bustard Chlamydotis undulata, Baasra Reed-warbler Acrocephalus griseicolus and Syrian Serin Serinus syriacus. Africa, Pacific and the Americas, each with large numbers of GTBs and hence more robust indices, show broadly similar patterns, although the status of African birds seems to have deteriorated more slowly.**1-2**

**Sources**


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4. **Birds have deteriorated in status across all major habitat types**

Most Globally Threatened Birds (GTBs) are restricted to just one or two broad habitat types. The Red List Index for birds (see box 1) can be broken down to show trends for four major habitat types. Species were assigned to each type only if status changes were driven by processes operating in the habitat, and if the habitat is of major or critical importance to the species (i.e. the species typically occurs in no other habitat, or just one other habitat at some point in its life-cycle). The index encompasses trends for 88% of all GTBs. It shows that species characteristic of forest (including a broad range of forest and woodland types), savanna/shrubland/grassland, wetlands and the marine environment have all deteriorated markedly in status since 1988 (see figure).**3-4**

**Sources**

1. Butchart et al. (submitted) Measuring trends in the status of global biodiversity: Red List indicators for birds. 2. Analysis of data held in BirdLife’s World Bird Database. ACKNOWLEDGEMENT Methodology developed in conjunction with the IUCN Red List programme.

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5. **Seabirds have deteriorated dramatically compared to other groups**

Some species-groups have been impacted particularly seriously by human activities and have an exceptionally high proportion of species listed as globally threatened (see p. 14, box 1). Breaking down the Red List Index for birds (see box 1) by particular species-groups shows that seabirds have deteriorated particularly severely since the first global assessment of the status of all birds in 1988 (see figure). This is closely linked to the expansion of commercial longline fisheries, which causes incidental mortality of albatrosses and other seabirds (see p. 11, box 3 and p. 43, box 4).**5**

**Sources**

1. Butchart et al. (submitted) Measuring trends in the status of global biodiversity: Red List indicators for birds. 2. Analysis of data held in BirdLife’s World Bird Database. ACKNOWLEDGEMENT Methodology developed in conjunction with the IUCN Red List programme.

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![Red List Indices for selected species-groups](image-url)
Most countries support threatened species

Nearly all countries and territories in the world (92%) support populations of one or more Globally Threatened Bird species (GTBs). Many GTBs (63%) have small ranges and are restricted to single countries. Others have ranges that are shared by many states, nearly 100 in the case of Lesser Kestrel (see box 1). Threatened species are found both across the largest land-masses and on some of the smallest islands. For example, the entire global population of the threatened Ascension Frigatebird breeds on Boatswinebird Islet, a 1 km² flat-topped rock off Ascension Island in the Atlantic Ocean. Oceanic islands have disproportionately large numbers of GTBs because their bird species are particularly susceptible to human influences owing to their isolated evolutionary history (box 2). The open oceans are also critically important for marine GTBs, with particularly high densities in the international waters of the southern oceans, notably around New Zealand (box 3).

Tropical countries are particularly important

Although GTBs are found from polar regions to the equator, they are concentrated in the tropics. Regions such as the tropical Andes, the Atlantic Forest of Brazil and the archipelagos of South-East Asia particularly stand out. Certain countries have exceptional numbers of GTBs. Indonesia and Brazil support the largest number of any country or territory (119 and 117 species respectively) and also the highest totals of GTBs endemic to a single country. In addition, they support the most GTBs relative to total numbers of bird species, and some of the highest numbers of threatened mammal and plant species (box 4).
2 Many Globally Threatened Birds are restricted to small islands

Most of the world’s bird species are found on the continents; only c.17% are restricted to islands. However, islands have disproportionately high numbers of threatened species: almost equal numbers of Globally Threatened Birds (GTBs) are found on continents (620 species), and islands (622 species), with few (69 species, 5.7%) shared between them (see figure)1. Oceanic islands are more important for GTBs, supporting 432 species, than islands located on continental shelves close to mainland, which support just 190. Some small islands harbour exceptionally high numbers of GTBs, with, for example, 11 on Mauritius and 13 on the Northern Mariana Islands (to USA). The Pacific island of Nauru—one of the world’s smallest states, with an area of just 18 km²—supports two GTBs, one of which (Nauru Reed-warbler Acrocephalus rehsei) is found nowhere else1. These patterns are not unexpected. Species on oceanic islands are often particularly susceptible to human influences, especially the impacts of introduced predators, having evolved in isolation for many thousands of years (see pp. 44–45).


3 The southern oceans are important for marine Globally Threatened Birds

The ranges of globally threatened seabirds cover both marine areas in the Economic Exclusion Zones of many countries and also large parts of the open oceans outside national sovereignty. For example, the highest densities of globally threatened seabirds are found in international waters in the southern oceans, with a particular concentration in the Tasman Sea and the south-western Pacific around New Zealand (see figure). International co-operation is therefore required to conserve such species, many of which are threatened through incidental capture by commercial longline fishing (see p. 43, box 4).

Density map of threatened seabirds in the southern oceans

Species density (1: 10: 20)


4 Some countries are particularly important for Globally Threatened Birds

Regional and national variations in numbers of Globally Threatened Birds (GTBs) depend on a combination of evolutionary history (which influences species diversity, range size, behaviour and ecology) and past and present threatening processes. Certain countries, mainly in the tropics, have particularly high numbers of GTBs and are therefore priorities for international conservation action. Ten countries have more than 60 GTBs, with Indonesia and Brazil heading the list, holding 119 and 117 respectively (see figure a). These two countries also rank among the top few for numbers of threatened mammal species2. They also have particularly high numbers of endemic GTBs (those restricted to just a single country): Indonesia has 69 and Brazil has 67. Eight of the ten countries with the most GTBs are in the ten most important for single-country endemic GTBs. The Philippines have a particularly high proportion of endemic GTBs: 85%. With dependent territories included, France ranks eighth in the list of countries with the most GTBs, supporting 71.

The overall avifaunas of some countries are particularly threatened. A graph of the number of GTBs plotted against the total number of bird species for each country shows that numerous countries are situated well above the regression line, i.e. they support more threatened species than expected (figure b). The ten countries with the most threatened avifaunas include seven of the most important in terms of absolute numbers of GTBs (e.g. Indonesia, Peru and Brazil, with New Zealand topping the list). The analysis also highlights several territories that have highly threatened avifaunas despite relatively low total avian diversity. For example, French Polynesia supports 79 bird species, of which 32 are globally threatened, and Norfolk Island (to Australia) supports 39 species, of which 16 are globally threatened.

Some countries also hold far fewer threatened species than expected, i.e. they fall far below the regression line. These include very small countries with no GTBs (e.g. Monaco and the Faroe Islands), but also sizeable ones such as Guyana, Suriname and Congo, with avifaunas of more than 600 species. Fortunately, few bird species are yet threatened in these countries because they still hold vast tracts of largely unpopulated forest3.


Acknowledgement Thanks to Camilla Hinde (University of Cambridge, UK) for help with the analysis.
Most bird species show clear habitat preferences

Birds occur almost everywhere on Earth, in all the major habitat types, from polar ice caps to equatorial rainforest, from the open ocean to true desert. Their degree of specialisation varies greatly, but most species show a clear preference for one or more habitat. Some habitats support many more species than others. Forest, especially moist forest in tropical and subtropical regions, holds by far the greatest numbers, with 74% of all bird species. Shrublands follow, holding 26% of species, while grasslands, savanna and inland wetlands each support about 15% of species. The habitat preferences of Globally Threatened Birds show a broadly similar pattern (see box 1).

Many bird species are confined to a single biome

Many bird species have their entire world distributions limited to within one of the world’s major terrestrial biomes. Region by region, each of the world’s biomes supports a distinctive set of bird species found nowhere else. Threatened birds show similar patterns.

**1. Birds are found in all major habitats, but forest is particularly important**

- **(a)** The importance of each major habitat type for all bird species and for GTBs
- **(b)** The relative importance of each major habitat type for GTBs
- **(c)** The importance of each major forest type for all bird species and for GTBs
- **(d)** Tolerance of GTBs to forest degradation

**Sources**
1. Analysis of data held in BirdLife's World Bird Database for 9,407 species (95% of all bird species) including detailed information for 1,211 GTBs.

For further information visit
www.birdlife.org
biomes—distinctive regional ecological units, such as the Eurasian high montane biome. Their evolutionary histories, and often quite narrow ecological requirements, have confined them to suitable habitat within a particular region. Thus, in Africa and Madagascar, where 15 biomes are recognised, some 910 bird species, 42% of the regional total, are confined to single biomes. The Guinea-Congo forests hold the largest total for a single biome (278 species), while just nine species are confined to the Fynbos of South Africa (box 2). Conserving representative areas of these distinctive habitats is clearly a priority and key sites within biomes are therefore included in BirdLife’s Important Bird Area programme (see pp. 24–25, 26–27).

The terrestrial biomes of western Eurasia, the Middle East, Africa and Madagascar

These biomes are distinctive regional ecological units, such as the Eurasian high montane biome. Their evolutionary histories, and often quite narrow ecological requirements, have confined them to suitable habitat within a particular region. Thus, in Africa and Madagascar, where 15 biomes are recognized, some 910 bird species, 42% of the regional total, are confined to single biomes. The Guinea-Congo forests hold the largest total for a single biome (278 species), while just nine species are confined to the Fynbos of South Africa (box 2). Conserving representative areas of these distinctive habitats is clearly a priority and key sites within biomes are therefore included in BirdLife’s Important Bird Area programme (see pp. 24–25, 26–27).

The tropical forests of Ghana, Brazil and Indonesia, for example, all look quite similar. This similarity is largely in their structure, however: the forests in the different regions are composed of very different species of plants. Their bird faunas are also very different, with high levels of endemism in each. For example, the Guinea-Congo forests of western and central Africa support some 278 species of bird found nowhere else.

Across Africa, the Middle East and Europe 22 biomes are recognized (see map). In Africa, 910 bird species are confined to a single biome, 42% of the regional total; the equivalent figures for the Middle East and Europe are 179 (22%) and 86 (17%), respectively. The Guinea-Congo forest biome, with 278 species, is the richest. Overall, fewer bird species are restricted to biomes at higher latitudes, in smaller biomes, and in less structurally complex vegetation types. Thus, the woodlands of the Zambezian (67 species) and Somali-Masai (129) biomes hold more biome-restricted species than do the arid grasslands of the Sahel (16) and the Kalahari-Highveld (13), while the Fynbos of South Africa has only nine species confined to it. The relatively large number of species confined to the Sahara-Sindian deserts of the Middle East (36) reflect the dominance of this biome in the region. In Europe, the richest biomes are the Mediterranean (18 species) and the Arctic tundra (32), although the majority of the birds occurring in the latter are confined to it as breeding species only. Most islands, particularly oceanic ones, do not fall easily within any biome classification and so have been excluded from this analysis.

Source: Analysis of data held in BirdLife’s World Bird Database.

2 Many bird species are confined to just one of the world’s terrestrial biomes

<table>
<thead>
<tr>
<th>Biome (number of bird species confined to biome)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eurasian Arctic tundra (60)</td>
</tr>
<tr>
<td>Eurasian boreal forests/taiga (62)</td>
</tr>
<tr>
<td>European temperate forests (13)</td>
</tr>
<tr>
<td>Eurasian high montane (50)</td>
</tr>
<tr>
<td>Eurasian steppe (10)</td>
</tr>
<tr>
<td>Mediterranean (24)</td>
</tr>
<tr>
<td>Irano-Turanian mountains (22)</td>
</tr>
<tr>
<td>Eurasian deserts and semi-deserts (17)</td>
</tr>
<tr>
<td>Sahara-Sindian (10)</td>
</tr>
<tr>
<td>Sahel (16)</td>
</tr>
<tr>
<td>Sudan-Guinea savanna (14)</td>
</tr>
<tr>
<td>Guinea-Congo forests (278)</td>
</tr>
<tr>
<td>Lake Victoria basin (12)</td>
</tr>
<tr>
<td>Allostragous highlands (24)</td>
</tr>
<tr>
<td>Somali-Masai (129)</td>
</tr>
<tr>
<td>East African coast (36)</td>
</tr>
<tr>
<td>Zambesian (47)</td>
</tr>
<tr>
<td>Kalahari-Highveld (13)</td>
</tr>
<tr>
<td>Numbi-Karoo (21)</td>
</tr>
<tr>
<td>Fynbos (9)</td>
</tr>
<tr>
<td>West Malagasy (24)</td>
</tr>
<tr>
<td>East Madagascar (45)</td>
</tr>
</tbody>
</table>
Many species have small or restricted ranges

Most of the world’s landbirds occupy breeding ranges much smaller than the land areas apparently available to them. For example, among African birds the median range size is equivalent to only 1% of the continental area south of the Sahara. Overall, more than 25% of birds (c.2,600 species) have a ‘restricted range’, defined as less than 50,000 km² (about the size of Costa Rica or Bhutan). Species with small ranges are potentially more susceptible to threats, especially habitat destruction, so perhaps it is not surprising that nearly 70% of Globally Threatened Birds (820 species) have restricted ranges (see box 1).

Restricted-range bird species occur together in Endemic Bird Areas

Nearly all (>90%) restricted-range bird species show range overlaps with at least one other such species. Where this occurs, the combined, often larger region is termed an ‘Endemic Bird Area’ (EBA). There are at least 218 separate EBAs found across the world, most of them in the tropics and sub-tropics. The majority of EBAs are also important for restricted-range species of other animals and plants. For example, there is good congruence (an overlap of over 60%) between EBAs and ‘Centres of Plant Diversity’—areas that are important for endemic plants (box 2).

More than 25% of all bird species have restricted ranges, including 70% of Globally Threatened Birds

Many species are confined to small areas of the world’s surface and occur together in ‘centres of endemism’. The unique biodiversity concentrated in these small areas is especially susceptible to the destructive effects of humans. In 1987, BirdLife International started a pioneering project to identify these priority areas for biodiversity conservation, using restricted-range landbirds as indicators. Restricted-range species were defined as those landbirds with a global breeding range of less than 50,000 km² in historical times (i.e. after 1800, when most ornithological recording began). In total, 2,623 bird species (>25% of the total) were identified as restricted-range species, largely occurring in 218 ‘Endemic Bird Areas’.

Endemic Bird Areas cover a small fraction of the Earth’s land surface

The size of EBAs varies considerably from tiny islands to much larger areas on continents, but together they cover only 14.5 million km². Today the restricted-range birds that characterise EBAs (c.25% of all bird species) are concentrated in just 5% of the Earth’s land surface (box 3). The EBAs of the world are clearly priority areas for action, and key sites within EBAs are included within BirdLife’s Important Bird Areas (IBA) programme.

3 Restricted-range bird species occur in just 5% of the Earth’s land surface

A species/area curve of the numbers of restricted-range landbirds and the area that they occupy shows that, historically, the 2,451 restricted-range species that are endemic to the 218 EBAs (c.25% of all species), were confined to c.14.5 million km² (c.10% of the world’s land area), while 2,000 (c.20%) were confined to c.4 million km² (c.2%). Today, the same restricted-range species are present in only c.7.3 million km² of remaining natural habitat (c.5% of the world’s land area; approximately the size of Australia) and c.20% occur in a total of less than 2 million km² (c.1%) (see figure). These findings show that focusing conservation resources and actions within a relatively small area can help to achieve the conservation of a major part of the Earth’s terrestrial biodiversity.


Many bird species are congregatory, including large numbers of waterbirds and migrants

Many bird species (often with large overall ranges) gather together at various times in their life cycles into large, often spectacular, groups for nesting, feeding, roosting or migrating. In total, nearly 10% of bird species (845) may be classified as congregatory. A large proportion (90%) of these are waterbirds and/or are migratory (>70%) (box 4). Congregatory behaviour confers many advantages but also vulnerabilities, especially when large numbers of birds make use of just a few important sites. Indeed, some 20% of these species are evaluated as globally threatened. Sites where congregatory species gather in significant numbers are therefore also included within BirdLife’s IBA programme (see pp. 24–25, 26–27).
Key species can be used to identify Important Bird Areas (IBAs)—sites that are critical for bird conservation. IBAs sustain bird species that are threatened, have restricted-ranges, are confined to a biome and/or congregate in large numbers. So far, more than 7,500 IBAs have been identified in 167 countries and territories.

Key species identify Important Bird Areas

When selecting sites for conservation networks, two characteristics are widely recognised as especially significant: vulnerability and irreplaceability. To identify such sites, we can use the presence of birds that are globally threatened (see pp. 14–15) and/or geographically concentrated in some way—through small ranges or congregatory habits (pp. 22–23), or restriction to a particular biome (pp. 20–21). This is the basis of BirdLife’s Important Bird Area (IBA) programme, which seeks to locate, document and protect networks of sites—areas that can be delimited and, potentially, managed for conservation—critical for the conservation of the world’s birds.

More than 7,500 IBAs have been identified

Important Bird Areas have already been identified in Africa, Asia, Europe and the Middle East using a set of standardised, objective selection criteria. The process of identification is well underway throughout the Americas and has begun in Australia and the Pacific, Central Asia and the Antarctic. The IBA approach is also being extended and adapted for application to the oceans. So far, 6,460 globally significant IBAs in 167 countries and territories have been identified, with an additional 1,179 sites identified at the regional and sub-regional levels (see box 1).

To date, more than 6,400 Important Bird Areas of global significance have been identified in 167 countries and territories.
Regional networks of IBAs cover no more than 7% of the land area. The proportion of sites qualifying under each of the four criteria varies between regions, reflecting differences in avifaunas. More than half of the 391 IBAs in Middle East are selected because they hold threatened species. Two-thirds of Africa’s 1,230 IBAs qualify for both threatened and biome-restricted species while the majority of Europe’s 2,187 IBAs of global significance are identified for threatened and congregatory species. Despite such regional variation, these key sites cover no more than 7% of the land area, a proportion that represents a realistic conservation goal (box 2).

A set of objective, standardised criteria has been developed for selecting Important Bird Areas (IBAs) of global significance, based on the presence of species of world-wide conservation concern. A site may qualify as an IBA if it meets one or more of the following criteria:

1. **Species of global conservation concern** The site is known or thought to hold, on a regular basis, significant numbers of a Globally Threatened Bird species, or other bird species of global conservation concern.

2. **Assemblage of restricted-range species** The site is known or thought to hold a significant component of the restricted-range bird species whose breeding distributions define an Endemic Bird Area (EBA).

3. **Assemblage of biome-restricted species** The site is known or thought to hold a significant component of the group of bird species whose distributions are largely or wholly confined to one biome.

4. **Congregations** The site is known or thought to hold, on a regular basis, more than threshold numbers of a congregatory waterbird, seabird or terrestrial bird species, or to exceed thresholds set for migratory species at bottleneck sites.

These criteria are being applied globally and the process of site identification is largely complete in Europe, the Middle East, Africa and Asia; in much of the Americas, Australasia and Central Asia the work is still in progress (see map). The IBA criteria have, over the last twenty years, proved to be extremely effective at identifying sites of international conservation importance. To date, 6,460 IBAs of global significance have been identified in 167 countries using these criteria. Similar criteria for identifying IBAs at regional and sub-regional levels have also been developed and applied in some parts of the world (with an additional 1,179 sites located so far). For clarity, only globally significant sites are shown on the map.

**SOURCES**
Important Bird Areas (IBAs) represent the most significant sites for bird conservation. One site alone is usually not enough to protect a particular species. However, safeguarding networks of such sites can effectively conserve birds of varied ecologies and distributions. Networks of IBAs have been defined for many Globally Threatened Birds (at risk because of their declining populations, small populations and/or small ranges—see box 1).

1. A network of 34 Important Bird Areas has been identified for the globally threatened Blue Swallow (Hirundo atracaerulea). The Blue Swallow migrates within Africa. It is globally threatened because of degradation and destruction of its grassland habitat in both its breeding and non-breeding ranges. The entire population of *H. atracaerulea* (estimated at no more than 3,000 birds) nests in montane grasslands, covering small parts of seven countries of southern and eastern Africa. The species’s known non-breeding range centres on the moist tropical grasslands of the Lake Victoria basin. A network of 34 Important Bird Areas (IBAs) has been identified for this species, 27 for breeding populations and seven in the less well-known non-breeding range (see figure). Together, these sites cover a combined area of 20,612 km². The total estimated range or Extent of Occurrence (EOO) for this species is 246,000 km². The IBA network therefore covers 8.4% of the EOO.

Similar calculations for the rest of the 174 globally threatened, resident landbirds in Africa show that the IBAs selected for them cover a mean of 8.6% of their EOOs. This demonstrates how the IBA approach focuses on the priority sites, where conservation efforts need to be targeted.

The 34 IBAs identified for Blue Swallow cover 8.4% of its estimated total range.\(^1,2\)

**Sources:**

2. A network of 18 Important Bird Areas has been identified for the restricted-range species of the Ecuador–Peru East Andes Endemic Bird Area (EBAs) are defined by the overlapping distributions of 17 restricted-range species—species whose individual breeding ranges are smaller than 50,000 km² (see pp. 22–23). The key habitats of this EBA are tropical montane and lowland evergreen forest, which are threatened by agriculture, logging and conversion to pastureland. The size of this EBA is estimated to be 28,000 km², a large area in which conservation efforts must be targeted in order to conserve the key species. A network of 18 Important Bird Areas (IBAs) has been identified in Peru and Ecuador which holds all 17 of the restricted-range species, such as the globally threatened White-necked Parakeet (Pyrrhura albiceps), Coppery-chested Jacamar (Galbula pastazae) and Bicoloured Antvireo (Dysithamnus occidentalis) (all Vulnerable, see figure). The distributions of many restricted-range species are still poorly known and the boundary of this EBA is necessarily approximate. However, the conservation of this IBA network will go far towards protecting these forests and their unique birds.

