

Partners with nature

How healthy ecosystems are helping
the world's most vulnerable adapt to
climate change



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Glossary

Community-based adaptation

This focuses on those communities that are most vulnerable to climate change, and is based on the premise of understanding how climate change will affect the local environment and a community's assets and capacities, including knowledge and practices of coping with past and present climate-related hazards.

Ecosystem approach

A strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It involves taking account of vital ecosystem functions and valuing the ecological goods and services they provide in all decision-making processes. 'The Ecosystem Approach' is the primary framework for action under the Convention on Biodiversity (CBD).

Ecosystem-based Adaptation

As set out by the CBD's Ad Hoc Technical Expert Group on Biodiversity and Climate Change (AHTEG), this refers to the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change¹. This includes the

sustainable management, conservation and restoration of specific ecosystems that provide key services.

Ecosystem resilience

Ecosystem resilience is the capacity of an ecosystem to deal with change and withstand shocks without shifting to a qualitatively different state. It is recognised as an important factor in any ecosystem being able to function and provide ecosystem services. Biodiversity, as a key component of ecosystems, is vital to ensuring ecosystem resilience.

Endemic Bird Area (EBA)

Area where the distributions of two or more bird species with restricted ranges (smaller than 50,000 km²) overlap.

Environmentally sound

Refers to principles, methods and procedures involved in the maintenance of a healthy bio-diverse environment and the protection of life-sustaining ecological processes. This should recognise Principle 4 of the Rio Declaration (1992): '*In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it*'.

Healthy ecosystems

Sustainable ecosystems that have the ability to maintain

their structure (organisation) and function over time in the face of external stress such as climate change. Maintaining such resilience supports the ultimate objective of the United Nations Framework Convention on Climate Change (UNFCCC) (Article 2).

Important Bird Areas (IBAs)

Places of international importance for bird conservation, forming part of a global network of sites².

Key Biodiversity Areas (KBAs)

Places of international importance for the conservation of biodiversity.

Local Conservation Group (LCG)

A BirdLife initiative that promotes local involvement with, and local solutions to, biodiversity conservation and development issues.

Mal-adaptation

Adaptation that leads to perverse outcomes, for example increasing risk or vulnerability of the poorest, causing greenhouse gas emissions from inappropriate land-use change, and destroying biodiversity and important ecosystem services.

Multiple benefits

Multiple and often mutually reinforcing social, economic and environmental co-benefits

that can be achieved through well-planned, inclusive and comprehensive adaptation.

National Adaptation Programmes of Action (NAPAs)

Documents prepared by Least Developed Countries (LDCs) identifying urgent and immediate needs for adapting to climate change. NAPAs are then presented to the international donor community for support³.

'No-regrets' options

Adaptive measures whose socio-economic benefits exceed their costs whatever the extent of future climate change, and which do not undermine future resilience (ecological, social or economic).

Ramsar Convention

An intergovernmental treaty that provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources⁴.

'Wise use' of wetlands

The maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development (Resolution IX.1 Annex A (2005), Ramsar Convention).

Summary

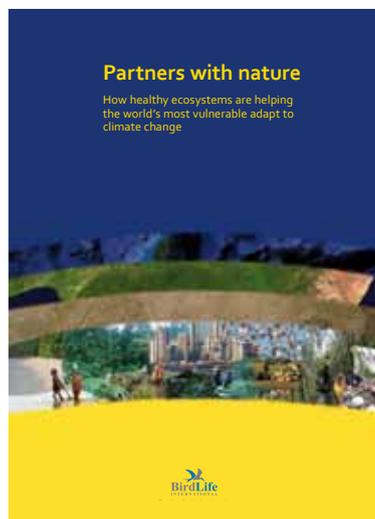
Climate change impacts including drought, crop failure, flooding, sea-level rise, and extreme weather events are already being felt across the world, with the poorest people and vulnerable ecosystems hit hardest. The effects of climate change will almost certainly persist for centuries, and depending on the level of mitigation achieved, will be of increasing severity. Adaptation is necessary to cope with present and future impacts.