Eighteen IBAs in Ecuador and Peru capture all 17 restricted-range species of the Ecuador–Peru East Andes Endemic Bird Area. Sites are identified for three of these species:

**Sources:**
2. Analysis of data held in BirdLife’s World Bird Database.

IBA networks also seek to capture significant populations of all species with restricted ranges (whose distributions define Endemic Bird Areas) (box 2), or limited to particular biomes (box 3). Most restricted-range and biome-restricted species are mainly sedentary. By contrast, many congregatory species are long-distance migrants. The IBA networks for these species protect critical sites along their migration routes, at which large proportions of their populations concentrate at different points in their life-cycles (box 4). IBA networks often cover only a small fraction of each species’s total range. Because they conserve core populations in critical habitat, they provide an excellent means of focusing conservation effort.
Small patches of habitat promote connectivity in modified landscapes

In agricultural and other modified landscapes, areas of remaining natural habitat may now be widely separated or restricted to small, apparently isolated fragments. However, even tiny patches can be important in maintaining connectivity between larger areas of favourable habitat. Studies are demonstrating dispersal between fragments, even for species usually considered to be sedentary. Habitat islands that act as ‘stepping stones’ can thus be vital for species survival in highly fragmented landscapes.

Where fragments are relatively close to each other, IBAs include both the fragments and the surrounding matrix within their boundaries (box 5). Where patches are more widely separated, sympathetic management of the landscape that takes into account species’ dispersal needs is essential.


A network of 105 Important Bird Areas has been identified for species confined to the Sudan–Guinea savanna biome

The Sudan–Guinea savanna biome extends across 22 countries from Senegal to Eritrea, and lies between the arid Sahel to the north and the Guinea-Congo rainforests to the south. Covering some 4.3 million km², this vast area includes a wide variety of tropical woodland and wooded grassland habitats. Some 54 species of bird, such as White-crested Turaco Tauraco leucophalus, Blue-bellied Roller Coracias cyanogaster and Pitié’s roller Ptilostomus afer, are largely or wholly confined to this biome, for which a network of 105 Important Bird Areas (IBAs) has been identified. Between them, these sites hold all 54 species of this biome, as well as many other bird species and much other biodiversity. However, the IBAs cover only 283,000 km² or 0.7% of the biome’s total area—a further illustration of how the IBA approach provides a practical and effective conservation focus on priority sites.


4 A network of 160 Important Bird Areas has been identified for a congregatory species, Eurasian Spoonbill

Some species, many of them migratory, congregate seasonally in large numbers at particular sites. These sites are critical to their conservation and need to be protected as a network: often, species move between them and use different sites at different times of year. For example, Eurasian Spoonbill Platalea leucorodia is a colonial species of extensive shallow marshes, rivers and flooded areas and, especially in the non-breeding season, of sheltered marine habitats such as tidal creeks and lagoons. It usually breeds on islands in lakes and rivers and has a wide distribution, ranging from western Europe to China and north and north-east Africa. The northern populations are migratory, most spending the non-breeding season in flocks in western and eastern Africa and south-east China. In the southern parts of its range birds are largely resident, and populations in these regions may be joined during the northern winter by migratory birds.

In Europe, the Middle East and Africa, 160 Important Bird Areas (IBAs) have been identified where numbers of P. leucorodia regularly exceed IBA selection thresholds in either the breeding season, when on passage or for non-breeding populations. Further IBAs are currently being identified in Asia which, when combined with those illustrated here, will form a vast yet conservable network of key sites for this species throughout its range.

Source: Analysis of data held in BirdLife’s World Bird Database.

3 A network of 105 Important Bird Areas has been identified for species confined to the Sudan–Guinea savanna biome

In the Taita Hills of south-east Kenya, forest-dependent birds will fly distances of more than 35 km between forest fragments, across intervening degraded habitat (220 ha).

Evidence of inter-fragment dispersal events obtained from capture-recapture of eight forest-dependent bird species in the Taita Hills: 4,320 individual birds were colour-marked over a period of six and a half years. The line width indicates the number of dispersal events between the respective pairs of fragments.


5 A network of forest fragments in Kenya, constituting one Important Bird Area, has been identified for three Globally Threatened Birds endemic to it

The Taita Hills Important Bird Area, south-east Kenya, (total area c.400 ha), is composed of three main massifs. Each holds small fragments of indigenous forest that are now confined to relatively inaccessible hilltops and surrounded by settlements and agriculture. Three Globally Threatened Birds are endemic to these forest remnants, Taïta Thrush Turdus helleri (Critically Endangered), Taïta Apalis Apalis fuscgularis (Critically Endangered) and Taïta White-eye Zosterops silvanus (Endangered). The land surrounding these natural forests is largely unsuitable for forest-dependent birds, but individuals of several such species, including all three endemics, still manage to move between patches (2). As expected, there is more exchange between patches closest to each other, but movements of over 35 km have been recorded. Such studies reveal the importance of even tiny fragments of habitat in enabling the dispersal of species that depend upon such habitat. The role of fragments as ‘stepping stones’ needs to be recognised: the management of the surrounding agricultural landscapes must ensure that these patches are not further eroded, and that linkages are, where possible, restored.

Important Bird Areas are key biodiversity areas

Important Bird Areas (IBAs) are part of a larger network of key biodiversity areas—the most important sites for terrestrial biodiversity conservation worldwide. Key biodiversity areas form the anchors of a systematic ecological network (see pp. 60–61). Like IBAs, they are identified based on the species they hold. We generally have good data on the status and distribution of bird species. However, the information for many other species is poor or patchy, often making it hard to identify the critical sites for these species.

All Important Bird Areas (IBAs) are themselves key biodiversity areas, because they are internationally important for birds. Individual IBAs are often important for many other taxonomic groups as well (box 4). For example, the network of 228 IBAs in Ethiopia, Kenya, Tanzania and Uganda do an effective job of capturing threatened and endemic terrestrial vertebrates. Collectively, these sites include 97% of the region’s 97 endemic mammals, 90% of 80 globally threatened mammals, and 92% of 131 endemic snakes and amphibians. To include the ‘missing’ species would require only 11 more sites, and this may be an overestimate: several of these species are poorly known and may well be found to occur in the existing IBAs.

Similarly, a study in the Eastern Arc mountains and coastal forests of Kenya and Tanzania, a biodiversity ‘hotspot’ (see pp. 54–55), identified 150 sites, some of them very small, that shelter one or more globally threatened species of mammal, bird, amphibian, gastropod or plant. Forty-three of these sites (c. 25%) had already been identified independently as IBAs.

However, the IBA network includes 92% of the 25 most significant sites, those for which ten or more globally threatened species are recorded. All 24 Critically Endangered species (only three of which are birds) occur in at least one IBA.

**Sources**

2 Uganda’s 13 ’Forest’ Important Bird Areas capture 89% of the butterfly, large moth, small mammal and woody plant species recorded in an inventory of 50 Forest Reserves

In Uganda, the national Forest Department has conducted a remarkably thorough inventory programme of five wildlife groups in 50 Forest Reserves, with the aim of identifying priority areas for conservation. The study took 100 person-years, cost US$1 million, and surveyed woody plants, birds, small mammals (rodents and insectivores), butterflies and large moths (saturmids and sphingids). A total of 2,452 species was identified.

Independently, NatureUganda (BirdLife in Uganda) has identified and documented a network of 30 Important Bird Areas (IBAs), 13 of which are also Forest Reserves. This provides an opportunity to evaluate how effectively these 13 IBAs, selected on bird data alone, represent total species richness across five taxon groups.

Analysis shows that the 13 ‘forest’ IBAs, with an area of 5,445 km², capture 2,181 (89%) of all the species identified in the 50 forest reserves, covering a total of 10,000 km². This suggests that these 13 IBAs are an effective suite of sites for conserving a large and representative proportion of Uganda’s forest biodiversity. The low cost of gathering IBA data, combined with conducting site inventories for multiple taxa, reinforces the practicality of using birds as beacons for key biodiversity areas.

**Sources**
Important Bird Area networks conserve much biodiversity in addition to birds

There is growing evidence that networks of IBAs, though identified using information on birds, are disproportionately important for other animals and plants. That is to say, IBA networks are good at capturing threatened, endemic and representative species for other terrestrial groups. The effectiveness of the IBA network has already been shown for terrestrial vertebrates in East Africa; globally threatened wildlife species in the mountains and coastal forests of Kenya and Tanzania (see box 1); butterflies, large moths, small mammals and woody plants in Ugandan forests (box 2); butterflies and dragonflies in all Ugandan habitats (box 3); and plants, mammals, reptiles, amphibians and freshwater fish in Turkey (box 4). It appears that IBAs can be used with confidence as a ‘first cut’ for the overall network of key biodiversity areas, with extra sites for other taxa being added when data become available.

3 Uganda’s 30 Important Bird Areas capture 74% of butterfly species and 84% of dragonfly species recorded from the country, and higher proportions of those species of greatest conservation concern

The 30 Important Bird Areas (IBAs) in Uganda occupy some 8% of the land surface of the country and include a wide variety of forest, savanna and wetland habitats1. Comparative studies of the country’s 13 ‘forest’ IBAs have shown they are effective at capturing much forest-dwelling biodiversity in other taxon groups (see box 2). More recently, butterflies, dragonflies, birds and vascular plants have been surveyed in the remaining 17, mainly savanna and wetland, IBAs in Uganda. The aim was to assess how well the country’s IBA network as a whole captures species diversity in other taxa, across the full range of habitats.

Data from these surveys are currently being collated with earlier records from the Uganda Forest Department2 and other sources. Preliminary results available for the two insect taxa show that the national IBA network includes most of Uganda’s butterfly and dragonfly biodiversity. Of the 1,247 butterfly species recorded from the country3, the IBA network captures at least 74% of the total and 82% of those of highest conservation priority (species endemic to the Albertine Rift or to Uganda) (see figure).

Six Ugandan IBAs have not yet been surveyed for dragonflies. Even so, 84% of the country’s 241 species have already been recorded from the 24 IBAs for which data are available, including 11 of the 12 Ugandan dragonfly species recently assessed as globally threatened or Near Threatened4.

The results of studies for woody plants are still awaited. However, the insect data suggest that the IBA network effectively captures a large proportion of Uganda’s species-level biodiversity across all main habitats, in only a small proportion of the country’s land area.


Acknowledgements Data and graphics kindly provided by Charlie Williams, Herbert Tushabe and Josephine Awiara of the Ugandan IBAs Project, a collaboration between Makerere University Institute of Environment and Natural Resources (MUSENUR), Kampala, Uganda; University of Copenhagen, Denmark; Royal Society for the Protection of Birds, UK; and University of Cambridge, UK. Additional records and other help were contributed by T. Davenport, S. Collins, W. Khatruh, D. Kalkulunka, F. Mellman, F. Jiggins, V. Clausnitzer, K.-D.B. Dijkstra, J.J. Kisakye, K. Miller and P. Etting.

4 Over 70% of Turkey’s Important Bird Areas also hold internationally important numbers of other animals or plants

The 156 Important Bird Areas (IBAs) in Turkey cover a total land area of 91,684 km², c.12% of the country1. Studies in progress have shown that at least 112 (72% of the total, 93% by area) of these sites also hold internationally significant populations of one or more of five other wildlife groups (plants, mammals, reptiles, amphibians and freshwater fish)2. Nearly one third, 48 IBAs, are of global or regional importance for three or more different groups, in addition to birds. As more surveys are carried out, the number of IBAs known to be important for other groups is likely to rise. These findings highlight the importance of conserving IBAs in Turkey for a diverse range of other fauna and flora.

Sources: 1. Analysis of data held in BirdLife’s World Bird Database. Z. G. Slem et al. (2000).

Acknowledgements Additional data kindly provided by Doga Demireli and WWF-Turkey.
Habitat destruction is the largest of the many threats to biodiversity

Humans cause the majority of threats to species, sites and habitats. These threats are often interconnected and reinforce each other. Habitat destruction and conversion for agricultural and forestry activities—and the associated degradation and fragmentation—are the biggest problems.

Most threats are caused by human activities

We cause nearly all of the many immediate threats that directly impact bird species and the sites and habitats in which they live. For example, some 95% of European Important Bird Areas (IBAs) are used for human activities, which often involve the entire site, and over 40% are subject to one or more high-impact threats. Threats are often interconnected and reinforce one another. For example, over 90% of Globally Threatened Birds (GTBs) that are currently threatened by over-exploitation are also affected by the destruction of their habitats.

Habitat destruction is the most serious threat

Habitat destruction and degradation threaten over 86% of GTBs and are currently the most serious pressures on the world’s birds. Over-exploitation (see pp. 42–43) and the effects of alien invasive species (pp. 44–45) are also major threats and others—notably pollution (pp. 40–41) and climate change (pp. 46–49)—are of increasing concern. Some of these threats can be reversed, given enough resources, but others are difficult to combat and can become the final cause of extinction for species that are already reduced to tiny numbers (see box 1).

Habitat destruction, over-exploitation and the effects of alien invasive species are the most prevalent threats to birds

Some of these threats can be reversed given enough resources. When species populations become very small, however, there is an increased risk of extinction from threats such as natural disasters (e.g. volcanoes, cyclones and drought) or changes in native species dynamics (e.g. increases in competition) that are difficult to combat. There are also factors that are intrinsic to highly reduced populations (e.g. inbreeding, limited dispersal, skewed sex-ratios) that can significantly increase extinction risk. Currently, nearly 60 species classified as Critically Endangered (>30%) are considered threatened by at least one of these factors. Without intensive management, threats such as these may become the final cause of a species’ extinction.

SOURCES
2. Analysis of data held in BirdLife’s World Bird Database.

The main threats to GTBs world-wide\(^1,2\)

- **High/medium impact**
- **Low impact**
- **Unknown impact**

- **Habitat destruction**
- **Over-exploitation**
- **Alien invasive species**
- **Habitat disturbance**
- **Natural disasters**
- **Pollution**
- **Changes in native species**
- **Incidental mortality**
- **Intrinsic factors**

![Graph showing the main threats to GTBs](image-url)
Habitat is destroyed mainly for agriculture and forestry

The expansion of agricultural activity has led to the destruction of huge areas of natural habitats, including forests, grasslands and wetlands, in nearly all regions of the world (see pp. 32–33). For tropical forests, the richest habitat for biodiversity, logging is typically the first major pressure, often providing access to remote areas and leading to further clearance and degradation (pp. 36–37). The expansion and development of urban areas and infrastructure also reduces natural habitats, and new roads give access to additional areas, which results in further losses (pp. 38–39). The relative importance of these factors varies in different parts of the world (box 2), but all play a significant part in the destruction of habitats and therefore in driving ecosystem change.

Habitat degradation and fragmentation compound the problem

For many species the habitat degradation that accompanies ‘selective’ resource exploitation, or that occurs in habitats next to cleared areas, can have serious consequences. Many tropical forest birds, for instance, rely on pristine or near-pristine primary forest, and show low tolerance to selective logging (see p. 20, box 1, figure c). Even for non-threatened bird species that have adapted to rural, semi-natural habitats, the intensification of agricultural practices is causing significant population declines in temperate and tropical regions alike (pp. 8–9). The problem is made worse by the fragmentation of natural habitats across much of the world, most notably in tropical and sub-tropical forests, but also in open-country habitats (box 3). Such fragmentation results in smaller, more isolated sub-populations, with reduced possibilities for dispersal and increased risks of local and ultimately global extinction. In total, 252 bird species are considered globally threatened by a combination of small severely fragmented ranges.

2 Agriculture and forestry are key drivers of habitat destruction in Important Bird Areas in Africa and Europe

In Africa, habitat clearance for agriculture threatens over 50% of Important Bird Areas (IBAs), with shifting agriculture an additional pressure1. In Europe too, agricultural expansion and intensification are among the most serious threats affecting IBAs, with a high impact at 35%2. In Africa, selective logging or tree-cutting affects 23% of IBAs, with firewood collection (including charcoal production) and forest grazing being additional, often related pressures (these threats are of less importance in Europe where little old-growth forest remains). In Africa, ongoing or planned infrastructure development (including dam and road building) is a further key cause of habitat destruction, with 21% of IBAs affected.

In Europe this is also a major factor affecting IBAs, with a high impact at 37%3 (see figure).

The key causes of habitat destruction threatening Globally Threatened Birds (GTBs) present a similar picture. Of the 1,045 GTBs affected by habitat destruction, large-scale agricultural activities (including crop farming, livestock ranching and perennial crops such as coffee and oil palm) impact nearly half. A similar proportion is affected by small-holder or subsistence farming. Selective logging or tree-cutting threaten c.40% of these GTBs, clear-felling and general deforestation affect some 30%, firewood collection and the harvesting of non-woody vegetation affect c.15% and conversion to tree plantations some 10%. Overall, over 60% of GTBs are impacted by forestry activities. Infrastructure development is a threat to over 30%4.


3 Habitat fragmentation puts pressure on remaining natural grasslands in Argentina

Continuing fragmentation is a major threat to the remaining natural grasslands of Argentina, caused most recently by an expansion in government-subsidised private forestry. The grassland biome in Argentina originally comprised a vast mosaic of temperate steppes (pampas) and subtropical savannas (campos) spread across several major flood-plains1. These grassland regions are a globally important centre of endemism for numerous species of fauna and flora1–3. About 60 grassland-dependent bird species occur in Argentina1, and 98 potential Important Bird Areas (IBAs) have been identified in these grasslands, especially in the campos1. However, these grasslands are also very suitable for agriculture, and as a result are now probably the most threatened terrestrial biome in Argentina1–3. The great majority have already been converted to cropland, rangeland or settlement—less than 3% of the original pampas remain in a natural state1, and only 0.3% of the original grassland area of 470,000 km² receives any form of statutory protection1.

The remaining large blocks of once open and tree-less grasslands are being afforested with plantations of trees, usually non-native species of pine and eucalyptus2, following land preparation that often involves road building and wetland drainage3. Between 1995 and 2000, the area of such monocultures increased by more than 500%, with over 1,000 km² of grassland converted to plantations in 2001 alone3. Several potential grassland IBAs have already been destroyed, before their importance could be confirmed4. Moreover, the negative impacts of tree plantations on grassland ecosystems can extend well beyond the actual converted habitat, for example through edge effects caused by road building5 and through increased densities of non-grassland predators6.

Agricultural expansion is severe in biodiversity hotspots
Agriculture has been expanding since the domestication of crop plants 10,000 years ago. But in the past three centuries, exponential human population growth has led to a 500% expansion in the extent of cropland and pasture world-wide (see box 1, figure a). In Europe and North America, unchecked agricultural development has already transformed many natural habitats and depleted their biodiversity. Similar transformation is now underway in the tropics, where most of the world’s biodiversity is found, with huge implications for both wildlife populations and ecosystem functioning. Endemic Bird Areas (EBAs), globally important centres of biodiversity (see pp. 22–23), are under above-average threat from agricultural expansion (box 1, figure b). As tropical forests are the predominant natural habitat in EBAs, this tells us that they too are particularly threatened by agriculture.

Demand for tropical commodities is a major cause of current agricultural expansion
The cultivation of agricultural export commodities has expanded rapidly within the developing world during the past half-century, notably for coffee, cocoa, sugar and (more recently) palm oil and soya (box 2). Increased production of such commodities is causing unprecedented levels of habitat loss, particularly of tropical forests.

(a) The timing and expansion of agricultural land from 1700 to 1990

Colours indicate the period in which relatively intact habitats were converted to agricultural land

1750
1815
1950
1990

The impact of agriculture as a threat to Endemic Bird Areas (EBAs, globally important centres of biodiversity; see pp. 22–23) can be derived by overlaying the distribution of EBAs onto such a map of global agricultural expansion. This shows that EBAs have been much more extensively transformed by agricultural expansion than the rest of the world (figure b). By 1990, 43% of EBA land area had been converted to agriculture, compared to 32% of the rest of the Earth’s land area (excluding the Antarctic). The apparent deceleration since 1970 is an artifact of the modelling procedure by HYDE.


ACKNOWLEDGEMENTS Figures and text kindly provided by Jim Schirlemann, Bly Green (both Royal Society for the Protection of Birds and Conservation Biology Group, University of Cambridge, UK) and Andrew Balmford (Conservation Biology Group, University of Cambridge, UK).
The past 40 years have seen dramatic increases in global production of soya, palm oil and other tropical export commodities

There have been significant recent increases in the areas under cultivation for many tropical commodity crops, including soya bean, oil palm, coffee, cocoa and rice. Soya bean and palm oil have experienced the biggest growth, although the actual area under cultivation for these combined is still lower than that for rice alone. Soya bean and palm oil have become major commodities for consumption by the developed world, the latter being used in a great range of products from ice-cream to beauty treatments. Coffee and cocoa are major sources of income for developing countries, second only to oil in legal international trade. Such land-use changes lead to drastic losses in biodiversity and ecological services from wild nature. For example, Brazil alone has over 20,000 km² of coffee plantation, most of it having replaced primary rainforest. In Indonesia, coffee planting is responsible for massive forest loss, even inside protected areas. These land-use changes are linked to global trade rules and over-consumption in the developed world, which are thus partly responsible for large-scale habitat loss in high-biodiversity countries (see pp. 50–51).

Agricultural expansion is increasingly threatening species

In the past, over-hunting and alien invasive species were responsible for most bird species extinctions. Today, the greatest threat to biodiversity is habitat loss, particularly as a result of agricultural expansion, which is now threatening previously widespread and common birds (box 3).

The potential impacts of genetically modified organisms remain unclear

Genetic modification is already producing plants, animals and micro-organisms that can overcome the current limits on their growth and ranges. Such organisms could have big impacts on biodiversity, but this will depend on how they are used, in agriculture and other natural-resource sectors. For instance, they could reduce pressure for new habitat clearance by making already degraded land more productive. By contrast, they could allow agriculture to intensify to the detriment of those species that inhabit farmed land, and could also facilitate its expansion into today’s agriculturally ‘marginal’ but biologically important habitats, such as boreal forests and drylands.

3  Agricultural expansion is a major threat to birds, and appears to be increasing in importance

The conversion of natural habitats to agricultural land is currently the most important threat to Globally Threatened Birds (see pp. 30–31). Agricultural expansion constitutes a higher proportion of all threats impacting Near Threatened species than it does for species in higher categories on the IUCN Red List (see figure). If the same threatening processes identified in recent assessments have been operating over a long period of time, this indicates that pressures associated with agriculture are set to become increasingly important in the future.

Hunting and alien invasive species were the most frequent threats (61% of threats) for Extinct birds whereas for Near Threatened birds, habitat loss through agricultural expansion is the most frequently listed threatening process (57% of threats).
Agricultural intensification is a major threat to sites and habitats

World-wide, agricultural policies have intensified farming in many countries, turning farmland into poor-quality habitat for birds and other wildlife. For example, rain-fed cereals have been replaced with irrigated, heavily fertilised and pesticide-treated crops. Pastures and rangeland have been overgrazed, leading to excessive soil erosion and compaction. Semi-natural habitat features have been lost from the farm landscape, including strips of meadow, hedgerows, groves, small wetlands and tree stands along wetlands. Vast and highly managed monoculture landscapes have replaced the diverse crop mosaics that were formerly essential in resting the soil and combating pests. As a result, 32% of Important Bird Areas (IBAs) in Europe, for instance, are threatened by agricultural intensification (see box 1).

In Europe, over the past three decades, the threats to Important Bird Areas (IBAs) posed by agricultural intensification and expansion have been severe in some countries. For example, agricultural intensification and expansion threaten c.70% of IBAs in Austria and Belgium, and overall 32% of the c.4,000 IBAs in Europe (see figure a)².

In Turkey, 50 out of 132 IBAs (c.38%) are significantly threatened by agricultural intensification and expansion (figure b). Wetlands have suffered in particular: rivers, streams and lakes have been adversely affected by water-diversion schemes to feed intensively irrigated farms². In addition, over the last century at least 13,000 km² of wetland habitat have been drained for conversion to arable land or otherwise destroyed, mainly since 1960³. In the Konya basin of central Anatolia, two large wetlands (c.300 km² in total) have recently dried up and three large wetland IBAs (Beyşehir Lake, Sugla Lake and the Hotamis marshes) have sustained serious damage⁴. These sites are important for threatened and declining waterbirds, such as Dalmatian Pelican Pelecanus crispus (Vulnerable) and White-tailed Lapwing Vanellus leucurus.


Acknowledgement Information and analysis for figure b kindly provided by Güven Eken (BirdLife International European Division).
Farmland birds are declining severely across most of the intensively farmed European countries, particularly in European Union (EU) Member States which are under the Common Agricultural Policy (CAP) (see figure a)\(^2\). Intensive farming driven by CAP subsidies has produced large quantities of food but at great cost to the environment. By comparing between countries, it is clear that the biggest declines are directly related to intensive agricultural methods\(^3\): 30% of the variance in farmland bird declines across countries in Europe can be explained solely by their differences in cereal yield. Few birds can breed in the extreme monocultures that have come to characterise much of the north-western European arable landscape. Such habitat degradation is likely to have similar detrimental effects on other components of European biodiversity\(^4\). The birds of the non-EU states of central and eastern Europe have fared better mainly because agricultural practices have remained less intensive and, as a result, less environmentally destructive. Of current concern are the 13 EU accession countries that face impending CAP-subsidised intensification of their agriculture. Unless the CAP is radically reformed, new EU states will probably experience similar declines in the diversity and abundance of their farmland bird species\(^5\).

In non-EU countries, increasing agricultural intensification has also had negative effects on birds. In Poland, breeding density of Eurasian Skylark \textit{Alauda arvensis} has declined threefold in areas of most intensive farming (figure b)\(^6\). Skylarks suffer in areas of high farming intensity because of a lack of semi-natural habitat features (such as vegetation mosaics) and also because of the intensive year-round use of land for multiple cropping.

**Intensive farming is depleting bird species and other wildlife**

Many common farmland birds are declining across the temperate zone. For example, almost 40% of bird species in Europe have an unfavourable conservation status, meaning their populations are small, declining or highly localised. Many of these species inhabit agricultural habitats and cannot be conserved solely within important sites such as nature reserves — indeed, around 90% of Europe lies outside such key sites. Agricultural intensification is partly to blame in causing these declines among birds and other countryside biodiversity (box 2). These losses have happened in some of the wealthiest nations in the world, indicating that European agriculture has not been developed sustainably and that its effects have not been adequately monitored.

**Tropical birds are also declining due to intensive crop production**

Vast areas of natural habitat in the tropics have been converted (a) Farmland bird declines between 1970 and 1990 have been greatest in EU countries\(^1\).\(^2\).

### Intensively farmed coffee supports many fewer bird species than traditional shade plantations

Traditional coffee plantations are ‘shade systems’ where the plants are grown under forest trees. Although disruptive to the understory, this method allows several guilds of forest birds and other indigenous biodiversity to survive within the complex vegetation structure. In the Cordillera Central of the Dominican Republic, bird diversity is much higher in traditional coffee plantations, shaded by native Inga trees, than in full-sun systems (see figure)\(^7\). This is one of many studies to demonstrate that forest bird communities are depleted when shade-coffee systems are converted to full-sun intensive farming\(^8\). These results are consistent across a wide range of other wildlife groups\(^9\), from arthropods\(^10\) to mammals\(^11\). Certain guilds of birds suffer especially badly; for example, nectar-feeding birds dependent on forest flowers are virtually eliminated from intensive coffee plantations. Conversion to full-sun systems clearly reduces the value of these agricultural habitats for forest bird communities.

**Bird species diversity is much lower in intensive full-sun coffee plantations in the Dominican Republic, compared with less intensive shade-plantation systems**

**State of the world’s birds 2004**

**Figure 2**

**Figures kindly provided by Paul Donald (Royal Society for the Protection of Birds, UK)**

### SOURCES


**ACKNOWLEDGEMENT** Figures kindly provided by Paul Donald (Royal Society for the Protection of Birds, UK).
Logging is responsible for much deforestation
It is estimated that since historical times the world has lost through human activity c.40% of its original 60 million km² of forest cover. Approximately 120,000 km² of tropical forests are destroyed each year, an area roughly the size of Malawi, Nicaragua or North Korea. Commercial clear-cutting and selective logging for timber is, directly or indirectly, responsible for much of this deforestation, especially in Asia (see box 1). Many countries try to mitigate the effects of logging through regulation and programmes designed to advance sustainable forest management, but enforcement is often poor, and illegal logging predominates in some regions. In addition to its direct impacts, logging can also open up forest to encroachment and settlement (see pp. 38–39), and other damaging disturbance, such as hunting (see pp. 42–43) and fire (box 2).

2 Human-initiated fires are responsible for massive losses of rainforest in Indonesia
In rainforest, natural fires are extremely rare, and birds and other biodiversity suffer greatly when human-initiated fires occur. Burnt forest may take hundreds or possibly thousands of years to return to its original state. Human activity worsens the risk of fire and its negative impacts for a variety of reasons. For example:
- fragmentation of forests increases their edge-to-area ratio, making them less humid and more susceptible to fire, while logging or mining roads allow access to areas previously protected by their remoteness
- fires from slash-and-burn cultivation often spread into areas of primary forest
- smouldering underground coal seams or layers of peat can re-ignite forest fires during the dry season, and can burn for decades as they are difficult to extinguish. At present, it is estimated that as many as 1,000 underground coal fires are burning in Indonesia alone.

In Indonesia during 1997–1998, fires damaged or destroyed almost 50,000 km² of forest in Borneo and Sumatra (an area larger than Switzerland). Although made worse by a drought induced by El Niño, these fires were caused by humans. The 1997 fires released as much carbon into the atmosphere as the total annual carbon intake of the world’s vegetation, equivalent to Europe’s current annual carbon emissions from the combustion of fossil fuels. Research at Bukit Barisan Selatan National Park, Sumatra, showed that the density of hornbill species decreased by 28–63% in fire-damaged forest, because of the sparse canopy and scarcity of fruit.


1 The forests of Asia, in particular, have suffered from unsustainable forestry practices
Although human activities have been reducing the world’s tropical forest area for centuries, the process accelerated to alarming rates in the latter half of the twentieth century. Deforestation is a complex issue with multiple causes, but commercial logging is a major driver in the tropics, where the greatest complement of the earth’s terrestrial biodiversity occurs. The forests of Asia in particular have suffered from unsustainable forestry practices, with 0.7% of the remaining natural forest lost to logging each year, much of it clear-felled (see figure).

In parts of Malaysia and Indonesia, many forests that have already been selectively logged will be logged for the second or third time in the near future, because there is so little primary forest left. In Sabah and Peninsular Malaysia, all primary rainforest outside conservation areas has effectively been lost. As deforestation continues, previously continuous tropical forests come to consist of protected fragments scattered across a mainly agricultural landscape. This is already the situation in a number of countries, such as the Philippines, Costa Rica and Ghana. This degree of habitat loss, degradation and fragmentation has serious consequences for birds.


Amongst the three major continents with tropical forest, Asia is losing the greatest percentage of its natural forest each year.
3 – Lowland forest will have been destroyed across large parts of Indonesia by 2010

Indonesia was still densely forested as recently as 1950, but between then and 2000 c.40% of the country’s forests was cleared, and this rate of loss is accelerating (see figure). Approximately 10,000 km² of forest were cleared annually in the 1980s, rising to c.17,000 km² per year in the early 1990s. Since 1996, deforestation has increased to an average rate of 20,000 km² per year. These losses are concentrated on non-swamp lowland forest, the type richest in biodiversity. Between 1985 and 1997, Sumatra lost 29% of its forests, and Kalimantan 22%. Unless the rate of deforestation is reduced or halted, non-swamp lowland forest in Sumatra will disappear by 2005, and in Kalimantan by 2010. Indonesia’s forests are being felled for timber and wood-pulp (c.48 million cubic metres per year), and the land is then converted to other uses such as oil palm plantations. Indonesia’s production capacity for wood-pulp and paper has grown by 700% since the late 1980s, and is now at a level that cannot be met by any form of sustainable forest management. This growth has been achieved mainly through illegal logging and land clearance. Around 73% of log production in Indonesia is illegal and occurs outside designated forestry concessions.


The pulp, paper and palm oil industries are currently expanding

The pulp and paper industry is currently expanding in tropical Asia, with several huge mills operational or under construction in Sumatra, Borneo and Mindanao. Large areas of mature forest are being cleared for pulp fibre, and the land is then converted to other uses such as oil palm plantations (box 3). The recent accelerating loss of forest in Indonesia has led to 65 species being moved to higher threat categories on the IUCN Red List.

Logged forest is an impoverished habitat for biodiversity

Logging can be selective and well-managed, but often it is not. Even selectively logged forests support consistently fewer forest-specialist bird species than primary forests. Those species that do persist often become rare. Many are understorey insectivores, unable to survive in the open, fragmented habitats created by current forestry practices (box 4).

4 – Forest bird communities are depleted even under selective logging regimes

Well-managed selective logging of tropical forest allows much biodiversity to persist, and is certainly less damaging than intensive timber extraction or clear-felling. Nevertheless, selective logging decreases both the diversity and abundance of forest-dependent bird species. A review of several studies shows that abundance of forest bird species drops by c.30% in selectively logged forests1,2,3,4, with forest-dependent birds becoming rare. In contrast, birds adapted to farmland, open or degraded habitats are able to colonise selectively logged forest successfully. Not all guilds of bird respond similarly to logging, leading to changes in the composition of communities (see figure). For example, species that feed on insects or nectar typically decrease in abundance. In Neotropical forests, those hardest hit are terrestrial insectivores such as leaf-tossers (Sclerurus spp.) and ground ants such as the antthrushes (Formicarius spp.). Arboreal insectivores, such as certain foliage-gleaners (Automolus spp.) and woodcreepers (Xiphorhynchus spp.), suffer less than their terrestrial counterparts, but significant decreases in abundance are consistently observed. Frugivores, by contrast, appear to be relatively resilient, and frequently comprise a higher proportion of the avian community in selectively logged and ‘secondary’ forests. This is probably because they are often adapted to foraging over large areas, and some species benefit from a more open canopy. However, the increases in frugivores do not compensate for declines of insectivorous species, and the resulting bird community is an impoverished version of the original.

The development of infrastructure threatens biodiversity world-wide

Infrastructure is the central nervous system of our world and the most obvious footprint of human activity. The expansion of the human-built environment into the natural one—infrastructure development—has a significant negative impact on biodiversity, mainly through the destruction, degradation and fragmentation of natural habitats. It has been identified as a key threat to many bird species (see box 1). Ramifying networks of housing, transport, energy and telecommunications infrastructure facilitate the spread and intensification of many human activities that threaten biodiversity, such as deforestation (see pp. 36–37), agriculture (pp. 32–33) and over-exploitation (pp. 42–43).

1 Threatened birds indicate the looming consequences of unchecked infrastructure development

It is predicted that in 30 years’ time over 70% of the Earth’s land surface will have been impacted by infrastructure development. Unless this expansion is better controlled and planned than at present, it will cause a substantial increase in environmental problems relating to habitats, biodiversity, food production, freshwater resources and health. Latin America and the Caribbean are likely to be the hardest hit, with more than 80% of the land significantly affected, closely followed by the rapidly developing Asia-Pacific region, where more than 75% of land area is predicted to be affected in this way.

These changes are already having profound impacts on the world’s birds. For example, in Latin America and the Caribbean, eight countries have more than 50% of their Globally Threatened Birds (GTBs) threatened by infrastructure development; seven of the eight are small island states in the Caribbean. In the Asia-Pacific region, infrastructure is an especially pervasive threat to bird species in the more industrialised and/or densely populated countries (see figure), and is judged to be causing a net reduction or degradation of habitat for 146 (27%) of the region’s 540 GTBs. The main types of threat from infrastructure in the region relate to human settlement (60 GTBs impacted), industry (46 GTBs) and tourism/recreation (14 GTBs)2.

2 Large dams and barrages are an increasing threat to wetland-dependent birds

Large dams cause major ecological changes in river basins. The first global survey of these changes shows that, despite some positive effects, their overall impact is distinctly negative1. Large dams have led to:

- the loss of forests and other economically and ecologically valuable habitats, the loss of biodiversity and the degradation of upstream catchment areas
- the loss of aquatic biodiversity in upstream and downstream fisheries, and the loss of ecosystem services of downstream wetlands, such as rivers, floodplain lakes, marshes and forests, estuaries, deltas and nearby shallow marine ecosystems
- cumulative impacts on water quality, river-flow regime and species composition, where a number of dams are sited on the same river2.

A high proportion of the world’s river basins (61% of a large sample) are highly or moderately fragmented by dams. For example, in Africa, the Middle East and Europe, dams and other hydrological structures are considered to pose a threat to nearly 10% (304) of the 3,701 globally Important Bird Areas (IBAs) in this region1. The great majority (87%) of the 304 potentially affected IBAs contain areas that qualify as wetlands of international importance (Ramsar Sites), according to the criteria of the Convention on Wetlands (see figure)2. In Asia, actual or planned dam projects are likely to have significant impacts on at least 10 Globally Threatened Birds. Waterbirds of lowland floodplains, such as Masked Finfoot Heliopais personata and Indian Skimmer Rynchops albicollis, are affected particularly badly.

- Data-threatened IBA but overlaps with Ramsar Site

Wetlands of international importance for birds that are threatened by dams, barrages and embankments in Africa, Europe and the Middle East2

SOURCES

The ten countries in Asia with the highest percentage of their GTBs impacted by infrastructure development:

<table>
<thead>
<tr>
<th>Country</th>
<th>% of country’s GTBs impacted by infrastructure</th>
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<tbody>
<tr>
<td>North Korea</td>
<td>50</td>
</tr>
<tr>
<td>Hong Kong &amp; Macau</td>
<td>47</td>
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<tr>
<td>South Korea</td>
<td>47</td>
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<td>Vietnam</td>
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</table>

Values indicate total numbers of GTBs affected

Dams and barrages are an increasing threat
The demand for clean water is increasing rapidly in our densely populated world. Careful development of hydrological infrastructure is ever more important. However, dams, barrages, embankments and other major hydro-engineering schemes often have serious impacts on river-basin ecosystems. Large dams in particular have had widespread negative impacts on biodiversity, and have disrupted many existing ecosystem services (box 2).

Human colonisation increases the threat from fire
People have used fire to alter habitats since pre-history, and the spread of fire traces human colonisation across the world. Fire is a natural phenomenon in many habitats. However, the increased access and human activity accompanying infrastructure development have led to major changes in the fire regime in many regions. This often has disastrous consequences for local biodiversity (box 3).

Artificial structures kill millions of birds each year
Especially when on migration, birds are susceptible to flying into and being killed by all kinds of artificial structures, from fences to electric pylons and wind farms. Larger birds are also vulnerable to electrocution on poorly designed power lines. Many casualties are of common species, but collisions and electrocutions can also have significant impacts on threatened birds (box 4). Often, deaths could be avoided through better design and the use of simple bird protection devices.

3 In Australia, human-caused fires are linked to the extinction or decline of many bird species
Humans have used fire to mould the landscape and wildlife of Australia since pre-history. Aboriginal people entered the continent 60,000–100,000 years ago and used small fires for hunting and land clearance. In south-western Australia, areas were burned every 5–10 years and fires were scattered and of relatively low intensity, resulting in a mix of habitats with a high diversity of plant species. However, once Europeans took over land management, the practice and purpose of burning changed rapidly. Early European colonists burned heathland more often, every 2–3 years. This fire regime favoured the development of grasslands, which replaced other habitats and provided habitat for grazing livestock. Destructive and extensive burns were also used to aid land clearance or to show European ownership.

The changes in the fire regime following European settlement were a major factor in the extinction of at least five bird taxa1. Species are lost because frequent fires alter the plant species composition and vegetation structure of their habitats2, meaning that fire-sensitive vegetation cannot be maintained. Inappropriate fire regimes are now recognised as a major endangering process for almost half of Australia’s nationally threatened birds3, notably those of heathland and mallee habitats4. World-wide, at least 78 Globally Threatened Birds are at risk from fire. One such Australian example is the Noisy Scrub-bird Atrochlamis lamellirostris (Vulnerable), which avoids areas that are burnt more often than every c.6 years, and reaches its highest densities only after 20–25 years of vegetation regrowth (see figure)5.


Noisy Scrub-bird avoids areas that suffer from frequent fires

4 Collisions and electrocutions: real threats for migrating and young birds

In Australia, Swift Parrot Lathamus discolor (Endangered) is threatened mainly by loss of its Blue Gum tree habitat1—only 1,000 pairs remain. With such extensive habitat loss, they have come to depend increasingly on suburban areas as a source of flowering trees, and collisions are beginning to take their toll. During a three-month period in 1997, 40 birds (c.2% of the world population) were killed by collisions with windows and fences while foraging amongst trees in one suburban area1.

Structures in urban areas are by no means the only problem: the mushrooming of radio, television and mobile phone towers across the countryside of Eurasia and North America poses considerable danger to birds2,3. Conservative estimates suggest that at least four million birds are killed in the USA each year by collisions with towers4. In Wisconsin, a single radio tower has caused at least 120,000 bird deaths since it was constructed5, and there are at least 100,000 large towers of this sort in the USA alone. Moreover, there is a growing likelihood that 1,000 so-called ‘megatowers’ for digital television transmission (including some taller than the Empire State Building) will be erected in the USA imminently6.

In Europe, central Asia and Africa, meanwhile, electrocution on power lines is documented as a cause of mass mortality of raptors, particularly of inexperienced, juvenile birds7. For example:

- Spanish Imperial Eagle Aquila adalberti (Endangered) loses 30% of juveniles to electrocution on power lines each year. However, simple, inexpensive alterations to the design of power line poles could cut annual mortality by more than 50%

- in Kazakhstan, a single 100-km section of 10 kV power line in the Atyrau region caused at least 31 raptor electrocutions in a single year

- north of the Caspian Sea in Kazakhstan, no fewer than 932 Stepple Eagle Aquila nipalensis were electrocuted along 1,500 km of power line in one survey season7. Given that Russia and Kazakhstan hold at least 50,000–70,000 km of this type of power line, this pressure alone may explain a large proportion of the raptor declines reported in this region.

Pollution remains a serious concern

Pollution of the environment has direct and indirect impacts

Bird populations are directly impacted by environmental pollution, through mortality and sublethal effects such as reduced fertility. Pollution can also have strong indirect effects, by degrading habitats or reducing food supplies, and overall it threatens 187 Globally Threatened Birds (GTBs). The types of pollution that affect bird populations are very diverse. Water-borne nutrient pollution from point sources (e.g. fish-farms, sewage outfalls) and from more dispersed sources (e.g. agricultural run-off) can devastate otherwise productive wetland and coastal habitats, through inducing algal blooms, poisonous ‘red tides’, fish-kills and the formation of permanently oxygen-less ‘dead zones’, as in parts of the Black Sea and Gulf of Mexico. Other water-borne pollutants that can affect birds and their habitats include pesticide residues, run-off from land-fill, suspended sediment from excessive soil erosion, heavy metals, salts and trace elements that are poisonous in excess (e.g. selenium).

Little is known of the long-term effects of many pollutants

Huge areas of farmland, rangeland, forest and wetland are treated with poisonous synthetic chemicals each year to control competitor species of plants, animals, micro-organisms and diseases. To enhance crop yields across the developing world, agriculture is becoming increasingly reliant on such biocides, many of which have been banned or restricted in other nations. Unfortunately, the side-effects and longer-term impacts of such pesticides and herbicides are often ignored or simply not known by those who use them (see box 1).

1 Pesticides continue to poison birds on a large scale

World-wide, more than two million tonnes of pesticides are applied annually and usage continues to increase. Pesticides are valuable tools assisting in food production, habitat management and the control of diseases and pests, but they also have significant environmental impacts. According to one conservative estimate, 672 million birds in the USA are directly exposed each year to pesticides on farmland, and 10% of these birds die as a result. As is probably the case in most countries, there is no centralised database in the USA to collect the information on bird kills attributed to pesticides. Such incidents are difficult to detect, and monitoring efforts are generally lacking. The longer-term and indirect effects of pesticide use are even less well monitored or studied. Nevertheless, approximately 50 pesticides used currently in the USA are known to have caused die-offs of birds, including such diverse groups as songbirds, gamebirds, raptors, seabirds and shorebirds, according to the US Fish & Wildlife Service.