Ever-increasing evidence suggests that healthy, bio-diverse environments play a vital role in maintaining and increasing resilience to climate change, and in reducing climate-related risk and vulnerability.^{1,5,6-9} Biodiversity, ecosystems and the functions and services they provide, such as water, food, soil protection, clean air, disaster risk reduction and carbon capture, underpin the Earth's life support system and our sustainable development. This is particularly critical to many of the world's 2.7 billion poor people, who depend on natural resources most directly for their livelihood and survival.

This report includes 14 case studies from different countries around the world. They provide compelling evidence of the roles that ecosystems play in climate change adaptation through protecting the natural resource base, providing alternative livelihood options, and maintaining resilience to future climate change. BirdLife International's experience shows that supporting the application of local knowledge and community engagement and action can build the resilience of natural and societal systems, delivering locally appropriate solutions to help communities, countries and economies adapt to the challenges of climate change. For the most vulnerable people in particular, an ecosystem approach to adaptation will often be the first line of defence against the impacts of climate change.

The role of ecosystems in climate change adaptation is relevant to, and can be applied at, all scales: local, landscape, national, transboundary and international. As the case studies show, the BirdLife International Partnership's unique local-to-global structure has enabled structures and processes to be established that contribute to long-term and flexible approaches to climate change adaptation.

BirdLife is calling for the importance of healthy ecosystems to be effectively written into national, regional and international climate change and development policy, as a key part of ensuring the current and future well-being of people and biodiversity. All adaptation responses should be environmentally sound, and specifically recognise the value and importance of healthy ecosystems as critical to building resilience and adaptive capacity. Maintaining healthy ecosystems, their functions and services, should be part of an overall adaptation framework for people and our planet.



The role of ecosystems in climate change adaptation

Climate change is one of the greatest global threats. Scientists confidently predict that average global warming of 2°C or more will result in dangerous and irreversible effects on nature, people and the economy.¹⁰ The ultimate aim (Article 2) of the United Nations Framework Convention on Climate Change (UNFCCC)¹¹ is to avoid dangerous climate change. It includes stabilising atmospheric concentrations of greenhouse gases at a level and in a time frame that allows ecosystems to adapt naturally. The value and importance of ecosystems in tackling and responding to climate change, both in adaptation and mitigation, is therefore recognised inherently by the Convention.

Climate change is happening: people, communities, biodiversity and ecosystems are already experiencing its impacts. Adaptation is necessary to cope with these changes. Climate change impacts will include more frequent and severe floods and droughts; disruption to food and water supplies; increasing frequency of natural disasters; changes in the range of disease vectors; reduction in ecosystem services; changes in species ranges; and extinction of many species, including those critical for ecosystems to function and essential for supporting human well-being.

We all ultimately depend on natural resources, ecosystem function and services and biodiversity for our health, prosperity and well-being. However, ecosystem loss or degradation can remove a vital lifeline from many of the world's most climate change-vulnerable communities, who are also some of the poorest. Loss of ecosystem services is a significant barrier to the achievement of the Millennium Development Goals.

Healthy bio-diverse environments play a vital role in maintaining and increasing resilience to climate change, and reducing climate-related risk and vulnerability. Species loss can increase the vulnerability of ecosystems to further impacts of climate change, with significant impacts on people and livelihoods. Climate change adds a further pressure on many natural systems and people already negatively impacted by unsustainable practices such as deforestation and land degradation.



Healthy, biodiverse forest in Indonesia plays a vital role in maintaining and increasing resilience to climate change.

Adaptation responses that are environmentally sound, and which recognise the value and importance of healthy ecosystems, will help protect the natural resource base, provide alternative livelihood options, and maintain resilience to future climate change. Adopting an ecosystem approach to adaptation – considering whole ecosystems, ecosystem functions and services in all adaptation planning, processes and decision-making – should help prevent ‘mal-adaptation’ and support ‘no regret’ and ‘multiple benefit’ measures. This does not preclude other approaches, but can help integrate all approaches and methodologies necessary to deal with complex and dynamic situations, as well as uncertainty in climate projections.

Adaptation responses can directly use biodiversity and ecosystems to help people adapt to the adverse effects of climate change. Ecosystem-based adaptation¹ includes the sustainable management, conservation and restoration of ecosystems to provide key services that enable people to adapt to climate change impacts. Examples include coastal defence through the maintenance and/or restoration of mangroves, and conservation of agricultural biodiversity to provide specific gene pools for crop and livestock adaptation to climate change.