For instance, monocrotophos is an organophosphat insecticide used in crop farming, and one of the most bird-toxic agricultural chemicals in use. Since its introduction in 1964, documented avian mortalities number well over 100,000, including the mass-poisoning of nearly 6,000 Swainson’s Hawk Buteo swainsoni in Argentina during 1995/96. Despite this, it remains one of the most heavily used pesticides in the world. In November 2000, 15 Sarus Crane Grus antigone (Vulnerable) were found dead in a field near their wintering grounds in Keoladeo National Park, northern India. The cranes had died after eating recently sown wheat treated with monocrotophos. Such pesticide poisoning is known as a direct cause of mortality in many crane species.

Another poisoning incident occurred in Mongolia in 2002, when about 3,500 km² of steppe were treated with the rodenticide bromadiolone, following a population explosion of voles. No monitoring of non-target mortality was conducted, but ecologists working in the area noted more than 340 dead or dying birds at several localities, including 145 Demoiselle Crane Grus virgo and large raptors such as Steppe Eagle Aquila nipalensis and Saker Falcon Falco cherrug. The true scale of the mortality was presumably much larger than observed.

Unfortunately, intentional poisoning of birds with pesticides is a common practice in some parts of the world, e.g. where farmers are attempting to prevent crop damage or to control perceived predators of small livestock. In South Africa, this type of poisoning is one of the greatest threats to Blue Crane Grus paradisea (Vulnerable), and in Europe numerous raptor species, including a number of Globally Threatened Birds, continue to be deliberately poisoned in this way.

Persistent organic pollutants (POPs) are toxic substances composed of organic (carbon-based) chemical compounds. They include industrial chemicals like polychlorinated biphenyls (PCBs), residues of organochlorine pesticides like DDT, and unwanted byproducts such as dioxins. These pollutants persist in the environment and can travel through air and water far from their source. POPs tend to collect in the fatty tissue of organisms, and thus dramatically increase in concentration as they move up the food chain. POPs are now found almost everywhere, in our food, soil, air, and water.

A growing body of evidence links POPs to reproductive failure, deformities and physiological and behavioural dysfunctions in wildlife. In the USA, studies from the heavily polluted Great Lakes region revealed that predators, including birds such as eagles and cormorants, suffered significant health impacts from POPs. These included various combinations of population decline and reproductive dysfunction, eggshell thinning, metabolic changes, deformities and birth defects, cancers, behavioural changes, abnormally functioning thyroids and other hormone system dysfunction, immune suppression, feminisation of males and masculinisation of females. Despite bans in an increasing number of countries, these chemicals are still much relied upon in medicine, industry and agriculture around the world. For instance, at Lake Kariba in Zimbabwe, African fish-eagle Haliaeetus vocifer showed significant eggshell thinning and consequent breeding failure due to accumulation of DDT residues, following heavy spraying of this insecticide in adjacent woodland for the purpose of disease control.


Birds can indicate the effects of pollutants

Bird populations are often good indicators of the impacts of pollutants, for instance in the well-documented case of the negative impact of DDT on populations of Peregrine Falcon and other raptors, and also for other less well known persistent organic pollutants (box 2). For example, the calcium-rich food needed for adequate eggshell development in nesting birds is less available in areas with increasingly acid rain, and this is manifested in eggshell thinning and population declines (box 3). Birds are often the most visible sign of the environmental problems caused by oil slicks or spillages of toxic chemicals in wetlands. These episodes can often be disastrous for biodiversity and for local economies (box 4).

Acid rain continues to exceed critical loads in industrialised regions

Vehicles, domestic heating, power-plants, factories and agriculture all pollute the atmosphere significantly with sulphur and nitrogen compounds. These chemicals can be transported long distances in the atmosphere before falling as acid rain, which can cause major economic damage to plants, crops and human health. Acid rain has been implicated in recent population declines of several bird species breeding in the eastern USA, particularly in high elevation zones with low pH soils. Despite clean-air legislation, many eastern regions of North America continue to experience acid rain, and many bird species breeding in these areas show unexplained population declines, including Globally Threatened Birds such as Bicknell’s Thrush Catharus bicknelli (Vulnerable). Long-term acid deposition has depleted the available calcium in acid-sensitive soils, and current emission standards may be insufficient to ensure their recovery. The lack of available calcium in the environment may be a key factor in explaining these bird population declines. In the UK, a recent study found that eggshell thicknesses of four species of thrush Turdus have declined over the past 150 years. This decline was evidently not caused by organochlorine pollution, because it began long before the introduction of DDT. A likely explanation is that acid deposition has caused a reduction in the availability of calcium, and that this has reduced the quality of eggshells laid by thrushes. Such a mechanism is also suggested by experimental work on Great Tit Parus major in the Netherlands and Estonia.


Oil spills significantly reduce populations of seabirds and are costly to clean up

Oil spills at sea can kill large numbers of seabirds and have the potential to wipe out entire populations where these are small or localised. For instance, the wreck of the oil tanker Prestige off north-west Spain in November 2002 caused the oiling of an estimated 115,000-230,000 individuals, of which only 23,181 birds of more than 90 species were actually retrieved (6,120 alive and 17,061 dead). The spill may have wiped out the rare Iberian breeding population of Common Murres Uria algea. Over the last 10 years, the world population of African Penguin Spheniscus demersus (Vulnerable) has been reduced from c.1.45 million adult birds to fewer than 200,000 by egg- and guano-collecting, and by depletion of food-fish stocks by commercial fisheries. One of the most immediate threats is now mortality from oil spills, with a single slick capable of oiling thousands or tens of thousands of birds. The species is particularly at risk because more than 80% of its population breeds within 100 km of a major harbour, and the world’s largest oil-shipping route lies offshore of its entire breeding range. During the last decade, there have been two catastrophic oil spills, with 10,000 penguins oiled in 1994 and 20,000 in 1998, from the wrecks of the Apollo Sea and the Treasure respectively. However, there is also a substantial ‘background’ level of oil pollution from smaller, unreported spillages and deliberate illegal discharges during cleaning operations. On average, more than 2% of African Penguins are oiled each year.

Efforts to rescue, clean and rehabilitate oiled penguins and other seabirds have increased in number over the years. In the 1970s, 55% of captured oiled penguins were released back into the wild in a healthy bird state; this figure rose to more than 86% in 2000, when the majority (up to 87%) returned to breeding colonies. This has played a significant part in reducing the declining trend of African Penguin: the population is estimated to be 19% larger now than it would have been without rehabilitation efforts. Cleaning oiled birds is a costly operation for the voluntary and non-profit groups involved—the insurance claim for the seabird rescue during the Apollo Sea spill was US$589,000 and that for the Treasure was US$1,459,000, equivalent to c.$100 for each individual successfully released back into the wild. Efforts to rehabilitate seabirds have been even more expensive in other parts of the world. Nevertheless, such sums are relatively tiny for the companies responsible for the pollution.

Exploitation of birds has become unsustainable
Humans have harvested and traded birds since time immemorial: for food, as pets, for cultural purposes and for sport. This use of nature is fundamental to the economies and cultures of many nations. Wild meat is not only a vital source of protein, but also generates valuable income for rural populations. However, expanding markets and increasing demand, combined with improved access and techniques for capture, are causing the exploitation of many species beyond sustainable levels. Over the last few decades, more than one-quarter of the world’s bird species have been recorded in international trade, with millions of individual birds traded each year.

Over-exploitation has already caused extinctions
Humans have already driven formerly numerous species to extinction through over-exploitation. An example is the Great Auk, once widely distributed across the North Atlantic, which was hunted for its feathers, meat, fat and oil, with specimen collecting the final cause of its extinction in about 1852. Another is the Carolina Parakeet, once widespread and very common in America. Bycatch of seabirds by fisheries is a major threat to many large and conspicuous bird species.

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In all, 345 Globally Threatened Birds (GTBs; nearly 30%) are currently threatened by over-exploitation for human use, primarily through hunting for food (262 species) and trapping for the cage-bird trade (117 species). Often these are large and conspicuous species, such as cranes and storks. Some families are particularly affected, with more than 10% of their species threatened by over-exploitation. Large numbers are at risk in some cases, e.g. 52 species of parrots and 44 species each of pigeons and pheasants (see figure). Other families, notably waterfowl, birds of prey and rails, are also heavily hunted, although smaller proportions are affected overall.

Source: Analysis of data held in BirdLife’s World Bird Database.

Nearly all the countries and territories of the world (212, 89%) harbour bird species that are threatened by over-exploitation, but this threat appears to be particularly prevalent in Asia. This region has eight out of the ten countries with the highest numbers of Globally Threatened Birds (GTBs) threatened by exploitation (see figure). Indonesia and China stand out: as well as having the highest numbers of GTBs threatened by over-exploitation (68 and 51 respectively), they also have a higher proportion than expected of all their GTBs, and of their entire avifauna, threatened for this reason.

Source: Analysis of data held in BirdLife’s World Bird Database.

In Indonesia and China, more than 50 GTBs are threatened by over-exploitation

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In the Asian region, over-exploitation is considered a particularly significant threat for 10 Critically Endangered and 25 Endangered bird species. For these particularly sought-after species, over-exploitation is causing rapid declines in both numbers and range. Examples include:

- the rapid decline of Swan Goose Anser cygnoides (Endangered) in the lower Yangtze basin in China, owing to large-scale commercial hunting
- the rapid decline of Maleo Macrocephalon maleo (Endangered) at many of its nesting colonies on Sulawesi (Indonesia), owing to uncontrolled egg harvesting
- the huge range reduction of Philippine Cockatoo Cacatua haematuropygia (Critically Endangered) and Straw-headed Bulbul Pycnonotus zeylanicus (Vulnerable), owing to intensive trapping for the cage-bird trade and compounded by habitat loss (see figure).2

In the case of the cockatoo, trapping is changing the age structure of the remaining population, with fewer and fewer young birds (on the island of Palawan, the stronghold, chicks are taken from every accessible nest). Individual island populations are expected soon to go extinct as a result. For the bulbul, much sought after for its celebrated song, extinction is imminent in Sumatra. Continued imports of illegally captured Malayan birds now feed the high demand in Indonesia, depleting populations in its remaining stronghold.2

**Hunting and the cage-bird trade are major threats**

Currently, nearly 30% of Globally Threatened Birds (GTBs) are threatened by over-exploitation, mainly through hunting for food and trapping for the cage-bird trade. Exploitation particularly affects some bird families, including parrots, pigeons and pheasants (see box 1), and certain countries, notably Indonesia and China (box 2). For some species that are especially highly sought after, over-exploitation is causing huge declines in both numbers and range, and is known to be the most significant threat to them (box 3). For many other species, the total numbers harvested for international and domestic markets, and the effects of this exploitation, are still poorly known.

**Growth of commercial fishing threatens seabirds**

The growth of longline fishing around the world is an increasing threat to many seabird species. This is for two main reasons: areas where fishing is concentrated overlap with foraging hotspots for birds (box 4), and measures that prevent seabird capture (see p. 59, box 4) are not yet widely used. Longline fleets set more than one billion hooks each year, catching and drowning some 300,000 seabirds as they scavenge the bait. Pirate fishing boats operating illegally in the southern oceans kill one-third, with the rest dying in legally licensed fisheries. This incidental bycatch is the single greatest threat to albatrosses. All 21 species are now classed as globally threatened or Near Threatened, largely because of interactions with fisheries (see also p. 11, box 3).

**State of the world’s birds 2004**

In the southern Indian Ocean, there is a critical overlap between commercial longline fishing effort and the foraging areas of Wandering Albatross breeding on the Prince Edward Islands.2

**Pressure**

What birds tell us about problems

In the southern Indian Ocean, there is a critical overlap between commercial longline fishing effort and the foraging areas of Wandering Albatross breeding on the Prince Edward Islands.

Albatross foraging areas = blue, with the darkest shades indicating the most intensively used areas.

Fishing effort areas = red, with the darkest shades indicating the most intensively used areas.
Invasive species are the main cause of recent bird extinctions

Humans have been transporting animals from one part of the world to another for thousands of years, sometimes deliberately (e.g. livestock released by sailors onto islands as a source of food) and sometimes accidentally (e.g. rats escaping from boats). In most cases, such introductions are unsuccessful, but when they do become established as ‘alien invasive species’, the consequences can be catastrophic. Invasives can affect native species by eating them, competing with them, hybridising with them, disrupting or destroying their habitat, or introducing pathogens or parasites that sicken or kill them. Over the last five hundred years, alien invasives have been partly or wholly responsible for the extinction of at least 65 bird species, making this the most common contributory factor in recent losses to the world’s avifauna (see box 1).

Invasive species are a particular threat on islands

Currently, nearly 30% of Globally Threatened Birds (GTBs) are affected by alien invasive species, making this the third most important threat after habitat destruction and over-exploitation (see pp. 30–31). Island species are particularly susceptible because of their isolated evolutionary history, with 67% of oceanic-island GTBs affected by invasive species (box 2). The arrival of new invasives in the near future is a very real threat for almost 50 island species. There is particular concern for bird species in Micronesia. The brown tree snake has already caused severe ecological, economic and health problems on Guam since it was accidentally introduced shortly after World War II (including the local and global extinction of several native bird, bat, and lizard species).

1. Invasive species have been implicated in nearly half of recent bird extinctions

In total, 129 bird species are classified as having gone extinct since 15001,2 (see pp. 12-13). The impacts of alien invasive species, over-exploitation by humans, and habitat destruction and degradation have been the major contributory factors (see figure 1). Invasive species are associated with the extinction of at least 65 species. Preyation by introduced dogs, pigs and mongooses, and habitat destruction by sheep, rabbits and goats, have been implicated in some cases. However, it is predation by introduced rats and cats, and diseases caused by introduced pathogens, that have been the most deadly, contributing to the extinction of some 30, 20 and 10 species respectively.

**Sources**
3. Analysis of data held in BirdLife’s World Bird Database.

**2. Small island species are most at risk from invasives**

In total, 326 Globally Threatened Birds (GTBs, nearly 30% of the total) are currently threatened by alien invasive species1. The problem is especially acute on islands, particularly small ones (67% of GTBs on oceanic islands are threatened by invasives, see figure 2a), where long isolation has led to the evolution of species that often lack adequate defences against introduced species. The majority of species (95%) are affected by introduced predators, but many are subject to multiple impacts from a range of invasives (figure 2b). One such example is Galápagos Petrel Pterodroma phaeopygia (Critically Endangered) which has undergone an extremely rapid decline since the early 1980s owing to a variety of threats, including predation by introduced rats, cats and dogs, and the destruction of breeding habitat by introduced goats and cattle1.

**Sources**
2. Analysis of data held in BirdLife’s World Bird Database.
Globalisation and climate change encourage the spread of invasives

Increases in human mobility and expansion of global trade encourage the spread of alien invasive species. Global climate change creates conditions suitable for new invasives. For example, increased temperatures potentially enable disease-carrying mosquitoes to expand their ranges (see p. 47, box 4). These factors, together with the degradation and fragmentation of natural habitats which make it easier for invasives to establish themselves, mean that invasive species are likely to become an increasing threat.

Invasive diseases are a growing problem

Diseases carried by invasive pathogens and parasites are already implicated in the decline and extinction of many bird species (box 3). Some diseases appear to be spreading to populations previously unaffected, including to species already threatened by other factors (box 4).

Avian diseases are spreading to impact hitherto unaffected populations

Avian diseases can cause chronic population declines, dramatic die-offs or reductions in the reproductive success and survival of individual birds. They can even cause extinctions. Certain avian diseases now appear to be spreading to populations previously unaffected, including to species already threatened by other factors.

Examples include:
1. Avian botulism, a bacterial disease that is arguably the most important disease of migratory birds world-wide, affects millions of birds. A recent outbreak in Taiwan killed more than 7% of the world population of Black-faced Spoonbill Platalea minor (Endangered)1.
2. West Nile Virus, a largely mosquito-borne viral disease (causing both bird and human mortalities), has established itself over much of eastern USA since 1999, and has now spread to Latin America and the Caribbean. American Crow Corvus brachyrhynchos has shown very high levels of mortality from this disease but remains relatively stable across its range. The consequences for the already diminishing White-necked Crow C. leucognaphalus (Vulnerable) from Hispaniola and Cuban Palm Crow C. minutus (Endangered) could be much more severe2,3.
3. Avian cholera and Erysipelothrix rhusiopathiae, two bacterial diseases, have caused considerable declines of Indian Yellow-nosed Albatross Thalassarche carteri (Endangered) on Amsterdam Island (French Southern Territories). The diseases may have spread to nearby colonies of Sooty Albatross Phoebetria fusca (Endangered) and Amsterdam Albatross Diomedea mediuamdamensis (Critically Endangered with a world population of only c.130 birds)4. Avian cholera has also devastated the population of Cape Cormorant Phalacrocorax capensis (Near Threatened) in Western Cape Province, South Africa, killing c.13,000 individuals between May and October 20025.
4. Mycoplasmal conjunctivitis, an infectious disease, has recently caused a significant decline in the introduced population of House Finch Carpodacus mexicanus in eastern North America, and has started to spread to the native population of this species in western North America6.

Sources
Our planet’s climate is changing rapidly
The Earth is undergoing profound changes to its climate. There is now little doubt that this results from human activities, mainly the burning of fossil fuels (see box 1). Climatic changes have occurred throughout Earth’s history.

However, these recent changes are different because they are taking place faster and are unlikely to be reversed by natural processes.

Climate change affects all biodiversity
The effects of climate change on biodiversity are far-reaching and operate at many different levels—from individuals to ecosystems. At the species level, climate change affects particular species in different ways. It may alter their distribution, abundance, behaviour, phenology (the timing of events such as migration or breeding), morphology (size and shape) and genetic composition. Many such effects have already been documented in a wide range of species (box 2). Birds provide some of the clearest examples, in both single species and multi-species studies (box 3).

1. The world’s climate has changed significantly over recent decades, and much larger changes are predicted in the coming decades

There is now convincing evidence that our planet’s climate has changed significantly over recent decades. Over the twentieth century the global mean surface temperature increased by 0.4–0.8°C and sea-levels rose 1–2 mm annually. The largest temperature increases occurred across the mid- and high-latitudes of northern continents, where precipitation increased by 5–10%. Snow cover has decreased by 10% in the northern hemisphere since the late 1960s.

Since the start of the industrial era, the atmospheric concentrations of greenhouse gases such as carbon dioxide and methane have increased due to human activities. For example, carbon dioxide concentrations have increased 31% since 1750, largely due to combustion of fossil fuels and deforestation. Most of the observed warming over the last 50 years, with associated precipitation changes and sea level rises, is likely to have been caused by the increase in greenhouse gas concentrations

As a consequence of continuing human-induced changes to greenhouse gas concentrations, the planet’s mean surface temperature is projected to rise by between 1.4 and 5.8°C by the end of the twenty-first century, with land areas warming more than the oceans, and high latitudes warming more than the tropics. Such rates are unprecedented during at least the last 10,000 years. The intensity and frequency of extreme climatic events are likely to increase. While annual precipitation is projected to increase overall (as a global average), particular regions will see increases or decreases of typically 5–20%. Broadly, precipitation is projected to increase at high-latitude and in equatorial areas and decrease in the subtropics. Sea levels are projected to rise 9–88 cm over the same period.


2. There is good evidence that climate change is already impacting a wide spectrum of taxa

Many individual studies have examined the evidence for recent biological changes in relation to measured climatic changes. These have mostly concentrated on a limited set of taxa, or been restricted to particular countries or regions. However, two recent meta-analyses combine a broad spectrum of results to test whether a coherent pattern exists across regions and for a diverse array of species. One analysis examined the results of 143 studies on a wide spectrum of species, totaling 1,073 organisms from all regions of the world. Of the 587 species showing significant temperature-related changes (in distribution, abundance, phenology, morphology or genetic frequencies), 82% had shifted in the direction expected from climate change (e.g. distributions moving towards higher latitudes or altitudes). The timing of spring events, such as egg-laying by birds, spawning by amphibians and flowering by plants, was shown (by 61 studies) to have shifted earlier by 5.1 days per decade on average over the last half-century, with changes being most pronounced at higher latitudes. The second analysis reviewed studies of over 1,700 species, and found similar results: 87% of phenology shifts and 81% of range shifts were in the direction expected from climate change (see figure).

These studies give us a very high confidence that global climate change is already impacting biodiversity.

Climate change makes other threats worse

Climate change may affect species directly, for example through changes in temperature and rainfall. Often, however, the indirect effects are even more important. There may be increased pressure from competitors, predators, parasites, diseases and disturbances (such as fires or storms). Climate change will often act in combination with major threats such as habitat loss and alien invasive species, making their impacts considerably worse (box 4).

3 Climate change is already affecting birds in diverse ways

There are many examples of the effects of climate change on birds from around the world, which taken together, provide compelling evidence that climate change is already affecting birds in diverse ways. It is these proximate responses that drive the ultimate impacts of climate change on species—the significant changes to ranges that will be catastrophic for many species (see pp. 48–49). Examples of responses include:

**Distribution and density**

- In Costa Rica, lowland and foothill species such as Keel-billed Toucan Ramphastos sulfuratus have extended their ranges up mountain slopes to at least 1,540 m in response to elevated cloud-base levels between 1979 and 1998.
- In the UK, breeding birds extended their ranges north by 19 km on average between 1968 and 1988, in association with increasing temperatures.
- In the USA, the number of Sooty Shearwater Puffinus griseus found off the west coast during the non-breeding season declined by 90% between 1987 and 1994. The decline was attributed to changes in ocean surface temperatures and ocean currents, associated with climate change. It appears unlikely that the birds simply moved to new feeding grounds, because the declines have occurred over huge areas.
- In Germany, the proportion of long-distance migrants decreased and the number and proportion of short-distance migrants and residents increased between 1980 and 1992. This may be because increased winter temperatures benefit residents and increase the competitive pressure they impose on long-distance migrants.