Ecosystems and their services are often an integral part of community-based adaptation. Ecosystem-based adaptation will often be the first line of defence against the impacts of climate change for the most vulnerable people. Poor communities are often regarded as helpless victims of climate change. But while they are being hit hardest, in many instances they are also the innovators and instigators of practical and effective solutions. Many of these are nature-based, and recognise the close links between well-being, livelihoods and the natural world, and the accessibility, cost-effectiveness and local appropriateness of ecosystem approaches to adaptation.



Drier climate conditions in south-eastern lowland Nepal have caused invasive species to thrive in the Sapta Koshi River, and threaten the local resource base. Innovative local community groups have cleared these invasive plants and used them for fuel and fertiliser. This has helped maintain and strengthen the wetland ecosystem and provided alternative livelihoods for local people.



The Hadejia-Nguru Wetlands in Nigeria provide essential ecosystem services such as water for drinking, agriculture, fisheries and livestock. Local people are restoring these wetlands, which dried out as a result of upstream dams. An example of mal-adaptation, these dams were originally built to help adapt to drought, but have subsequently disadvantaged communities downstream.

How healthy ecosystems are helping the world's most vulnerable adapt to climate change

Through a diverse set of case studies from across the world, and recommendations drawn from them (see *Making it happen* p.14–17), this report shares some of the work that BirdLife Partners are undertaking, working with local communities, to strengthen resilience and build the adaptive capacity of ecosystems and human systems to cope with present and future climate change.

BirdLife Partners are working in many areas already impacted by climate change, and in others where climate change will add to current vulnerabilities. Of BirdLife's 100-plus national Partners, more than 60 are in low income countries, where lives and livelihoods are often intricately linked to the environment. Many of these case studies feature Important Bird Areas (IBAs), important sites for birds and biodiversity, where BirdLife is working with local people to integrate conservation and development goals.

The initiatives, drawn from different geographic regions, include:

- conservation and restoration of **forests** to stabilise slopes and regulate water flows, preventing flash flooding and landslides as rainfall levels and intensity increases (pages 6–7)
- establishment of healthy and diverse **agroforestry** systems to cope with changed climatic conditions (pages 8–9)
- sustainable management of upland **wetlands** and floodplains for maintenance of water flow and quality (pages 10–11)
- **coastal** defence through the maintenance and/or restoration of mangroves and other coastal wetlands to reduce coastal flooding and coastal erosion (pages 12–13)
- integration of 'green' or 'nature-based' **infrastructure and technology** approaches into hard-engineering approaches wherever possible, to avoid damage to ecosystems and mal-adaptation (e.g. The Netherlands case study, p.11; Nigeria case study, p.10)
- national guidance and best practice on **community engagement** in the face of sea-level rise (e.g. UK case study, p.13.)

The case studies demonstrate that recognising and including the role of ecosystems in different approaches to adaptation can provide many benefits. These include:

- **being accessible to rural and poor communities**, and often **more cost-effective** and **enduring** because they provide **local benefits**, and can be **locally managed and maintained** (e.g. Peru/ Ecuador p.7, Haiti p.7, Pakistan p.6, Philippines p.9, Indonesia p.9, Kenya p.8, Burkina Faso p.10, Nigeria p.10, Nepal p.11, Panama p.12, Samoa p.12)

PHILIPPINES *"Palbong is now a community living and working together in harmony with nature."*

Joselito Balbin, Chairperson of the Palbong Community-based Forest Management Association

- **balancing immediate needs with preparation for long-term impacts, providing alternative livelihood options in the face of climate change uncertainty** (e.g. balancing the need for water availability and prevention of flooding in Haiti p.7, Pakistan p.6, Philippines p.9, Indonesia p.9, Nigeria p.10, Nepal p.11, The Netherlands p.11, Panama p.12, Samoa p.12)

HAITI *"BirdLife, working with Haiti Audubon Society, has enabled some important community-based ecosystem management and restoration work to start, but so much more needs to be done to increase the resilience of this critical biodiversity area to the effects of climate change."*

David Wege, Senior Caribbean Programme Manager at BirdLife International



Sustainable fishing
Nepal

NEPAL "The project has hugely supported local people to diversify livelihood activities and therefore adapt with environmental change".

Mr Bhagwan Dahal, Project Officer of Koshi Wetland Project

- **combining indigenous and local knowledge with external expertise** (e.g. indigenous peoples' understanding of water conservation methods in Burkina Faso p.10)

BURKINA FASO "Our programme at Lake Oursi and Lake Darkoye in Burkina Faso has had a positive impact on biodiversity and local people, combining local knowledge and an ecosystem approach to develop capabilities for adaptation to climate change. Sometimes local people need a little help to adapt their ancestral techniques to climate change impacts."

Georges Henry Oueda, Conservation Director, NATURAMA

- **contributing to the conservation and sustainable use of biodiversity**, and thus to meeting other national and international commitments under, for example, the CBD (all case studies, particularly: mangrove restoration in Panama p.12, Samoa p.12, and Palau p.13; and sustainable harvesting, processing and marketing techniques in Pakistan p.6 and Panama p.12)

PANAMA "The mangrove reforestation training has had a positive impact on communities, who are now aware of the value of their mangroves. Our programmes have contributed both to poverty alleviation, and to enhancing ecosystem services."

Rosabel Miro, Executive Director of Sociedad Audubon de Panamá

"One thing we know: if we did not have the mangroves in front of our communities, we would not exist because the mangroves are our shield against the strong winds that occur every year during the hurricane season."

Local community member

- **providing multiple 'win-win' benefits to both society and the environment, lowering the risk of mal-adaptation** (e.g. tropical forests support a range of food staples and alternative harvestable crops for poor communities, protect against erosion, filter the air, sequester carbon, increase water holding capacity, are biodiversity rich, and offer renewable raw materials; Peru/ Ecuador, Haiti and Pakistan p. 6-7)

PAKISTAN "Natural disasters, even minor ones, can have disastrous affect on the poor people of Palas valley. Under these conditions the Palasis are dependent on the natural resources available to them. They substitute staple food with wild vegetables and bring fuel-wood and medicinal plants from forests for their own treatment as well as for their animals."

Local community member

- **building relations and resilience across national boundaries and borders (including at community, sub-national, national, regional and international levels)** (e.g. Peru/Ecuador p.7)

TUMBESIAN "The dry forest shared by both countries is the geographical locale where communities have developed their adaptive strategies. The forests also provide essential services and functions. However, they are among the world's most critically threatened ecosystems. The shared watershed, as well as strong economic and social linkages, made bi-national co-operation for development and natural resources management essential to adapt with climate change vulnerability."

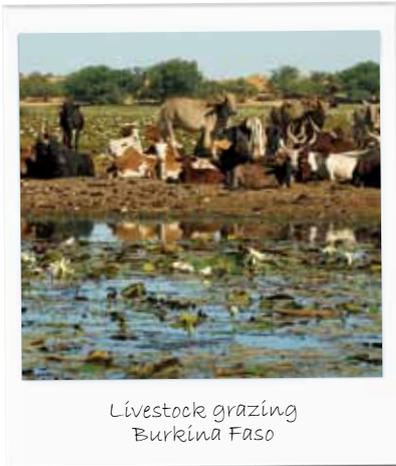
Fernando Angulo Pralongo, BirdLife Peru Programme Co-ordinator

- **working at appropriate functional scales** (e.g. Landscape Management Approach of The Netherlands p.11, the bi-national approach to watershed management in Peru and Ecuador p.7, or the valley-scale non-timber forests products management plan of the Palas Valley, Pakistan p.6)

NETHERLANDS "This project is a brilliant showcase of what a climate buffer should be: increasing the resilience of our water systems, and restoring habitat for marshland birds in the process!"

Robert Kwak, Head of Conservation at Vogelbescherming Nederland

- **contributing to mitigation through maintaining carbon storage** (e.g. combating deforestation and educating on diversification of coping and livelihood strategies in Ecuador p.7, Haiti p.7, Kenya p.8, Indonesia p.9, and the Philippines p.9).