**Behaviour and phenology**

- In the UK between 1971 and 1995, 63% of 65 breeding bird species tended to nest earlier—by nine days on average for those showing significant trends.
- In Europe, the migration of birds that winter south of the Sahara has advanced by an average of 2.5 days in the last 40 years, possibly so that they can cross the Sahel before the seasonal dry period. By contrast, migrants wintering north of the Sahara have delayed autumn passage by 3.4 days on average over the same period.
- In New York and Massachusetts, USA, migrants arrived significantly earlier during the period 1951–1993 than 1903–1950. From 1951 to 1993, birds that winter in southern USA arrived on average 13 days earlier, while birds wintering in South America arrived four days earlier.

- In the UK, increasing spring temperatures over the past decades have led to changes in vegetation phenology. The food supply for Great Tit Parus major chicks now peaks earlier. However, egg-laying by the tits has not advanced, presumably because the cues to which tits respond during reproductive decision-making have not shifted in synchrony with changes in vegetation phenology. Hence, there is now a mismatch between food supply and timing of breeding.
- In Finland, breeding Pied Flycatcher Ficedula hypoleuca laid progressively larger eggs through the period 1975–1993, correlating with rises in mean spring temperatures. Since larger eggs enjoy improved hatching success, global warming may allow females to alter their reproductive strategy and invest more resources in reproduction.


4 In Hawaii, climate change will increase the impact of disease

Endemic birds in the Hawaiian Islands have been severely impacted by avian pox and malaria, transmitted by introduced mosquitoes. These are restricted to the lowlands, so cooler high-elevation forests remain the last refuge for 18 Globally Threatened Birds (GTBs), mainly honeycreepers (Drepanididae) (see p. 45, box 3).

In the Pacific islands, as elsewhere, climate change is predicted to lead to the lifting of the cloud-base, and consequent upward shifts of montane cloudforests. Thus, in Hawaii, as temperatures rise, the altitudinal zone of malaria risk will also shift upwards. In some areas, the coolest (and hence safest) cloudforest zone is constrained in its upward shift, because the higher elevations have been cleared for pasture.

The effects of climate change on the extent of forests with high to low malaria risks have been modelled for three specific areas (representative of the most intact forest and highest abundance of native species) on the islands of Hawaii, Maui and Kauai (see figure). The results show increases in the areas of high malaria risk, and reductions or disappearances of areas with low risk. For example, a temperature increase of 2°C will almost eliminate low malaria-risk forest in the Hakalau Wildlife Refuge on Hawaii (an important area for five GTBs). Current forestation of pasture land above the refuge is crucial to improving the chances of survival of the endemic species.

Many species will suffer from range shifts and losses
Modelling studies show that the ranges occupied by many species will become unsuitable for them as climate changes. The climate space that is suitable for particular species may shift (in latitude or altitude; see box 1), contract (boxes 2 and 3), or even disappear (box 4). Species whose climate space both contracts and shifts substantially will be of particular concern (box 5).

1 In Mexico, climate change may lead to habitat becoming unsuitable in large parts of the range of Worthen’s Sparrow

Worthen’s Sparrow Spizella wortheni is currently listed as Endangered because it has an extremely small and declining range and population in north-east Mexico, threatened by continued degradation of its open shrub-grassland habitat by agriculture and grazing. Climate change modelling shows that much of the remaining habitat may become unsuitable in just 50 years. This was determined by modelling the relationship between known localities1,2 (see figure a) and various climatic variables to generate a predicted potential distribution3 (figure b). This was then combined with global climate change models to generate a predicted potential distribution in 20554,5 (figure c). The modelled distributions for present and future were brought together to determine areas that are suitable now and likely to remain so (figure d). Many of the sites from which the species is currently known are predicted to become unsuitable in future due to climate change. Assuming that Worthen’s Sparrow has minimal dispersal ability, this analysis points to the populations at the south-western edge of the species’ distribution as the most vulnerable in the long-term.

(a) Historic distribution of Worthen’s Sparrow based on specimen localities
(b) Current potential distribution of the species based on modelling of its ‘ecological niche’
(c) Potential distribution in 2055, based on modelled current distribution and global climate change models
(d) Potential present and future distribution of the species

Darker shades of red indicate greater probability of an area being suitable.

Darker shades of green represent areas that are both presently suitable and likely to remain suitable under climate change predictions for 2055.

Sources

Acknowledgements
Data and figures kindly provided by A. Townsend Peterson (University of Kansas Natural History Museum and Biodiversity Research Center, USA), Adolfo G. Navarro-Sigüenza (Universidad Nacional Autónoma de México), and Enrique Martínez-Meyer (Universidad Nacional Autónoma de México).

2 In the Arctic tundra, climate change will cause dramatic losses in waterbird breeding habitat

The Arctic region showed the most pronounced warming of any part of the globe in the last century. This trend is set to continue, with warming of up to 5°C in the next 50–80 years predicted by some models1. Considerable changes in vegetation cover are predicted by all models: boreal forests are likely to spread northwards, perhaps at a rate of 0.2–2 km/year2. As there are few areas where tundra is expected to expand, there will be a consequent net loss of 45–71% of the area of tundra if CO2 levels double, a scenario that is predicted to occur by 2070–20993.

The Arctic tundra is the main breeding habitat for many migratory waterbird species, comprising 23–27 million individual geese and waders4. Many species will be severely impacted by the loss of tundra habitat. A study of 23 Arctic waterbirds showed that, on average, they may lose 35–51% of their breeding range5. For example, Dunlin Calidris alpina could lose up to 58% of its breeding habitat in this time-frame (see figure), Red-breasted Goose Branta ruficollis (already classified as Vulnerable) may lose up to 85% and Spoon-billed Sandpiper Euryornynchus pygmeus (Endangered) could lose up to 57%6,7. Such results show how climate change may impact species that are distributed at the polar edges of continents, and which may therefore have limited opportunities for dispersing to new areas of suitable habitat.

Dunlin is predicted to suffer extensive loss of its tundra breeding habitat

Sources

Acknowledgements
Figure kindly provided by Christoph Zöckler (United Nations Environment Programme: World Conservation Monitoring Centre, UK).
Climate change will result in many extinctions

Studies suggest that many species will not be able to keep up with their changing climate space. As species move at different rates, the community structure of ecosystems will also become disrupted. Both local and global extinctions are likely, even of species currently considered safe.

One recent global study estimated that 15–37% of species could be committed to extinction by 2050 as a consequence of climate change. The most susceptible species will be those with restricted ranges, bounded distributions (on the edges of continents, mountain-tops or small islands), specialised habitat requirements, poor dispersal abilities or small populations. While bird species differ greatly in dispersal abilities, most are relatively mobile compared to other organisms—which will be impacted even more severely.

The extent of warming will be critical

The size of the extinction crisis caused by climate change will be directly related to the degree of global warming (box 4). A global average temperature rise of 2°C in the next century will lead to numerous extinctions, but leave open some practical management options for the conservation of biodiversity. Temperature rises beyond this level are predicted to lead to catastrophic extinction rates, with few management options and a bleak future for both biodiversity and people.

In southern Africa, the range of Cape Longclaw is predicted to retreat to upland areas

Cape Longclaw (Macronyx capensis) is endemic to southern Africa, occurring in a variety of grassland habitats from the coast to highlands. Over much of its range it is a fairly common breeding resident. To assess the potential effect of climate change on its distribution, a ‘climate envelope’ was modelled using the current known distribution of the species and a number of climatic variables. These included a measure of moisture availability and of summer and winter temperature. The resultant model was then applied to a future climate scenario to indicate the future distribution of suitable climate. This shows that towards the end of the twenty-first century the range is predicted to retreat south and contract considerably. Cape Longclaw will become extinct in Botswana and will be largely confined to regions of higher ground in South Africa (see figure). Any management necessary to safeguard the species should be concentrated in those upland areas predicted to remain suitable.


The number of montane endemic birds that go extinct in Australia will depend on the degree of warming from climate change

The montane tropical rainforests of north-eastern Australia support 13 endemic bird species. Under global climate change, these forests are expected to shrink considerably. An increase of just 1°C (considered inevitable within the next few decades) will reduce the mean range of endemic birds by over 30%, as suitable climate space retreats to higher altitudes up mountain sides. The reduction will be as much as 96% if temperatures rise 3.5°C. Assuming that the complete loss of a species’ suitable range results in its extinction (because there will be no areas of new suitable habitat to disperse to), the number of extinctions will increase dramatically if temperatures rise by more than 2°C, and almost all species will go extinct if temperatures rise by 5.8°C (the upper end of the predicted range of temperature increases; see figure). These results are mirrored for other endemic vertebrates, and dramatically illustrate the need for action to ensure that temperature rises do not exceed c.2°C. If they do, the results for biodiversity will be catastrophic.


In Europe, species with ranges that both contract and shift are likely to be most at risk

For ten landbirds endemic to Europe, the potential impact of climate change was assessed by modelling their recent (1980s) geographical distribution in terms of three climatic variables. This model was used to simulate their recent ranges, usually with good agreement between the observed and simulated ranges. The model was then used to map the area in which the climate is likely to be suitable for the species in the late twenty-first century under a future climate scenario. The graph shows how well the projected and current modelled ranges match up in overlap (y axis) and extent (x axis). For six species, the area where climate is suitable will decrease (x axis values less than 100). Even where this does not occur, the climate space associated with the species may shift so much that there is little overlap between future and current modelled ranges. For eight species, less than 20% overlap is predicted and for three species there is no predicted overlap at all. Species with low values on either axis might be at risk, but those with low values on both axes—those marked in red on the graph—may be of particular conservation concern.

Immediate threats to biodiversity have much deeper causes

The immediate threats to birds and other biodiversity are ultimately caused by societal problems—including growth in human population and material consumption, widespread poverty, inequitable access to resources and an unfair global trade regime.

Immediate threats to biodiversity are humanity’s most serious problems

The immediate threats to birds and biodiversity are growing in both scale and scope. The underlying causes are a complex tangle, rooted both in our expanding demands on the planet (see p. 5, box 2) and the unfair ways that we share our resources. Rising individual consumption and material expectations, especially in rich nations, are driving agricultural intensification, habitat destruction and over-exploitation elsewhere. Although developing countries have a special responsibility for global biodiversity conservation (see box 1), imbalances in global trade arrangements and technology access make conservation challenging for them, as do a range of severe social pressures including widespread poverty. Areas that have rich and irreplaceable biodiversity often support the densest human populations (box 2), increasing the immediate pressures.

1. More species are threatened in the developing world than in the developed world

Developing countries (as defined by FAO) host the great majority of the world’s Globally Threatened Birds and those evaluated as Near Threatened (see figure). The proportion of species that are confined to the developing world is much greater for this group of species (82% and 88%) than for Extinct species (59%), suggesting that threats to birds in the developing world are increasing with time relative to the developed world. It may be that species in the developed world have already passed through an ‘extinction filter’: in other words, the most susceptible species have already been driven to extinction, leaving only the more resilient ones.


ACKNOWLEDGEMENTS Figure and text kindly provided by Tim Schaefermann and Rhys Green (Royal Society for the Protection of Birds and Conservation Biology Group, University of Cambridge, UK) and Andrew Balmford (University of Cambridge, UK).

The numbers of bird species in each IUCN Red List category that are confined to the developing and developed worlds (based on breeding distributions)

2. People and biodiversity are often concentrated in the same areas

Demographic pressures—such as high densities or growth rates of human population, and increasing flows of migrants and refugees—are one of the main drivers of the extinction crisis. There is increasing evidence that areas of dense human settlement or impact coincide with areas of unique and irreplaceable biodiversity. In sub-Saharan Africa, human population density is positively correlated with species richness of terrestrial vertebrates, at least at the scale of a 1° grid. This association holds for such different groups as widespread species, narrowly endemic species and globally threatened species, and looks set to persist in the face of foreseeable population growth. Many 1° grid cells with dense human populations also contain species found nowhere else, highlighting the potential for policy conflict between human development and biodiversity conservation. Similar relationships between the distributions of people and biodiversity have been found for Australia\(^1\), North America\(^2\), Europe\(^3\) and, at a smaller scale, the tropical Andes (see figure).\(^4\)

Economic pressures erode the capacity for biodiversity conservation

For many developing countries struggling with economic crises, short-term measures for rapid economic recovery are more expedient than long-term solutions. If structural adjustment programmes are imposed as a condition of international financial assistance, government budgets are usually reduced and this has often decreased the ability to enforce environmental laws. Despite developed-world protectionism and subsidies, many developing countries have also had to liberalise and deregulate their markets, increase the production of agricultural commodities for export, and allow increased foreign investment and control of natural resources. All of these trends have encouraged the rapid liquidation of natural capital and have eroded the legislative basis, political will, managerial capacity and financial resources for biodiversity conservation.

Poverty and inequality undermine biodiversity conservation

Poverty is a major driver of biodiversity loss. Poor people often depend directly on natural resources, but are forced for survival to use them unsustainably. They may have little voice in decision-making, and are all too often displaced or dispossessed by skewed power structures, political instability or armed conflicts. Under such circumstances, they have no choice but to use what marginal resources remain, even if weakly claimed by others—including areas ‘protected’ for biodiversity conservation. Migrant people are rarely able to adopt the local land-use practices that have been finely tuned over generations. They often also bring new technologies and improved access to markets, leading to further resource degradation, biodiversity loss and social conflict.

Solutions are often short term and unsustainable

National governments are faced with the challenge of addressing the poverty and inequality that continue to afflict millions of people world-wide. The usual strategy is to encourage centralisation, urbanisation and the development of infrastructure. Such responses can be effective, but at a long-term cost to society if poorly planned (box 3). Unless an ethic that values and conserves biodiversity and the environment is better integrated into current approaches to human development, they will continue to bear significant responsibility for the global biodiversity crisis.

3 When planning for development does not integrate environmental issues, biodiversity suffers

Ten central and eastern European countries are to join the European Union (EU) between 2004 and 2007, with all the benefits and obligations that membership entails. One obligation is to conserve the most important sites for birds and other biodiversity within a network of protected areas, called Natura 2000. These 10 ‘accession’ countries are also required to increase the capacity of their transport infrastructure network—roads, railways and waterways—to help achieve ‘universal mobility and accessibility’.

Although not official policy, the EU’s Transport Infrastructure Needs Assessment (TINA) guides both national transport policy developments and transport investments in the accession countries by the EU, international financial institutions and private investors. BirdLife’s investigations into the TINA proposals have revealed that 85 Important Bird Areas (IBAs)—21% of IBAs in the accession countries—could be affected by new transport developments (see figure). New or upgraded roads potentially threaten 52 IBAs, and developing waterways—supposedly a more environmentally sustainable mode of transport—could negatively impact as many as 34 IBAs.

IBAs meet the criteria for sites requiring protection under the Natura 2000 network, and these findings highlight a potentially major conflict between EU environmental legislation and EU funding for transport infrastructure development. Ongoing TINA-guided development is already threatening the ecological integrity of several IBAs—e.g. in the Czech Republic, eastern Hungary and southern Bulgaria. Full-scale implementation of TINA proposals, combined with weak implementation of Natura 2000, could irreversibly damage many sites that are important for birds and other biodiversity.

Biodiversity provides for our needs
The Earth’s living and non-living natural resources provide us with the raw materials and processes that provide our food and shelter and that recycle our wastes. Nature’s huge bounty and powers of regeneration have encouraged us to take the benefits of our environment for granted, as if they were something infinite and eternal, too large to measure or monitor. Developed and developing countries alike continue to rely heavily on the consumption and transformation of natural resources to improve the lot of their citizens in the short term.

Our needs are beginning to threaten biodiversity
Now, with the world’s human population exceeding six billion and still growing rapidly, our own actions and their consequences are beginning to rival in magnitude the dominant processes of nature. Across the world, our ever-increasing consumption and transformation of natural resources are irreversibly reducing the diversity of genes and species on Earth, so altering ecosystem processes and patterns. Our waste products are accumulating faster than the planet can absorb them and this is setting in motion massive changes in our physical environment—climate change—even as we erode biodiversity, upon which we are ultimately dependent for our continuing existence.

We don’t recognise biodiversity’s immense value to humanity
So why do we ignore or undervalue biodiversity and the benefits that it provides, when we know that this attitude undermines our prospects and those of future generations? The answer is economically complex, but ultimately quite simple. It seems that we cannot calculate exact values for things that are neither bought nor sold, or whose benefits lie in the future. Indeed, a first attempt at valuing global biodiversity in monetary terms was only attempted very recently. The estimate—US$33 trillion per year—is of the same magnitude as the annual global gross national product (see box 1).

1 How much do we value wild nature?

Biodiversity, in the sense of ecosystems and their interaction with the non-living world, provides numerous services to humanity, such as climate regulation, soil fertility, crop pollination and water purification. These processes nevertheless remain outside the calculations of conventional market-based economics that have guided models of human development up to now. Widespread degradation of ecosystems in recent decades has prompted concern among conservation scientists that enormously valuable assets to humanity are being lost in the pursuit of short-term private wealth, partly through such ecosystem services being undervalued or ignored. Hence a recent attempt to calculate the total annual value of nature’s services in gross monetary terms, which extrapolated from an assessment of 17 ecosystems spread over 16 biomes, to make a best estimate of $33 trillion (in year-1997 US$).

Although ‘nature’ is increasingly appreciated, ecosystem services are not yet widely valued in many societies, especially in highly urbanised regions and in industrialised nations where people are no longer directly subsistent upon their local ecosystem. For example, a survey that monitors citizens’ environmental awareness in the USA has found that environmental ‘illiteracy’ remains widespread amongst the general public, despite good progress over the last 30 years in addressing national environmental problems at the levels of government, corporations and municipalities. People are not yet widely aware that the sum of their actions as individual consumers is often a leading cause of ecosystem degradation, through driving such processes as climate change and biodiversity loss. Improving knowledge of, and access to, information on ecosystem services at the grassroots level is a clear priority if policies are to change and the world is to shift towards more sustainable forms of development.

2 In current global markets, oil-palm plantations are valued more highly than ancient rainforest

Sumatra is Indonesia’s largest island and one of the richest and most spectacular biodiversity hotspots on Earth. Yet Sumatra’s lowland rainforests are being converted to oil-palm plantations on a massive scale. As a result, over 75% of Sumatra’s 102 lowland forest-dependent bird species are now considered to be threatened or Near Threatened with global extinction1. Twenty-seven of Sumatra’s 34 Important Bird Areas (IBAs) contain major tracts of lowland rainforest, but more than 60% of this estate remains totally unprotected2.

Over 40,000 km² of Sumatran rainforest have been clear-cut during the past 20 years, with the lumber feeding the wood-pulp industry and the deforested land being turned over to the plantation industry, primarily for oil palm3. Local communities have been displaced and social conflict has resulted4. The World Bank has warned that Sumatra’s remaining lowland rainforests will be gone by 2005 if current deforestation rates continue5.

Palm oil is Indonesia’s most lucrative agricultural commodity, and global demand continues to increase6. Multinational corporations are major buyers, and use palm oil to make such everyday products as margarine, ice-cream, biscuits, crisps, chocolates, cooking oil, soaps, lipsticks, hand-creams and sun-creams7.

There remains no effective mechanism for realising the global value of biodiversity in these irreplaceable forests. A national governmental focus on short-term economic benefits has been allowed to drive widespread rainforest logging and conversion in Indonesia8–9. Concern for the ecological and social impact of the palm-oil industry has been very slow to develop among the international financial institutions that have helped to fund the industry’s growth world-wide, and among the multinational corporations that are the major buyers and consumers of palm oil as a raw commodity9.

3 The perverse economics of habitat conversion

On average, c.50% of the total economic value of a relatively intact natural habitat is lost following its drastic conversion to more intense human use, after currently unmarketed benefits are taken into account10.

In four out of the five case-studies, habitat conversion made economic sense to the converters, in terms of the short-term private benefits accruing to them—especially when subsidies were taken into account11. However, even when some of the private benefits are accrued by the local population (which is often not the case), they frequently fail to filter down to subsistence users (the poorest segment of society), thereby increasing poverty and inequality12.

In all five cases, however, once the wider, unmarketed costs to society had been accounted for, in terms of the loss of ecosystem services, the public costs of habitat conversion were found to outweigh the private benefits by c.50% on average (see figure)13. Habitat conversion does not make sense from the perspective of global sustainability14. Indeed, the economic benefits of conserving the world’s remaining natural habitats appear to exceed the costs by at least 10 to 11.

Such case-studies highlight some of the reasons why drastic conversion and degradation of the Earth’s remaining natural habitats have continued largely unabated since the Earth Summit in 1992, and why many countries are not on track to meet the United Nations’ goals for human development and poverty eradication by 201515.


ACKNOWLEDGEMENT Figure kindly provided by Andrew Balmford, Conservation Biology Group, University of Cambridge, UK.

Unsustainable development results from our under-valuation of biodiversity

There is still a widespread lack of recognition, whether political, corporate or individual, of the high value of wild nature in the longer term. Government policies, markets and societal institutions often make matters worse, by subsidising and funding activities, such as intensive farming or wide-scale deforestation, that create private wealth in the short term, but accelerate the loss of natural systems (box 2).

In the long term, it makes sense to conserve remaining biodiversity

We do not manage our national economies so as to protect the wild nature that we instinctively value, and that is essential for generating economic wealth far into the future. Indeed, we often waste money by destroying natural ecosystems for short-term profits. This makes no sense, not just from a moral point of view, but from a conventional (far-sighted) economic perspective (box 3).
Effective conservation requires much larger and better-targeted investment

Despite growing awareness of biodiversity’s value, global investment in conservation does not come close to what is needed. Because resources are still so scarce, immediate action must focus on priorities.