Livestock grazing
Burkina Faso



Watershed protection
Tumbesian Forests

Forests

Forests are home to much of the world's biodiversity and many of the world's indigenous peoples. A large proportion of the world's poor depend on forests for their livelihoods and direct needs. Forest ecosystems provide a wide range of ecosystem services that benefit humans locally and globally, for

Case Study 1.

Palas Valley, Pakistan

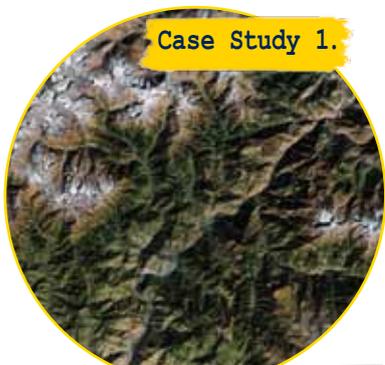
Extreme weather events and other natural disasters have disrupted the lives of communities living in the Palas Valley IBA, a remote part of Pakistan's North West Frontier Province, several times in recent years. In 1992, a '100-year' flood caused widespread destruction to the valley, destroying housing and infrastructure such as bridges, watermills and irrigation channels, and washing away farms and stores of food and fodder. Floods and landslides again rocked the area in 2007. The increase in summer and winter precipitation over the last 40 years in Northern Pakistan^{10,12} suggests that such events could become increasingly common.

Evidence following these events showed that damage was less in valleys where forests covered the mountain slopes and helped regulate run-off, compared to neighbouring valleys where widespread deforestation had taken place.

Working with a number of national Partners, including WWF-Pakistan, the Government of North West Frontier Province and the World Pheasant Association, BirdLife has been supporting development and the sustainable management of forests and natural resources in the Palas Valley since 1992. The forests in Palas are entirely owned by local tribes, though they have to be managed according to a management plan agreed with the Provincial Forest Department.

Working together on organisational capacity development with tribe-based institutions, BirdLife has supported production of a management plan focused on delivery of a range of natural resource goods and services, with particular attention to harvesting and marketing of non-timber forest products that require healthy forest ecosystems. Using and managing the forests sustainably helps reduce vulnerability to extreme weather events and related impacts. Unpredictable weather events resulting from climate change will only increase the importance of local resilience linked to the health of intact forest ecosystems.

The project is expected to help provide cash income from the sale of sustainably harvested timber, while also providing the ecosystem goods and services that support climate change adaptation and are so important to people living in an area largely cut off from centrally provided services.



Assessing needs



Natural forest



Terraced agriculture



Western Tragopan

Biodiversity benefits

Palas Valley includes the largest single tract of Western Himalayan temperate forest habitat in Pakistan. Eight of the 11 characteristic species of the Western Himalayas EBA occur in the Palas Valley, and the population of Vulnerable (using 2009 IUCN Red List categories) Western Tragopan *Tragopan melanocephalus* in the IBA is believed to be the largest remaining in the world. Within an IUCN identified region of high floral endemism, Palas also contains the largest known population of the Vulnerable West Himalayan elm *Ulmus wallichiana*. The area is also home to the Endangered Snow Leopard *Panthera uncial*.

example: carbon storage; maintaining biological diversity; and regulating rainfall, water infiltration and flooding. Conservation, sustainable management and restoration of natural forests can increase resilience and capacity to adapt to climate change, as well as supporting mitigation.

Macaya Biosphere Reserve, Haiti

Caribbean hurricanes are predicted to become more severe, with increased precipitation and higher peak wind speeds³³. Such events have caused much damage and loss of life in Haiti, especially where highly degraded watersheds have resulted in flash flooding and mudslides down denuded hillsides.

BirdLife and Haiti Audubon Society are working with local communities in the buffer zone of the Macaya Biosphere Reserve in south-western Haiti, to conserve and reforest the areas around the primary water sources with native plant species. This stabilises the slopes, and ensures continued supplies of drinking water to local communities – the water supply system for two communities in the buffer zone has already been restored.

The project is building organisational capacity, and forming and enabling watershed management committees to produce management plans that recognise adaptation, mitigation and biodiversity co-benefits, and utilise traditional knowledge. These activities are all contributing towards alleviating the devastating pressure on local forest resources and biodiversity.

The project balances the immediate need for water availability with preparation for the longer term impacts of climate change, in a cost-effective and locally appropriate manner that does not undermine, but rather fully utilises, the functioning of ecosystems.

Biodiversity benefits

Macaya Biosphere Reserve is in the Massif de la Hotte, which is one of the most important KBAs in the world, supporting populations of 42 globally threatened species, including 18 Critically Endangered amphibians.

Case Study 2.



Forest watershed

Tumbesian forests, Peru/Ecuador

The Tumbesian dry forests of south-western Ecuador and north-western Peru provide major ecosystem services, including protection of the largest river catchment west of the Andes, promotion of fog-drip which lengthens the growing season by two months, and genetic diversity and forest resources for local livelihoods. Climate change-related impacts will affect these services. They are predicted to include floods and landslides (exacerbated by soil loss), and the more intense precipitation often associated with El Niño³⁰.

The Nature and Culture International (NCI) project 'La Ceiba-Pilares' is working to retain the essential services the forest provides, which will become even more important with changing climate conditions. Through the work of NCI to strengthen local community land rights, community-based organisations have formed to improve sustainable management of forest resources, and to provide micro-credit for sustainable livelihood diversification. Benefits include improved food security and greater diversity of natural resources, as well as a social network which will help identification of, and adaptation to, climate change impacts.

The shared watershed, as well as strong economic and social linkages, made bi-national transboundary co-operation for development and natural resources management essential. In Ecuador, NCI is supporting the implementation of the Watershed Conservation Programme, FORAGUA, which aims to establish municipal watershed reserves in forested areas. In Peru, it is working with the Provincial Government of Piura and the Environment Ministry on biodiversity conservation aspects of the Climate Change Adaptation Strategy. This work enhances local and regional capabilities to adapt to climate change, and ensures that people have the knowledge and skills to make their livelihood activities compatible with their natural, social and cultural environment.

Biodiversity benefits

The project area falls within the Tumbesian region EBA that supports 800 bird species, 82 of which are endemic and 8 threatened with extinction.

Case Study 3.



Forests regulate water flow

Agroforestry

Agroforestry (the integration of trees into food and animal production) can be an effective adaptation approach. It is often considered more acceptable to communities than large scale reforestation, because traditional agricultural commodities can continue to be produced through modification of existing farming practices.

Case Study 1.

Kikuyu Escarpment Forest, Kenya

The Kikuyu Escarpment Forest IBA provides water, fuelwood, herbal medicine and building materials for more than 200,000 local people. It also provides the catchment for the drinking water supply for parts of Nairobi. Recent extended dry periods are being linked to climate change, and climate change predictions suggest this may worsen. This has resulted in reduced crop yields, which in turn have driven some local people to undertake largely unsustainable activities such as illegal timber harvesting, overgrazing and charcoal burning, with negative impacts on the forests and the water catchment. This has serious consequences, including resource conflicts between communities linked to reduced water levels.

To help address this, a BirdLife Local Conservation Group (LCG) (the Kijabe Environment Volunteers, KENVO), in collaboration with Nature Kenya (BirdLife in Kenya) and the Kenya Forest Service, has developed community awareness of more diverse strategies for coping with periods of drought. Through site-based community workshops, regular bird and forest walks and local community partnerships, residents have embraced sustainable activities that conserve and create diverse ecosystems, and, in turn, improve water conservation and filtration.

Alternative or adapted livelihood options suggested and supported with training and other activities include agroforestry, crop diversification, eco-agricultural practices such as bee-keeping, grazing management, and keeping livestock that are better adapted to the harsher climate. The forest is also easily accessible from Nairobi, and has excellent potential for ecotourism. These activities replace the proportion of household income derived from the unsustainable use of the forest, help buffer the impacts of climate change, and reduce emissions from deforestation.



Agroforestry



Grazing management



Bee-keeping



Abbott's Starling

Biodiversity benefits

This forest has a rich avifauna, characteristic of the central Kenyan highlands. Preventing forest loss and degradation should benefit the Vulnerable Abbott's Starling *Cinnyricinclus femoralis* and other forest species.

Adaptive benefits of agricultural systems with a diversity of crops and natural habitat include: microclimatic buffering; increased resistance to change impacts such as weather extremes, pest infestations and invasive species; improved soil fertility; more efficient water use; and income diversification. There are also mitigation co-benefits through increasing carbon stocks and reducing deforestation pressure.