Public and political understanding of biodiversity issues is increasing

The last two decades have seen real, though still inadequate, advances in public and political understanding of biodiversity and its importance. The landmark conventions agreed in 1992 (see p. 66) were reinforced at the 2002 World Summit in Johannesburg. Many nations have implemented national action. In developed countries, an ever more urbanised population is, paradoxically, more and more interested in nature—a trend supported by accessible materials across a wide range of media. Our data on the status of, and threats to, biodiversity are also getting better by the year.

We must invest more in biodiversity conservation, especially in developing countries

There are three main problems affecting resources for conservation world-wide. Not enough money is being spent, finance is not sustained, and it is often applied in the wrong way and in the wrong places.

Biodiversity is concentrated in the tropics but economic wealth is not. To conserve globally important biodiversity, many international conservation NGOs invest in tropical countries, as does the Global Environment Facility (GEF), the funding mechanism for the Convention on Biological Diversity. How far do these sources make up any shortfall from cash-strapped developing-country governments? The figure below shows a relative measure of national investment in conservation, adding up: (a) estimates of the national protected areas budget1–2, (b) average annual GEF ‘biodiversity’ investment since 1990; and (c) country-specific investments by the eight largest international conservation NGOs in the year 2002 (all adjusted to 1995 US$). Despite the efforts of the GEF and the NGOs, average national conservation investment (scaled by the number of bird species in the country, a simple index of biodiversity) is over 20 times lower in developing countries (as defined by the FAO) than in developed nations. This inequality is even more acute when scaled by the number of Globally Threatened Birds (GTBs), with almost US$15.5 million scaled investment each year in developed countries, compared to c.US$0.5 million in developing countries (see also p. 50, box 1). Correcting this global imbalance requires much greater investment in tropical conservation by developed countries, which benefit from the global goods and services that tropical biodiversity provides.

1 We can easily afford global biodiversity conservation if we want to

Nevertheless, our global expenditure on conservation remains pitifully short of what is required. Biodiversity conservation is an excellent investment, but one that we are still not making. The world’s existing protected areas have an annual budgetary shortfall of around US$2.5 billion. Expanding the network to safeguard biodiversity adequately would cost another US$21.5 billion per year. Current global funding is only US$7 billion per year, of which less than US$1 billion is spent in the developing world, which holds most of the world’s biodiversity (see box 1). These amounts seem huge, but they are entirely manageable if we re-focus our priorities. They represent a tiny proportion of the global economy and only a small fraction of the $1–2 trillion spent on ‘ perverse’ subsidies that both damage the environment and encourage economic inefficiency. We can safeguard the bulk of global biodiversity for much less than is spent on soft drinks in the USA each year.

SOURCES


ACKNOWLEDGEMENTS: Data kindly provided by Jerry Hamilton (United Nations Environment Programme: World Conservation Monitoring Centre, UK) and Andrew Balmford (Conservation Biology Group, University of Cambridge, UK).

Relative annual conservation investment (scaled by the number of bird species in the country) is over 20 times lower in developing countries, which hold the bulk of global biodiversity, than in developed countries.
2 Different broad-scale conservation priorities overlap extensively

Responding to the need to focus effort and investment, many conservation organisations have carried out priority-setting exercises. However, these differ extensively in their targets, scale (both ‘grain’, i.e. size of the unit of analysis, and extent), and whether they tackle questions of where or how to do conservation. Given these disparities, argument about the ‘right’ way to set priorities is not surprising. Different approaches are often trying to achieve different things, or are nested within one another in terms of scale. When approaches of similar grain, extent and purpose are compared, there are often reassuring levels of agreement.

Well-established, large-grain, global priority analyses that ask ‘where’ conservation should be done include Endemic Bird Areas (EBAs) (BirdLife International)\(^2\), Terrestrial Biodiversity Hotspots (Conservation International)\(^3\) and the Global 200 Ecoregions (WWF)\(^6\). EBAs (numbering 218) are areas where two or more bird species with ranges of less than 50,000 km\(^2\) co-occur (see pp. 22–23). Hotspots (25) are biogeographic regions with high levels of plant endemism (at least 1,500 endemic plants, corresponding to 0.5% of the global vascular plant flora) and where less than 30% of the original natural habitat remains. Global 200 Ecoregions (200) are considered the most biologically valuable ecoregions, containing outstanding examples of each of the world’s habitat types.

These priority areas have been identified using different approaches and criteria, including different taxonomic coverage at different scales, yet they show considerable geographic overlap and similarity (see figure). For example, EBAs, Terrestrial Biodiversity Hotspots and Global 200 Ecoregions all encompass the Atlantic Forest of Brazil, the Philippines, large parts of Madagascar and the tropical Andes. These priority-setting frameworks are valuable for focusing global-scale attention and funding on the world’s most important places for biodiversity conservation.


3 Birds are valuable indicators of global patterns in biodiversity

Endemic Bird Areas (EBAs) successfully capture c.85–90% of the total species diversity of mammals, snakes, amphibians and plants in mainland sub-Saharan Africa (see figure)\(^1\)\(^,\)\(^2\). In addition, EBAs include no less than 96% of the avian species diversity in this region\(^1\). This is achieved through 22 EBAs covering just 7.9% of the land area. EBAs are clearly excellent indicators of vertebrate and plant diversity patterns in sub-Saharan Africa, due to the common ecological principles and evolutionary histories on which species distributions are based. This congruence of species diversity across widely differing taxonomic groups is likely to be similar in other parts of the world for which data are not yet available. This is good news, meaning that we can use the EBA network to set priorities for biodiversity conservation in general. In other words, conserving habitats based on bird diversity will effectively capture an approximately equivalent complement of total terrestrial species diversity. This pattern is very useful because data on bird distribution and endemism are often better than those for any other taxa (see pp. 6–7).

In sub-Saharan Africa, the great majority of vertebrate and plant diversity is captured by the network of 22 EBAs identified in this region\(^1\).


Priorities must be set to target scarce resources

Global investment in biodiversity conservation must be massively scaled up. Until that happens, it is essential to set priorities for where limited resources should be invested. Since BirdLife identified Endemic Bird Areas in 1992, many other conservation organisations have set large-scale geographical priorities. These overlap extensively, pointing a way forward to agreeing a common set of priorities (box 2). Biogeographic patterns mean that we can use birds, usually the best-known group, as an initial basis for planning, being confident that the great bulk of other biodiversity will be captured too, both at a large scale (box 3) and at site level (see pp. 28–29).
Many species still need more research
In 2000, an analysis was published that identified nearly 5,500 key actions to help save the world’s Globally Threatened Birds (GTBs). Many actions focused on research because threatened species are, by their very nature, often rare and poorly known. Thus, conducting baseline surveys to map distributions and estimate population sizes was a key action for over 900 GTBs (more than 70% of the total). Good data are essential to identify the highest priority species, but also to understand the reasons for their declines so that effective conservation action can be taken.

Actions at sites will help protect most species
The identification, protection and management of sites is a key action for nearly 750 GTBs (more than 60% of the total). Selection of sites that regularly hold significant populations of GTBs, through BirdLife’s Important Bird Area (IBA) programme, is already making a major contribution to addressing this need (see pp. 24–25). Recognition of IBAs is leading to improved safeguards for these sites, through a range of conservation approaches (see pp. 60–63).

Some species need extra attention
Beyond site conservation, some actions address factors that directly impact particular GTBs, such as control of hunting and trade or eradication of alien invasive species. For a smaller set of GTBs, including more than 40 Critically Endangered species, actions relate to the need for intensive management, such as recovery plans, captive breeding and re-introductions. Countries whose avifaunas have suffered heavily from widespread habitat loss and invasives require intensive management of their remaining species. For example, 47% of GTBs in the USA (almost entirely in Hawaii) and 44% in New Zealand require such management.

Many actions are underway but there are still gaps
The actions proposed for GTBs in 2000 provide a baseline against which conservation responses can be measured—the first time that such a global analysis has been possible for a complete class of animals. So far, some key actions are underway, but there are still crucial gaps, and research must be followed up by more direct interventions.

1. Are we doing enough to save the world’s birds?
Since 5,500 key actions were proposed for 1,186 Globally Threatened Birds (GTBs) in 2000, an impressive 67% of GTBs have had at least some of these actions implemented. This was determined from a review by a world-wide network of over 100 species experts (see figure a). However, the full set of proposed actions has been undertaken for only 5% of GTBs.

Furthermore, for at least 17% of GTBs no conservation action has been carried out—and this proportion may be as high as 33%, because many of the species where the action was classed as ‘unknown’ implementation probably had none. For the 182 species considered Critically Endangered in 2000, the proportions are similar: 73% have had partial or complete implementation of actions, while 15–27% have had no action undertaken. The latter group needs immediate intervention: these are species on the brink of extinction. Some simply remain too poorly known, some sadly may already be extinct, and others occur in places too currently insecure for conservation work.

However, for the rest, such as Junin Grebe Podiceps taczanowskii in Peru and Black-chinned Monarch Monarcha joanensis in Indonesia, urgent attention can and should be given.

The survey showed that actions for GTBs were implemented by a wide range of governmental and non-governmental organisations. The BirdLife International Partnership contributed to actions for 42% of GTBs (and 41% of Critically Endangered GTBs), with significant contributions for 17% (and 21% of Critically Endangered GTBs; figure b).

SOURCE: Analysis of data held in BirdLife’s World Bird Database. ACKNOWLEDGMENTS Information kindly provided by 100+ species experts.
have been started for 67% of GTBs, but for only 5% have all key actions been implemented (see box 1). For only 24% of GTBs has this led to any improvements in their status (box 2). There are still many crucial gaps, not least the 28 Critically Endangered bird species for which no actions are currently in place. For widespread species, actions are needed across entire ranges in order to improve their global status (box 3). For many species, research actions are being tackled, but direct interventions are still needed (box 4). In the longer term, these conservation efforts will only be successful and sustainable if they are integrated with (and influence) global and regional agreements, national legislation and sectoral policies such as those on agriculture, fisheries, forestry and energy.

2 Are our actions having any effect?

Although 67% of Globally Threatened Birds (GTBs) have had at least some action implemented since 2000 (box 1), not all these actions have yet benefited the species directly. For only 24% of GTBs has this been the case, by mitigating threats or through inferred effects on population size, trends, or productivity (although not necessarily yet resulting in a change in IUCN Red List Category). For only 4% of species is the benefit judged to be ‘significant’. For 26% of GTBs, the action has had no direct benefit yet, and for the remaining 17% of GTBs where one or more actions have been implemented, the effects are unknown (see figure). Actions that have not directly benefited species have not necessarily been ineffective, because many involve essential research on, for example, distribution, population size or cause of declines. Research may not immediately benefit the species, but it paves the way for effective conservation management (box 4). The challenge is now to follow up our improved knowledge with urgent implementation of direct interventions to reduce declines or increase populations.

SOURCE Analysis of data held in BirdLife’s World Bird Database. ACKNOWLEDGEMENTS Information kindly provided by 100+ species experts.

3 In Europe, many essential nationally based actions have been undertaken but many more need to be addressed

In 1993, BirdLife International was asked by the European Commission to develop Species Action Plans (SAPs) for the 23 Globally Threatened Birds (GTBs) occurring in Europe. These documents were produced following an extensive consultation process involving many experts, and were approved and endorsed by several inter-governmental committees and organisations, including the Berne and Bonn Conventions. In 1996, the SAPs were published as a book and on the internet1. All the species covered were (and still are) considered a priority for funding under the LIFE-Nature programme which provides co-finance for nature conservation projects in the European Union (c.$300 million during the period 2000–2004).

In 2001, a review of progress in implementing these SAPs showed that, five years after their publication, over 500 nationally based actions had been nearly or fully completed2. This is an encouraging example of how an NGO–government collaboration can stimulate conservation action for threatened species. However, overall, only c.5% of the 4,000 high priority or essential actions were underway, despite broad acceptance of the SAPs, stakeholder involvement and the potential for funding (see figure). Given that the majority of GTBs in Europe occur in several countries, actions must be undertaken across their entire ranges if their overall status is to improve significantly. Most of the actions still to be implemented relate to the integration of the species’ requirements into sectoral policies such as those on agriculture, fisheries and forestry.


4 For globally threatened gamebirds, research is laying the basis for strategic interventions

In 1995, IUCN Species Action Plans (for the period 1995–1999) were compiled by the World Pheasant Association (WPA) and the relevant WPA-IUCN Specialist Groups for the three groups of Galliformes (‘gamebirds’): namely, the megapodes3; the partridges, quails, francolins, snowcocks and guineafowl4; and the pheasants5 to recommend priority actions for thier conservation. A subsequent evaluation revealed that, of the 54 priority projects identified in the Action Plans, an impressive 61% had been initiated6 and, as a result of this work, 35 further specific actions had been recommended7. For example, research on Brown Eared-pheasant Crossoplania mantchuricum (Vulnerable) in northern China revealed that excessive disturbance by mushroom collectors was a likely cause of low breeding success, leading to revised management of mushroom collection in protected areas.

A comparison of priority projects identified in the 1995 Pheasant Action Plan with those in the 2000 edition8 (covering 2000–2004) shows a progression in the aims of the projects. The earlier projects focused on the compilation of baseline information (e.g. taxonomy, surveys, basic ecological research), while the later ones involve more applied ecological research (e.g. assessing off-take levels) and direct measures (e.g. habitat and protected-area management). Thus, for gamebirds at least, many baseline research actions have already been undertaken, allowing well-designed interventions to be planned. The next stage is the implementation of these solutions and the monitoring of their impact to ensure long-term conservation success.


ACKNOWLEDGEMENT Analysis kindly provided by Philip McGowan (World Pheasant Association, UK).

About 50% of high priority actions for GTBs in Europe were undertaken between 1996–2001

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**RESPONSE** What birds tell us about solutions
1 Back from the brink: two Critically Endangered species saved from extinction

Black Robin Petroica traversi is endemic to the Chatham Islands (New Zealand). The rescue of this species from its tiny refuge on Little Mangere Island is one of the most remarkable successes in species conservation. Following human settlement of the islands, the species declined rapidly as its forest habitat was lost and degraded, and due to predation by introduced rats and cats. In 1976, when the population had declined to just seven birds, the remaining individuals were relocated to nearby Mangere Island, where thousands of trees had been planted to provide suitable habitat. Nevertheless, by 1980, numbers had fallen to five (three males and two females)—the smallest population of any bird species for which precise figures were known. Nest protection, supplementary feeding, and a cross-fostering programme (with the congeneric Torotiti P. macrocephala) were then established, and the population began to recover steadily. Individuals were later introduced to South East Island, and by 1989 the population had topped 100 individuals, at which point management ceased. The population continued to rise until carrying capacity was reached in the late 1990s, since when it has been stable at around 250 birds.

Rarotonga Monarch (or Kakerori) Pomarea dimidiat is endemic to the Pacific island of Rarotonga (Cook Islands). Although common in the mid-1800s, the species subsequently declined rapidly, and following the collection of a few specimens in the early 1900s, was not recorded again until 1973. In 1983, 21 birds were discovered, and a survey in 1987 estimated the population at 38 individuals, but declining. A recovery plan was prepared in 1988, and implementation began later that year. Intensive control of predators (particularly black rats Rattus rattus) reduced adult mortality from 24% to 9%, with nesting success increasing from 15% to 63%. By 2000, the population on Rarotonga had reached 221 individuals (see figure), and between 2001–2003 30 young birds were transferred to the rat-free island of Atiu (200 km north-east of Rarotonga) in an apparently successful attempt to establish a second ‘insurance’ population.


2 Intensive habitat management has led to a spectacular increase in Kirtland’s Warbler

The recent recovery of Kirtland’s Warbler Dendroica kirtlandi illustrates the potential of effective habitat management in securing populations of threatened species. The warbler’s exacting requirements for breeding habitat—stands of young (5–23 year old) jack pine Pinus banksiana growing on well-drained soils—mean that its breeding range is confined to a small area in the Lower Peninsula region of Michigan, USA. Counts of singing males in 1951 and 1961 totalled 432 and 502 respectively, but this declined to 201 in 1971. A suite of measures was then put in place to stabilise the population.

These included control of Brown-headed Cowbird Molothrus ater (a brood parasite of the warbler), annual population censuses and active management of the species’ jack pine habitats. The population remained relatively stable between 1971 and 1987, with suitable habitat regenerating after wildfires or management action apparently offset by ‘losses’ due to the increasing over-maturity of many older pine stands. However, following further management action and two large wildfires, the amount of suitably aged habitat doubled between 1987 and 1990, and the warbler population more than tripled between 1990 and 2000 in response (see figure). By 2000, the population had reached the maximum projected carrying capacity within its core breeding range (in Michigan’s Lower Peninsula), with the number of peripheral breeding records (in the Upper Peninsula region and in Wisconsin) increasing over the same period.

As a result of intensive habitat management, the breeding population of Kirtland’s Warbler more than tripled between 1990 and 2000

3 Eradication of introduced mammals from Clipperton Island led to dramatic recovery of seabirds

The history of Clipperton Island (to France), located c.1,000 km south-west of Manzanillo, Mexico, illustrates the dramatic ecosystem-wide effects of eradicating introduced mammals from a small uninhabited island. Before the introduction of feral pigs in 1897, Clipperton was a small, sparsely vegetated atoll, with extremely high densities of plant-eating crabs *Gecarcinus planatus*, and tens of thousands of nesting seabirds. Once introduced, the pigs ate the eggs of nesting seabirds and most of the land crabs. The diminished crab population caused a dramatic increase in plant cover, and hence a reduction in seabird nesting sites. These factors reduced the numbers of ground-nesting seabirds to c.1,000 individuals, including no more than 150 Masked Booby *Sula dactylatra* and 500 Brown Booby *S. leucogaster*. In 1958, all 58 pigs on the island were shot. The effects were evident on the next visit to the island by researchers, ten years later. There was much less vegetation on the island and the number of breeding seabirds had increased to c.25,000, including more than 4,000 Masked and 15,000 Brown Boobies. Clipperton is now almost devoid of ground cover, and it has an estimated 11 million land crabs, and it once again holds one of the largest Masked and Brown Booby colonies in the world (with c.40,000 and 20,000 birds respectively).

Unfortunately, rats have recently been discovered on Clipperton, probably introduced following shipwrecks of longline shark-fishing boats in 1999 and 2001. The rats are likely to feed heavily on crabs and seabirds. Nevertheless, it is hoped that—like the pigs before them—they can be eradicated from the island.

4 Simple changes to fishing methods can get seabirds off the hook

Thousands of seabirds—particularly albatrosses—are killed every year when they attempt to snatch baited hooks being set from commercial longline fishing vessels. Birds are caught on the hooks, dragged underwater and drowned. This has led to severe long-term population declines in several albatross species (see p. 11, box 3). Currently, all 21 species of albatross are classified as either globally threatened or Near Threatened, largely because of the effects of longline fishing. The good news—for albatrosses, fishermen and conservationists alike—is that simple measures can reduce the bycatch of seabirds without any negative effect on fish catches. Indeed, fish catches actually increase in some cases, as shown by a trial of mitigation measures on a Norwegian longline fishing vessel. With the use of an ‘advanced bird-scaring line’, for instance, bird bycatch dropped to zero, while fish catch increased by over 30% (see figure 3). More fish can be caught because fewer baits are lost to birds; birds can steal up to 18 baits before themselves being caught.

Although this message seems simple enough, it is a huge task to communicate it effectively to the diverse community of fishermen (from many different countries and cultures) that practice longline fishing. Furthermore, what works for one longline fishery does not necessarily work for others. Nevertheless, BirdLife’s Save the Albatross campaign is working with longline fisheries around the world to identify the best ways to reduce seabird bycatch and convince fishermen of the economic and conservation benefits of mitigation measures.


If the causes of declines are identified and treated, species can recover

For many threatened species, the key step in their recovery is the correct identification, and subsequent treatment, of the causes of their decline. These often relate to habitat loss, invasive species or over-exploitation, with incidental mortality a further significant threat for certain groups, such as seabirds. Treating declines may therefore involve creating suitable habitat (box 2), controlling or eradicating invasive species (box 3), or reducing the impact of human exploitation (box 4). For many species, however, a combination of measures may be necessary—co-ordinated and implemented with the help of a Species Action Plan (box 5). However, the process does not end there. Recovery programmes are accompanied by monitoring schemes, to document the response of species and to ensure that the recovery is sustained in the longer term.


5 Hunting ban reversed decline of White-headed Duck in Spain

White-headed Duck *Oxyura leucocephala* has a fragmented distribution, with a small, resident population in Spain, Algeria and Tunisia, and a larger, mainly migratory population in the east Mediterranean and Asia. Destruction and degradation of their wetland habitats, combined with hunting (to which it is extremely susceptible1), have caused rapid population declines across much of its range and, consequently, it is considered Endangered. By the 1970s, the Spanish population was close to extinction, with counts in 1977 recording just 22 individuals, confined to a single lagoon in Córdoba province (Andalucía)2-3.

In 1979, however, a highly successful conservation programme was initiated. Following the prohibition of hunting at its stronghold lagoon, the population began to recover, and the species gradually expanded into the adjoining Andalucian provinces of Sevilla, Cádiz and Huelva. By 1988, the population exceeded 400 birds, and breeding had spread into the provinces of Almería and Toledo3-4. Despite fluctuations linked to levels of spring rainfall, the Spanish population is now c.2500 individuals (see figure), with breeding activity in 13 provinces, including Mallorca (where it was introduced in 1996)5-6.

This striking recovery resulted from a combination of conservation actions, co-ordinated more recently in a Species Action Plan1. Effective protection from illegal hunting in its Andalucian stronghold was undoubtedly the most important factor, but habitat measures—including removal of introduced fish, control of pollution and sedimentation, and regeneration of fringing vegetation—were also significant1. Currently, the most important threat to the species’ long-term survival is hybridisation with introduced Ruddy Duck *O. jamaicensis* originating from the USA population7. However, control of introduced Ruddy Ducks is now underway in the UK and a number of other countries.