Mbeliling, western Flores, Indonesia

The largely agriculture-dependent population of Mbeliling, western Flores, is highly vulnerable to crop failure, given the predicted decrease in precipitation during the dry season at higher altitudes, the extended dry period, and the higher temperatures associated with the climate change projections for southern Indonesia.

Through agroforestry and organic farming, Burung Indonesia (BirdLife Partner in Indonesia) has worked with community groups in 27 villages around Mbeliling IBA to improve the economic productivity and long-term viability of the local landscape. The soil is managed to avoid nutrient depletion and to increase organic matter, which makes it less prone to drought, flooding and water-logging. The project helps reduce pressure on the local forests, including Mbeliling IBA, from people seeking new land to farm as soils become exhausted and land degraded. The forests, the ecosystem services they provide, and the more sustainable agricultural practices being employed, will help build local resilience to the increasing impacts of climate change. The project has also instigated a productive learning environment through lesson sharing with a similar project in eastern Indonesia.

Biodiversity benefits

If deforestation is halted, Mbeliling IBA could remain the richest area for restricted-range birds in Flores. It supports four globally threatened species, the Endangered Flores Hanging-parrot *Loriculus flosculus*, Flores Monarch *Monarcha sacerdotum* and Flores Crow *Corvus florensis*, and the Critically Endangered Yellow-crested Cockatoo *Cacatua sulphurea*.



Organic farming

Case Study 2.



Soil management

Mount Siburan, Philippines

At the Mount Siburan IBA in Occidental Mindoro, the Haribon Foundation (BirdLife Partner in the Philippines) has implemented a project to restore the remaining forests and build sustainable and diverse livelihood options. This will help reduce the vulnerability and enhance the adaptive capacity of communities to predicted climate change. An increase in inter-annual variability of the onset of rainfall, and more frequent extreme events⁵⁰, will impact on water resources and crop productivity.

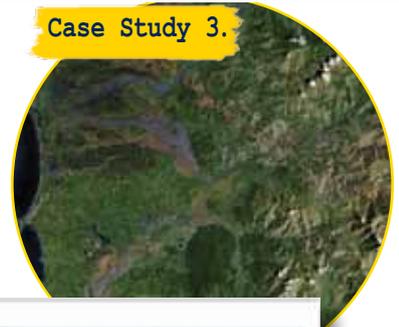
The project's goals include the restoration of denuded forests using native tree species; introduction of environment-friendly agricultural practices, such as organic farming in place of slash-and-burn cultivation; and piloting sustainable livelihood options using non-timber forest products, such as mat-weaving, broom-making and small-scale vegetable production.

Through the partnership of Haribon and the Palbong community, logging activities have dropped by 50% in two years, and no new clearing of forest for agriculture and homesteads has been recorded. This work has improved ecological and social resilience to climate change. By involving local stakeholders from the project's inception (in raising awareness, capacity building, resource inventory and assessment, resource management planning, and advocacy), acceptance and ownership of proposed sustainable livelihood options has been achieved.

Biodiversity benefits

Protection of the Mount Siburan IBA probably represents the best opportunity to prevent the extinction of the Critically Endangered Mindoro Bleeding-heart *Gallicolumba platenae* and Black-hooded Coucal *Centropus steerii*, and the Endangered Mindoro Hornbill *Penelopides mindorensis*.

Case Study 3.

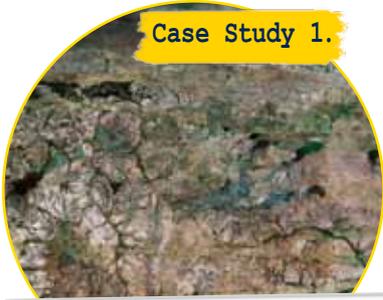


Tree nursery

Wetlands

Freshwater ecosystems occupy less than 1% of the earth's surface, but sustain life and provide economic goods and services of enormous value. However, inland and coastal wetlands are being lost and degraded faster than any other ecosystem type⁵.

Case Study 1.