Networks of protected areas are essential, but remain very incomplete. Nations have already invested heavily in systems of protected areas and this is one of the most valuable mechanisms for biodiversity conservation. Unfortunately, and for many reasons, these systems are rarely designed so as to conserve biodiversity comprehensively. Although more than 100,000 protected areas have been established world-wide, analyses show that many serious gaps in coverage remain. More systematic ecological networks are needed to ensure that globally important biodiversity is conserved. These should consist of key areas of the highest biodiversity value that are interconnected within a managed landscape (see pp. 64–65). Safeguarding these ‘key biodiversity areas’ (see box 1) will require a variety of governance approaches, including, for example, national parks, community and indigenous conservation areas and private reserves (see pp. 62–63). However, all need to be managed in order to safeguard the important biodiversity they shelter.

Many Important Bird Areas need recognition

Because of the extensive information available about birds, Important Bird Areas (IBAs) tend to be identified sooner than other key biodiversity areas. Fortunately, the IBA network is effective at capturing other biodiversity (see pp. 28–29), and thus itself forms an excellent basis for planning and implementing conservation—right away. However, a high proportion of IBAs are entirely unprotected, including many which hold Globally Threatened Birds (box 2). These IBAs are priority sites for being accorded appropriate forms of statutory recognition and protection.

1 What are key biodiversity areas?

Key biodiversity areas are places of international importance for the conservation of biodiversity through protected areas and other governance mechanisms. They are identified nationally using simple, standard criteria, based on their importance for maintaining populations of species. As the building blocks for designing the ecosystem approach and maintaining effective ecological networks, key biodiversity areas are the starting point for landscape-level conservation planning (see p. 64, box 2). Governments, inter-governmental organisations, NGOs, the private sector and other stakeholders can use key biodiversity areas as a tool to identify national networks of internationally important sites for conservation. Key biodiversity areas are now being identified in many parts of the world, by a range of organisations.

Key biodiversity areas extend the Important Bird Area (IBA) concept to other taxonomic groups. The aim of the key biodiversity areas approach is to identify, document and protect networks of sites that are critical for the conservation of global biodiversity. Here a ‘site’ means an area (whatever the size) that can be delimited and, potentially, managed for conservation. As with IBAs, key biodiversity areas are identified based on populations of species that are threatened or geographically concentrated (see pp. 24–25). All IBAs are key biodiversity areas, but some key biodiversity areas are not IBAs (i.e. they are significant for the conservation of other taxa, but not birds). Nevertheless, the IBA network has proved a good approximation to the overall network of key biodiversity areas, as it includes the bulk of other target species and the most significant sites (see pp. 28–29). Important Bird Areas are thus an excellent starting point for immediate conservation planning and action—or other sites can be added to complete the network as data become available.

SOURCE Emlen et al. (2004) Protected areas design and systems planning: key requirements for successful planning, site selection and establishment of protected areas. In SCBD, biodiversity. Important and management of protected area sites and networks network but, at present, many lack any statutory recognition or legal protection. Nevertheless, their identification is stimulating effective safeguard for sites under a range of governance mechanisms.

2 Many African Important Bird Areas, including those holding Globally Threatened Birds, have no legal recognition or protection

Thirty-two IBAs in Africa hold one or more GTBs that presently lack protection at any site.

The majority of Important Bird Areas (IBAs) in Africa (57% of 1,230 sites) overlap to some extent with some kind of protected area. In principle at least, they are therefore partly or wholly covered by conservation management provisions that aim to protect the sites’ natural values and prevent unsustainable uses such as large-scale deforestation, over-hunting and over-fishing. Nevertheless, 43% of IBAs in Africa (525 sites) have no such protection or recognition of their natural values. This leaves 44 Globally Threatened Birds (GTBs) ~20% of the total number in Africa—lacking protection at any of the sites where they regularly occur (see figure). Capturing the unprotected GTBs within Africa’s protected-area networks is a high conservation priority.

SOURCE Analysis of data held in BirdLife’s World Bird Database.
Within the European Union there has been slow but significant progress in the legal recognition of Important Bird Areas as Special Protection Areas

The Birds Directive ("Council Directive on the conservation of wild birds"), adopted in 1979, is an international legal instrument for bird conservation that applies to all Member States of the European Union. Among other measures, it requires the creation and proper management of a coherent network of Special Protection Areas (SPAs) for 181 bird species, subspecies or populations that are considered the most threatened in Europe, as well as for all other migratory bird species and for all wetlands of international importance (Ramsar Sites).

The means by which BirdLife identifies Important Bird Areas (IBAs) in Europe is directly relevant in this context, as the selection criteria for IBAs were deliberately aligned with SPA selection criteria. Consequently, the value of the IBA inventory as a ‘shadow list’ of SPAs has been recognised by the European Court of Justice and the European Commission. This has helped to bring about an increase in the designation (partial or entire) of IBAs as SPAs, from 30% to 54% in the period 1989–1999 despite an overall increase in the number of IBAs recognised over this period (see figure). However, there remain over 1,000 IBAs in the European Union which do not presently overlap with any SPA and which should therefore be considered for designation as SPAs.


Important Bird Areas are influencing the identification of new protected areas

The situation is, however, improving in some parts of the world. In the European Union, where Member States are required to designate ‘Special Protection Areas’ (SPAs) under the legal instrument of the Birds Directive, IBAs have been recognised as a ‘shadow’ list of SPAs and inform the process of site designation in many countries. As a result, there has been a slow but significant increase in recent years in the number of IBAs granted legal protection (box 3).

In Africa also, IBA designation is having an impact on the designation of new protected areas (box 4). In Vietnam, the identification of IBAs has encouraged the government to gazette a number of new protected areas. For example, the Lo Go Xa Mat IBA has now been designated a National Park, with the endorsement and involvement of the local communities, and substantial resources have been allocated to its development and protection (box 5).

Identification of Lo Go Xa Mat as an Important Bird Area in Vietnam resulted in its being declared a National Park

Lo Go Xa Mat is an area of lowland forest and wetland in Tây Ninh province of southern Vietnam, located in the Southern Vietnamese Lowlands Endemic Bird Area. The site was declared a protected area by the government of Vietnam in 1986, but this was to commemorate its historical importance as a revolutionary base during the Second Indochina (Vietnam–America) War. In January 2001, following reports that the site had been designated for village resettlement, the BirdLife International Vietnam Programme undertook a reconnaissance trip. Lo Go Xa Mat was found to support a mosaic of lowland habitat types almost lost from elsewhere in Vietnam, but these were under severe and immediate threat from conversion to agricultural land. Indeed, drainage canals and roads were already under construction.

In response to these threats, BirdLife and the International Crane Foundation convened a meeting with provincial leaders to explain the importance of the site for conservation, and to raise awareness of the threats posed by the resettlement project. The response from the provincial leaders was positive: they agreed to halt the project temporarily, pending a more detailed biodiversity assessment.

Consequently, in October 2001, BirdLife led a joint survey of Lo Go Xa Mat. The site was found to qualify as an Important Bird Area (IBA) due to the presence of a number of globally threatened birds and restricted-range species, including Germain’s Peacock-pheasant *Polyplectron germainii* (Vulnerable). The designation of the site as an IBA was announced at a provincial workshop, generating much interest among local leaders, who were hitherto unaware of the biodiversity value of the site. Immediately following the workshop, the provincial leaders made an official request that the site be designated a National Park. Based on this, Lo Go Xa Mat was declared a National Park by the prime minister in July 2002. Subsequently, central government approved US$ 2 million of funding for the site over a five-year period.


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### Table: Designation of IBAs as SPAs in the European Union in 1989 and 1999

<table>
<thead>
<tr>
<th>Year</th>
<th>IBAs Recognised as SPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>1,661 (30%)</td>
</tr>
<tr>
<td>1999</td>
<td>2,342 (46%)</td>
</tr>
</tbody>
</table>

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### Figure: Important Bird Areas in Africa

- 45% of IBAs in Africa have been legally protected.
- 55% of IBAs in Africa are protected.
- 60% of IBAs in Africa are unprotected.

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### Sources


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### Additional Sources

Protected-area designation may not be sufficient—or, in some cases, appropriate
Incorporating Important Bird Areas (IBAs) into formal protected-area networks is often not sufficient to maintain their biodiversity. Many protected areas have effectively failed in their conservation objectives for want of resources, sound management and, in particular, local community support. Unthinking designation under restrictive laws could even be counter-productive, if, for example, it disrupts existing traditional land-use practices responsible for creating or maintaining a site’s significance. It is increasingly recognised that protected-area governance mechanisms can range widely, depending on circumstances—from strict protection to community management for sustainable use (see box 1). Unfortunately, legal regimes have often not caught up with this broader concept of ‘protected area’. Changes are needed, especially since in many countries the scope for creating new protected areas under ‘fenced-off’ management is now very limited.

Site Support Groups can help mobilise communities for conservation
Whatever the governance model for an IBA, community engagement and involvement in its conservation will usually be desirable—and often essential. This is increasingly being achieved through the actions of local Site Support Groups (SSGs), who raise awareness in site-adjacent communities and help protect and monitor IBAs (box 2). An SSG is a form of independent community-based organisation, its members motivated by a shared desire to conserve ‘their’ site. SSGs build on local experience and existing organisational team spirit. Membership comes from the local community, who will often have been managing the natural resources of the site or surrounding areas for generations, even if their primary purpose has not been biodiversity conservation.

Harnessing this knowledge and...
2 The Berga Floodplain Site Support Group—a local initiative for a globally important site

The Berga Floodplain Important Bird Area, in the north-western highlands of Ethiopia, holds several Globally Threatened Birds and is the world’s premier breeding site for White-winged Flufftail Sarothrura ayresi (Endangered). The Berga Floodplain Site Support Group (SSG) grew out of a conservation task force set up in 2000 through facilitation by the Ethiopian Wildlife and Natural History Society (BirdLife in Ethiopia). The current members of the SSG include representatives of four peasant associations, a large dairy farm and the District Agricultural Officer. Activities undertaken by the SSG include:

- preventing unauthorized grass and sedge cutting
- ensuring that cattle do not enter the site during the flufftail breeding season, through contact with adjacent farmer associations
- developing tree nurseries and vegetable growing, to provide income for the group’s conservation activities.

All the appropriate stakeholders are involved, including the local decision-making structures (the peasant associations), guards, forage collectors, individuals who assist forage traders from outside the area, the district agriculture office and the dairy farm. The SSG provides a forum for sharing ideas, fears and needs. The strong relationship between the local people and the site is demonstrated by the fact that they are willing to contribute to its protection. A local farmer donated a plot of 3,000 m² of land to the group for nursery activities. The poorer members who take on conservation activities voluntarily are finding that the nursery work and vegetable growing are appropriate alternatives for meeting their food requirements. The SSG at Berga is young but demonstrates the potential for the emergence of home-grown solutions appropriate to the context of the individual site.


3 Community conservation action is showing success on Mount Oku, Cameroon

Mount Oku, an Important Bird Area in the Bamenda Highlands of north-western Cameroon, holds the largest remaining populations of two Globally Threatened Birds, Bannerman’s Turaco Tauraco bannermani and Banded Wattled-eye Platysteira laticincta (both Endangered). These two species, along with others confined to the Cameroon highlands, are threatened by the loss of their montane forest habitat to agriculture. In response to the continuing rapid deforestation, BirdLife initiated a community-managed forest project on Mount Oku in 1987. The project has been working with local people to:

- establish forest boundaries
- facilitate planning for the sustainable use of forest resources
- improve agricultural practices
- identify and promote alternative sources of income.

Local communities, enabled by new legislation and supported by the Government of Cameroon and the project, now legally manage half of the forest. The remaining is soon to come under similar management.

A recent study of changes in forest cover on Mount Oku, using satellite imagery and aerial photographs, has revealed strong regeneration since 1988, soon after the project started. From 1995, the rate of regeneration (2.3% per year) has significantly exceeded the rate of deforestation (see figure). This reversal is a tribute to the success of local people in taking action to conserve their natural resources. It clearly also benefits the unique biodiversity found in the region. The project at Mount Oku shows that the conservation of natural resources can be compatible with the conservation of biodiversity at the local scale.

Thanks to effective community action, the forest on Mount Oku IBA is now regenerating, after decades of deforestation.

ACKNOWLEDGEMENT Data and photographs kindly provided by Susana Baena, Justin Mount and Philip Forboseh.
To conserve biodiversity, we must conserve the wider environment

Complex and biodiverse natural habitats continue to undergo sweeping human transformation, into simplified 'man-made' ecosystems designed for agriculture, forestry and aquaculture. Safeguarding a global network of key biodiversity areas (including Important Bird Areas) will do much to protect biodiversity (see pp. 60–61)—but we must also attend to the wider fabric of nature that surrounds these sites. Key sites need to be linked and buffered to maintain a set of dynamic ecological processes, such as migration and dispersal. But even site-networks that are well designed and managed are susceptible to damage from human-driven disturbances in the wider environment—for instance, watershed degradation, air- or water-borne pollution and, in the longer term, climate change. Many species, whether declining or not, have populations that are simply too dispersed or nomadic to be conserved adequately by a fixed system of sites that cover only a small part of their range and population. The biodiversity in our productive landscapes is itself important: when we create sterile agricultural monocultures lacking in birds and insects, we lose significant ecological services, as well as much of aesthetic and cultural value.

To conserve the wider environment, we need social, economic and political solutions

Recognising the real importance of biodiversity in the wider environment is a first step towards solving these problems. Solutions will focus on broad-scale approaches to maintaining or restoring the biodiversity value of transformed habitats (see box 1) and on the detailed planning needed to connect sets of key biodiversity areas within degraded or intensively used landscapes, in ways that benefit nations and peoples (box 2).

For instance, effective inter-governmental agreements are needed for the conservation and management of shared natural resources, against a background of increasing
competition in the global economy (see pp. 66–67). At both domestic and international levels, the reform of subsidies and taxes is vital, particularly the removal of financial incentives that promote environmental damage. Positive objectives for the environment need to be genuinely integrated into broad policies, plans and programmes, with suitable targets and indicators concerning biodiversity and sustainability (see p. 68).

1 A guide for governments and civil society to conserve habitats for birds and other biodiversity in Asia

Asia has many diverse habitats, ranging from Arctic tundra to tropical forests, and including the highest mountains in the world. But the region is experiencing rapid environmental change as the human population and national economies grow, and many of Asia’s natural habitats and their immensely rich wildlife are now under great pressure. Roughly a quarter of all bird species in Asia are of global conservation concern, and 324 Globally Threatened Birds (GTBs).

Many of these GTBs have similar ranges and habitat requirements. By grouping species of overlapping range according to their shared habitat, a recent BirdLife analysis (funded by the Critical Ecosystem Partnership Fund of Conservation International) has identified 20 key wetland regions, nine key forest regions and three key grassland regions in Asia. It is clearly more efficient to consider the conservation of these 32 habitat regions than to address the conservation needs of the 324 bird species individually. This habitat-based approach also makes it easier to relate bird-conservation issues to land-use planning processes, and the key regions can also be related to other broad geographical analyses of conservation priorities (see p. 66–67, box 2).

This analysis has been published as a guide to the immediate measures that need to be taken by civil society and governments to conserve the habitat regions (see figure). These measures include greater integration of environmental objectives into all socio-economic sectors, and more stringent environmental assessment of existing and proposed development policies, plans, programmes and projects. In the longer term, the underlying and indirect root causes of biodiversity loss in Asia will also need to be tackled. The guide outlines the fundamental changes in land- and resource-use that are needed for this.

Conservation organisations can implement many of the proposed conservation measures, such as surveys and ecological studies, education and awareness activities. For many other actions, the leadership of governments and the corporate sector is also necessary. Many of the strategic measures that are recommended will go a long way towards conserving not just GTBs, but all elements of biodiversity in the wider environment.

2 For birds and people in the Jordan Valley: a landscape approach

One hundred years ago the Jordan Valley was a sparsely populated and wildlife-rich landscape of steppes, savannas, floodplain wetlands and scattered oases. Today, irrigation and energy networks have transformed these rangelands at the borders of Israel, the Palestinian Authority and Jordan into densely settled farmland.

Intensive land uses now threaten the ecological integrity of the valley, through urban and industrial sprawl, depletion of surface water and aquifers, salinisation of soils and waters, and pollution by farm chemicals, factory and sewage wastes. Poverty and inequality affect many of the agricultural communities in the valley. BirdLife Partners in these countries are now working together on a community-based project, the vision of which is to transform the Jordan Valley into a more ecologically sustainable region, through a combination of nature-based socio-economic development and better land-use planning, site protection and management.

Three centres have been established in the Jordan Valley (one per country), and are coordinating their work towards the project’s objectives, which are:

- to support an ecological network of key biodiversity areas (see pp. 66–67) throughout the region, including the 10 Important Bird Areas already identified, and to support scientific research on, and monitoring of, the region’s wider environment
- to promote sustainability in businesses and more sustainable practices among land-use sectors (e.g. organic agriculture and eco-tourism), so as to generate employment and alternatives for local people
- to provide environmental information and awareness programmes and projects tailored specifically for local people, businesses and municipalities in the valley
- to inform and influence each country’s government policies, plans, programmes and projects in the valley, with respect to environmental issues and objectives, and to promote compliance with existing environmental regulations and plans
- to promote dialogue, conflict resolution and co-operation between different interest groups such as developers, farmers and environmentalists.

In the longer term, a network of nine such centres is planned (three per country). By taking a transboundary approach to nature conservation, BirdLife Partners are encouraging co-ordinated environmental action between countries and building new economic infrastructures for the region. The project is thus a landscape-level, long-term approach to nature conservation and peaceful coexistence between the peoples of this war-torn region.


Managing landscapes means involving the whole of society

There are many ways that civil society can support these structural and technical changes in governance. An enabling and encouraging environment is needed to promote creative responses in the form of community-based and business-driven initiatives and partnerships. These could include, for example, NGO formation and development, co-operation in the management of privately owned land, shareholder activism, eco-labelling, elaboration of best practice, innovation and investment in green technology, eco-efficiency and greater adoption of sustainability within the corporate sector (see p. 69, box 3).
Mechanisms exist for co-ordinating environmental actions across nations
Legally binding agreements between governments are one of the main ways in which countries can co-operate to achieve common goals. Eight such treaties are particularly important in attempting to move the Earth’s nations forward in a fair and co-ordinated fashion, towards more sustainable use of the planet’s atmosphere, waters, lands, soils and life-forms, so as to conserve the world’s genetic resources, species and ecosystems more effectively (see box 1).

Most national governments are ‘contracting parties’ to one or more of these agreements. Taken together, these mechanisms should form a strong basis for international co-operation in conserving biodiversity and in combating complex environmental problems.

1 Most countries have ratified key international treaties, although significant gaps remain

There are now more than 500 international treaties that concern the environment. The ‘big five’, in terms of global reach and core importance to biodiversity conservation, are:

- the Convention on Biological Diversity (CBD)
- the World Heritage Convention (WHC)
- the Convention on Migratory Species (CMS)
- the Convention on International Trade in Endangered Species (CITES) and
- the Convention on Wetlands (Ramsar Convention).

In addition, there are three other international treaties that are crucial in managing and reducing humanity’s impact on the planet’s biosphere:

- the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol
- the UN Convention to Combat Desertification (UNCCD) and
- the UN Convention on the Law of the Sea (UNCLOS).

The three ‘Rio conventions’ (CBD, UNFCCC and UNCCD) rapidly achieved almost universal acceptance, while the other conventions have large gaps in their geographical coverage (see figure). Although the ratification rate of the CMS has accelerated in recent years, a stronger commitment to the conservation of migratory birds and other animals is needed, particularly in the Americas, Asia, the Middle East and the Pacific. The Convention on Wetlands needs more contracting parties in the Americas, Asia, Africa and the Middle East. A number of countries in Asia and the Middle East, where significant international commercial trade in wild birds occurs, have yet to join CITES.

Sources 1. http://www.cites.org; 2. Data from websites of the Conventions.

2 Lists of species form a key part of several conventions, and need to be reviewed and updated regularly

The Convention on International Trade in Endangered Species (CITES) and the Convention on Migratory Species (CMS) both incorporate lists of relevant species (as Appendices) for which particular conservation actions need to be implemented by contracting parties. For both CITES and CMS, Appendix I species are agreed to be of global conservation concern, with governments agreeing to prohibit all international commercial trade in wild birds of such species listed under CITES and to adopt strict protection measures for those listed under CMS. Appendix II species are agreed to have an unfavourable conservation status (CMS) or otherwise to benefit significantly from international co-operation in controlling their international trade (CITES) or in their conservation (CMS). Hence, governments are obliged to regulate and manage the import/export of Appendix II species listed under CITES, and to conclude Agreements with other ‘Range States’ to conserve Appendix II species listed under CMS.

In an effort to protect groups vulnerable to over-harvesting, such as parrots and raptors, the number of bird species included in CITES Appendix II increased considerably up to the mid-1990s (see figure). However, many countries still allow exports of species without knowing whether this use of wild populations is sustainable. It is therefore important for range countries to review regularly the commercial trade in species listed in Appendix II and, in some cases, prohibit the international trade through national export bans or by moving species to Appendix I.

As with CITES, the biggest changes in the CMS species-lists have taken place in Appendix II (see figure). A number of international Agreements have been adopted under CMS for its Appendix II bird species. For example, the listing of waterfowl in 1979 led eventually to the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) in 1995, which entered into force in 1999 (see box 4). The listing of albatrosses in Appendix II in 1997 enabled the subsequent adoption of the Agreement on the Conservation of Albatrosses and Petrels (ACAP), which entered into force in 2004. However, for many of the species listed in the CMS Appendices, inter-governmental Agreements and action plans have not yet been planned or concluded.

Source Data from websites of the Conventions.

During the past 25 years, under CITES and CMS, governments have agreed to take special conservation measures for an increasing number of bird species
Weak obligations and poor implementation have reduced treaties’ effectiveness
In practice, contractual obligations on governments have tended to be vaguely or weakly formulated, so as to attract maximum participation. Necessary measures are often not spelled out clearly, and so are not implemented well or quickly. In addition, direct inter-governmental monitoring or control of implementation is often difficult. Over time, however, obligations and targets can be improved, e.g. through the adoption of protocols or agreed work programmes.

Gaps in coverage remain significant
Currently, there still exist some important gaps in geographical coverage that reduce the effectiveness of these treaties (box 1). Many significant gaps in biological coverage remain as well, in that conservation actions are still not being taken for species and sites that are of agreed relevance (boxes 2 and 3).

At the broader ecosystem level, only one international convention deals with the conservation of a large-scale ecological process (migration: see box 4), and it is notable that an effective mechanism for reducing greenhouse-gas emissions has yet to be ratified under the UN Convention on Climate Change (box 1).

Many Important Bird Areas are now listed under global or regional conventions, but many more qualify and are not yet listed
There are three global initiatives that promote the conservation and good management of particular sites: the Convention on Wetlands (Ramsar Convention), the World Heritage Convention (WHC) and the Biosphere Reserves of UNESCO’s Man and the Biosphere Programme.

Although many Important Bird Areas (IBAs) meet the criteria for official recognition under these mechanisms—respectively as ‘Wetlands of International Importance’ (Ramsar Sites), World Heritage Sites and Biosphere Reserves—so far only a small minority are benefiting from such status (see figure) 

However, the documentation of sites as IBAs has helped to increase significantly that small proportion over the last 20 years, as legislators and planners increasingly use national IBA inventories in evaluating and improving the effectiveness of protected-area networks under their jurisdiction (see also pp. 60–61, boxes 2 and 3).

SOURCES

International agreements can be used to make transboundary ecological networks a reality, if governments give enough support
Ecological networks of protected areas, that cross country boundaries, are needed urgently if the rate of biodiversity loss is to be significantly reduced. At the global level, the Convention on Wetlands (Ramsar Convention), the World Heritage Convention (WHC) and the Man and the Biosphere Programme all emphasize this concept and can give site networks more international coherence within the wider landscape/seacape. Each of these systems incorporates a process to review the status of protected areas and to identify those that are threatened or dysfunctional. Because such judgements are internationally agreed, nations are more likely to co-operate in helping to alleviate the problems. Likewise, for the Convention on Migratory Species (CMS), networks of protected areas are seen as pivotal in conserving migratory species.

The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) is the largest multilateral Agreement concluded under the CMS so far (see box 2). AEWA aims to conserve 235 species of migratory waterbird that use one of the world’s major flyways, spanning 117 countries in Africa, Europe, the Middle East and parts of Asia and Canada. There are at least 2,252 Important Bird Areas (IBAs) within the AEWA flyway that support globally significant congregations of one or more of the AEWA-listed species. Nearly 40% of these sites are currently lacking either statutory protection at the national level or international recognition as Ramsar Sites, natural World Heritage Sites or Biosphere Reserves (see figure).

SOURCES
2. Analysis of data held in BirdLife’s World Bird Database.
Paper commitments must be turned into action

The negotiation and adoption of the Convention on Biological Diversity (CBD) represented a realisation of the crucial importance of biodiversity to national and global well-being. The evidence for this has strengthened further in the last decade, but while Parties to the CBD (see p. 66, box 1) make important commitments concerning the conservation of biodiversity, its sustainable use, and access to its benefits, these are only patchily and inadequately realised in national legislation and planning (see box 1). Under article 20(2) of the CBD, developed countries promised to make available ‘new and additional’ financial resources to developing countries. These have failed to materialise, crippling conservation efforts in the developing world.

Internationaly agreed commitments to biodiversity conservation need to be enshrined in national legislation and made effective in practice. There is need for a dramatic scaling-up, both nationally and internationally, of the resources available for conservation, from a much wider range of sources—including the private sector.

1 National biodiversity legislation and planning are failing biodiversity and need strengthening

Few countries have yet ‘mainstreamed’ biodiversity conservation into their legislation and policy, and made provision for raising the money needed for long-term investment. Many still retain a range of financial incentives that incidentally act to destroy biodiversity, rather than look after it. So, for example, the European Union’s Common Agricultural Policy soak up €45 billion of taxpayers’ money each year, yet has the side-effect of devastating countryside biodiversity, as shown by declines in farmland bird populations (see p. 8, box 1). There is experience of alternative approaches to draw on, for example in Costa Rica, where taxes on fuel, hydrological services and provision of biodiversity and scenic beauty have been used to invest in the retention and management of natural forests.

As part of implementing the Convention on Biological Diversity (CBD), more than 80 countries have produced National Biodiversity Strategies and Action Plans (NBSAPs), often with support from the Global Environment Facility. However, these rarely demonstrate how biodiversity conservation will be integrated into broader land-use and economic decisions. Their technical content is also patchy. A BirdLife analysis suggests that only a minority of NBSAPs adequately address the conservation of Globally Threatened Birds (GTBs) and Important Bird Areas (IBAs). This study looked at 36 NBSAPs from around the world, focusing on the countries with the highest importance for GTBs in Africa, Asia, Americas, Europe, Middle East/ Central Asia and the Pacific and with completed and available NBSAPs (see figure). Only 14% of the NBSAPs analysed gave high priority to bird species conservation, through the development of Species Action Plans and recognition of international agreements (e.g. CITES and CMS: see pp. 66–67) or regional treaties. In many cases, the NBSAPs recognise the importance of the country concerned for threatened species but do not propose a clear strategy and effective actions for their conservation. However, 28% of the NBSAPs analysed lend strong support to the conservation and sustainable use of IBAs, by developing protected-area networks and identifying gaps in protected-area coverage. Often, the protected areas include Ramsar-listed wetland sites (see p. 67, box 3).

In general, the better and more accessible the national information on species and sites, the better the coverage in NBSAPs and the tools developed to safeguard a country’s biodiversity. As an International Thematic Focal Point for the Clearing House Mechanism of the CBD, BirdLife aims to make scientifically sound information on bird species and available for the better development and more effective implementation of NBSAPs.

How well is the conservation of GTBs and IBAs addressed by 36 NBSAPs?

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<tr>
<th>Species</th>
<th>GTBs</th>
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<td>Weakly</td>
<td>14%</td>
<td>28%</td>
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<tr>
<td>Effectively</td>
<td>61%</td>
<td>22%</td>
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56
The mismatch between conservation costs and benefits needs addressing.

The costs and benefits of biodiversity conservation are still very skewed at different scales. By and large, the costs borne locally while the benefits accrue on a wider scale—nationally and globally (box 2). Covering the costs requires a major increase of the resources available to invest in conservation (see pp. 54–55). There are many innovative ideas about how to go about this, including involving private donors, encouraging commercial sector investments and partnerships (box 3), and developing new markets for conservation-friendly products, ecosystem services and carbon credits. However, the amount of the resources needed is such that the major source must be tax revenue, raised by governments. Nationally and globally, those who benefit from biodiversity conservation, including its dispersed ecosystem services and existence values, must be prepared to pay for it, rather than watch it vanish.

2 Those who enjoy the benefits of biodiversity conservation should pay the costs

A perennial problem in biodiversity conservation has been inadequate information on costs and benefits, and the scale at which these apply. Recent analyses are beginning to get to grips with this problem, at least at a conceptual level1. In developing countries, local communities generally pay little of the ‘active’ costs of conservation—for example, the budget for managing a national park. But although these communities are often impoverished, they pay most of the ‘passive’ costs, such as benefits foregone through lost opportunities for conversion or exploitation (see figure). These costs, although rarely taken into account, can be very substantial. They are one reason why it is often so difficult to make ‘conservation and development’ projects work. Such projects usually try to offset such costs through new income-generating schemes, for instance marketing sustainably-harvested forest products, bee-keeping or nature-based tourism. While there are successful examples of this approach, it is hard to apply where the local benefits (even including those from localised ecological services) are substantially less than those offered by land conversion.

The difficulty is that the biggest benefits are often enjoyed at distances remote from the conserved area—at the national and global scales. These benefits are also very hard to quantify in monetary terms. They include the role of natural habitats in carbon storage and climate regulation. They also include the possibility of use in the future (option values), the value of a habitat or species still existing (existence values) and the chance to pass on benefits to future generations (bequest values). These services and values accrue at a larger scale and to many more people than localised services. Their importance will grow as people become more numerous, more wealthy and more aware of their natural heritage; and as natural habitats become more diminished, fragmented and threatened.

The implication of this analysis is that more of the costs of conservation to local communities must be met by payments from the national and global beneficiaries for the continued delivery of biodiversity goods and services. While such payments raise a number of difficulties, these appear to be soluble both in principle and in practice1. By far the biggest obstacle is the lack of political or societal recognition, nationally and globally, that biodiversity conservation needs to be paid for and is a worthwhile, indeed essential, investment. While the principle of global payment for global goods is already enshrined in the Convention on Biological Diversity, developed countries have dismally failed to live up to their commitments.


3 Businesses need to take biodiversity on board

The corporate sector often has a poor reputation where biodiversity conservation is concerned. Especially in countries with weakly developed regulation, it has often appeared that businesses are happy to take short-term gains even if these come at tremendous environmental cost.

However, some more far-sighted businesses, often with activities that directly impact the environment, are increasingly recognising that they have a stake in biodiversity conservation. This makes sound business sense: by incorporating biodiversity values into operational and strategic planning, businesses can avoid costly confrontation, improve their licence to operate and achieve meaningful reputational gains. Working in partnership with a conservation NGO can bring real gains for biodiversity while achieving business goals.

Rio Tinto, a multinational mining company, has such a partnership with BirdLife International. This works in a number of ways to address the company’s sustainable development objectives while achieving a range of benefits to bird conservation. The partnership has a particular focus on Important Bird Areas (IBAs) that are close to individual Rio Tinto businesses. For example:

- In South Africa at Richards Bay, where Rio Tinto mines coastal dune sand, the business helps support the Richards Bay Avitourism Programme. Under this programme, IBAs are highlighted within the Zululand Birding Route, managed by BirdLife South Africa. Notably, the programme helps individuals from the local communities to develop both their nature-interpretation and business skills. This has a multiplier effect in building local support for effective conservation and management of the IBAs. Thus, the programme helps communities to achieve sustainable livelihoods that depend on conservation—and builds constructive community relations for Rio Tinto.

- In Namibia, Rössing Uranium has worked closely with local businesses, the Ministry of Environment and Tourism and a local NGO to safeguard the breeding sites of Damara Tern Sterna damarensis (Near Threatened). The terns’ main breeding site is an IBA on the coast between Swakopmund and Walvis Bay, close to Rössing Uranium’s operations.

- In the USA, a project run by the National Audubon Society (BirdLife in the USA) addresses visitor access, site management and interpretation of a shorebird IBA at Great Salt Lake in Utah. This project builds on the management of an adjacent shorebird reserve purchased (as mitigation for a mine development) by Kenneckut Utah Copper, another Rio Tinto business.

These partnerships are achieving benefits that are locally relevant, yet aligned with regional and global conservation frameworks and with wider business objectives.
Are we on track to achieve our targets? Is the world making progress towards the goal, agreed at the 2002 World Summit on Sustainable Development, to achieve ‘a significant reduction in the current rate of loss of biological diversity’ by the year 2010? Are we on track to ‘ensure environmental sustainability’ (Millennium Development Goal 7) and to ‘reverse the loss of environmental resources’ (Millennium Development Target 9)?

Unfortunately, it is difficult to tell. There is presently no systematic global framework for generating and interpreting data on the loss of biodiversity.

1 Towards a global monitoring system for biodiversity

How can we measure progress towards the 2010 target to reduce the rate of biodiversity loss? After much discussion on this topic during 2003, the 9th meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) to the Convention on Biological Diversity recommended that the following indicators should be tested immediately:

1. Trends in extent of selected biomes, ecosystems and habitats
2. Trends in abundance and distribution of selected species
3. Change in status of threatened species
4. Trends in genetic diversity of domesticated animals, cultivated plants and fish species of major socio-economic importance
5. Coverage of protected areas

and that indicators for the following should be developed:

6. Threats to biodiversity
7. Ecosystem goods and services
8. Equitable sharing of benefits arising from the use of genetic resources.

All these indicators need to be scaleable from local to national, regional and global levels.

Conservation NGOs are already collecting large amounts of data that could be used to construct this small set of high-level global biodiversity indicators. Five of these eight proposed indicators (nos. 1, 2, 3, 5 and 7) have already been suggested by a grouping of around a dozen NGOs (including BirdLife International) as a coherent set that can build on existing efforts with minimal extra cost.

More work is needed to make these ideas a reality. However, monitoring of bird species and Important Bird Areas (IBAs) can potentially contribute substantially to many of these indicators. Examples in this report show that indicators for trends in abundance and distribution of selected species (see box 2; also p. 8, box 1) and change in status of threatened species (pp. 16–17) are already available for birds. Monitoring of IBAs (box 3) will help in tracking the extent (and quality) of selected biomes, ecosystems and habitats, as well as the coverage and status of protected areas, threats to biodiversity, and (potentially) ecosystem goods and services. Individually each of these datasets has its strengths and weaknesses; but taken as a suite, the bird indicators we already have, or soon will have, can make a major contribution to measuring progress.

**REFERENCES**

Birds as a ‘Quality of Life’ indicator in the United Kingdom

An index based on population trends in a set of wild bird species has been adopted by the UK government as one of its fifteen headline indicators, out of a set of 150 core indicators of sustainable development. Such an index has resonance with policy-makers, politicians and the public alike. It also meets the key attributes of an effective bio-indicator, being quantitative, simplifying, user-driven, policy-relevant, scientifically credible, responsive to change, easily understood, realistic to collect and amenable to analysis. Data for the index come from a wide range of sources in schemes co-ordinated by C12 national organisations and are mainly collected by volunteer observers. Over 32 years, the index (see figure) shows fluctuating but largely stable populations over the whole set of 106 breeding bird species. However, farmland birds have declined dramatically. This reflects a severe deterioration in the quality of farmland habitats, affecting both birds and other elements of biodiversity. Such habitat degradation does not relate to the rarest species, nor to Special Protection Areas (both of which are critical elements of biodiversity); rather, it relates to biodiversity in the wider countryside. There is good evidence that this decline is due to widespread intensification of agriculture (see p. 75, box 2). Woodland birds also show a substantial, though less precipitous, decline, suggesting that woodland habitats are also in trouble. A similar composite index for farmland birds has now been developed for Europe as a whole (see p. 8, box 1).


ACKNOWLEDGEMENT: Figure kindly provided by Richard Gregory (Royal Society for the Protection of Birds, UK).

BirdLife takes a three-pronged approach

BirdLife’s monitoring framework encompasses Globally Threatened Birds, Important Bird Areas (IBAs) and common birds, corresponding to the objectives for species, sites and habitats in A strategy for birds and people (see p. 1). For each kind of monitoring, appropriate indicators of change can be calculated. This approach is already being implemented in Europe, where it relies on the national bird and IBA monitoring schemes of BirdLife Partners (box 2), and for common birds the European Bird Census Council. Bird monitoring is now being expanded strategically elsewhere in the world, as BirdLife Partner capacity permits (box 3).

For the indicators under development in Europe, birds offer continental coverage across a wide range of habitats; relatively long time-series of data and annual monitoring; scientifically sound methods providing extensive, high quality, internationally standardised datasets; and analysis at national and international levels. The basis for data collection is a cost-effective network of professionally co-ordinated volunteers, and the collaboration of scientific and nature management organisations.

Monitoring Important Bird Areas in Africa

Monitoring is costly. Especially in developing countries, many monitoring systems have failed because they are over-ambitious. Systems that rely on expensive equipment and highly trained personnel are often difficult to sustain. Yet data must be collected systematically and to a high standard, or they will be worthless.

BirdLife’s Important Bird Area (IBA) monitoring framework for Africa uses a two-tier system to obtain both breadth (coverage of the entire IBA network) and depth (more intensive effort at a sample of sites). Basic IBA monitoring involves regular assessment, usually once per year, of every IBA against indicators of state, pressure and response. The data required are simple and mainly qualitative. They can be collected on site by management authority staff, Site Support Groups (SSGs), project workers, members of the BirdLife Partner or other volunteers. Qualitative data are scored to give an overall rating for each site.

Detailed IBA monitoring takes place at a sub-set of priority sites, where capacity permits. The monitoring design varies but is tightly linked to site conservation objectives. It is always designed to be as simple, robust and inexpensive as possible. Existing bird counting schemes, such as the African Waterbird Census co-ordinated by Wetlands International, are linked closely into the IBA monitoring programme.

As well as keeping the monitoring methods cost-effective, it is important to institutionalise the work. This means that organisations based at the site, such as a parks authority or SSG, carry out monitoring as part of their routine activities. For example, members of the Friends of Kinangop Plateau, an SSG in Kenya, are monitoring three separate areas of the Kinangop Grasslands IBA. In a carefully selected set of sample fields the monitoring teams count numbers of Sharpe’s Longclaw (Endangered), assess grassland condition and measure areas converted from grassland to cropland (or vice versa) (see picture, right).

Once given some initial training, the individuals involved should be able to continue monitoring with only occasional help and supervision. This necessitates a full participatory approach, so that the monitors ‘own’ both the process and the data. Those on the ground also need to receive relevant feedback on the information they provide, so continuing investment is needed in national co-ordination.

The IBA monitoring framework is now being implemented by the BirdLife Partnership in around a dozen countries across Africa, and a similar framework is under development in Europe.

Birds make us aware of the vital choices that we face

We need a fundamental shift in the way we look after our world—and this is a political challenge. More than any other wildlife, birds are a gateway to environmental understanding, and a focal point to empower people for change.

Biodiversity conservation requires social and political changes

The state of the world’s birds is deteriorating. This signifies deeper problems in our environment and in the way we look after our world. There is much we can do right away to save birds and other biodiversity, but lasting solutions require lasting changes—we need fundamental rebuilding, not just painting over the cracks. The major challenges are not scientific, but social and political. Until enough people are aware of the issues and can directly influence their elected leaders, progress towards a sustainable world will remain slow. What is clear is that the choices we make will have a real impact on the diversity of life with which we share the Earth, and which forms our own life-support system (see box 1).

Birds provide a focus for positive change

Birds are an excellent gateway to understanding the environment. Appreciating birds and their conservation problems leads to... to change its values and behaviour. Important Bird Area Site Support Groups (see pp. 62–63), building from a focus on birds, grow local pride in special wildlife. They help to develop democratic structures, empowering individuals and communities to take control and ensure wise use of their own resources. The millions of members of BirdLife Partners around the world are a sign of growing public awareness and activism, the beginning of real societal changes. It is encouraging that bird- and

1 Security or sustainability first? The fate of Endemic Bird Areas depends on the choices we make

It is hard to foresee the future. To help, we can use scenarios—descriptions of possible futures based on a variety of assumptions, uncertainties and anticipated new factors. Scenarios do not predict the future, but they sketch out what might happen under different assumptions. For the Global Environment Outlook 3; the United Nations Environment Programme (UNEP) outlined four plausible scenarios:

1. ‘Markets First’: a world in which market-driven developments converge on the values and expectations that prevail in industrialised countries.
2. ‘Policy First’: a world where strong actions are taken by governments to reach specific social and environmental goals.
3. ‘Security First’: a world of great disparities, where inequality and conflict prevail, brought about by socio-economic and environmental stresses.
4. ‘Sustainability First’: a world in which a new development paradigm emerges in response to the challenge of sustainability, supported by new, more equitable values and institutions.

(ii) ‘Sustainability First’

Colours indicate the period in which habitats that have been little modified by human activity will be converted to agricultural land.

(i) ‘Security First’

(a) Predicted expansion of agricultural land by 2050 under two GEO3 scenarios: (i) ‘Security First’ and (ii) ‘Sustainability First’

For further information visit www.birdlife.org
nature-focused membership organisations are going from strength to strength in developing, as well as developed, countries (box 2). But we do not have much time. Our options are narrowing fast, giving us perhaps just a decade or two to prevent our planet being irretrievably impoverished. This report’s companion publications, Working together for birds and people and A strategy for birds and people, describe in more detail what the BirdLife Partnership is doing and planning to bring about real, positive change. Birds, seemingly among the most fragile of animals, may yet help form the foundation for building a better world.

Under each scenario, the spatial extent of future agricultural land has been modelled by the Netherlands National Institute of Public Health and the Environment (RIVM)². Distributions of cropland and pasture are allocated to half-degree squares, taking into account current ecosystems, soil suitability and irrigation potential (see figure a).

What are the implications for birds? By 1995, agriculture was estimated to cover 37% of the world’s land surface. The model predicts that this would rise to 43% by 2050 under the ‘Security First’ scenario, compared to no change under ‘Sustainability First’. Endemic Bird Areas (see pp. 22-23)¹ already have a much higher proportion of land under agriculture, c.42%, than the world as a whole (see p. 32, box 1). Under the ‘Security First’ scenario, 56% of their area is likely to be used for agriculture by 2050. In contrast, under the ‘Sustainability First’ scenario this figure might rise only to 45%, not much greater than today’s level (figure b). This difference is very sizeable. The impacts of the choices we make will be amplified in some of the world’s most important places for birds and other biodiversity.

Which world will people inhabit five decades from now—and what wild birds will it retain? The choices are ours.

2. Membership of bird conservation organisations is growing world-wide

The BirdLife Partnership of more than 100 national non-governmental organisations has grown from an estimated 1.7 million members in 1994 to well over 2.3 million members world-wide. In many countries, this membership is already a significant voice for the environment (see figure a). Many more individuals belong to local conservation organisations. The largest BirdLife Partners are still found in developed countries, where people tend to have substantial disposable income and the tradition of leisure birdwatching is often strong. However, Partners are growing fast in many developing countries. The BirdLife Partner in Uganda still has few members compared to the country’s population (c.22 million people) but the membership is increasing at a rapid rate (figure b) and has influence out of proportion to its size. Like other BirdLife Partners, NatureUganda also engages many other people in rural areas around IBAs, through an expanding set of local Site Support Groups and many school and college students.

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Together, these publications present the state of the world's birds, and the actions and future directions of the BirdLife Partnership