Collecting water

Lake Oursi-Lake Darkoye, Burkina Faso

More than 17,500 people live in and around the Lake Oursi-Lake Darkoye IBA and Ramsar site, in the north of Burkina Faso. The area consists of seven seasonal lakes, surrounded by dune, steppe and semi-arid grasslands. The 12 communities in the IBA rely mostly on ecosystem services for their livelihoods, which include farming, livestock grazing and fishing.

The long-term negative climate impacts are predicted to be linked to increased temperatures and reduced rainfall, said BirdLife Partner NATURAMA's Conservation Director Georges Henry Oueda²⁴: "Climate change will convert most of the area into an arid zone. Many biological resources including birds and mammals will suffer, and it's likely that future climate change will also have an impact on social cohesion."

NATURAMA is working with local people to ensure that water conservation mechanisms are in place, such as ditches, small dams and small lakes (*boulis*) for water collection, with tree planting for improved filtration during the rainy season. Techniques for 'wise use' of water, especially in relation to agroforestry, are also being promoted.

Biodiversity benefits

The IBA supports more than 200 bird species including 106 waterbird species and 5 species found only in the Sahel biome, as well as the globally Vulnerable Red-fronted Gazelle *Gazella rufifrons* and Cheetah *Acinonyx jubatus*.

Case Study 2.



Cutting *Typha* to unblock channels

Hadejia-Nguru Wetlands, Nigeria

The Hadejia-Nguru Wetlands, an IBA and Ramsar site, lies on the southern edge of the Sahel savanna in north-eastern Nigeria, and is a floodplain comprising permanent lakes and seasonal pools, all connected by channels. These wetlands provide essential ecosystem services including water for irrigation of export products such as peppers, as well as dietary staples such as millet and sorghum. The seasonal pools are particularly important as they support: irrigation of land outside of the wet season; livestock grazing (250 herds with an annual cattle trade turnover of about US\$ 2.75 million); and fishing for the majority of the 1.5 million people of the floodplain, with fishing providing a major component of household cash income (approx. 6% of Nigeria's inland fish catch with a market value of about US\$ 300,000 per annum). The diverse nature of these services ensures flexibility in resources and income, which is vital to the ability of communities to adapt to environmental shocks like drought. The wetlands also provide water to groundwater reservoirs that supply wells and boreholes for a large proportion of this Sahelian area.

Climate change has compounded wetland shrinkage caused by upstream dams built to supply water for irrigated agriculture, in response to droughts that were affecting communities both upstream and downstream. These developments did not consider downstream effects, and as water levels have dropped and the velocity of water flow in rivers has decreased, *Typha*, a native wetland plant species, has thrived and blocked the waterways. This has prevented a natural flooding regime so that water has not been able to reach the floodplain and pools, whilst at the same time flooding areas of productive farmland upstream of the blocked channels.

As part of the 'Wings Over Wetlands' Project (The UNEP/GEF African-Eurasian Flyways Project), BirdLife Partner the Nigerian Conservation Foundation, has empowered local communities to counter the mal-adaptation impacts of the dams by restoring wetland ecosystems through clearing the *Typha*. This work by the communities has not only restored a more natural flood pattern, but has also increased household incomes. Building on this success, the communities have now set up their own maintenance programme.

Biodiversity benefits

Located at the edge of a desert ecological zone, these wetlands ecosystems provide wintering stop-over sites for 68 different waterbird species such as Ruff *Philomachus pugnax* and Spur-winged Goose *Plectropterus gambensis*.

Healthy wetlands can greatly increase our resilience to climate change impacts such as storms, floods or droughts. For example, floodplains, peatlands and lakes reduce peak flood flows in periods of extreme rainfall, and can help compensate the impacts of glacier melt. Due to their ability to store and slowly release water, wetlands can also be a vital lifeline in periods of extreme drought.

Koshi Tappu Wetland, Nepal

Koshi Tappu Wildlife Reserve, an IBA and Ramsar site, lies on the floodplain of Sapta Koshi River in south-eastern lowland Nepal. Unusual rainfall patterns have caused fluctuations in water levels, including a longer dry season that has led to water bodies drying up. This has resulted in the depletion of habitat of waterbirds and fishes, and of the natural resource base (fish, molluscs and water for crops) that sustains many of the poorest people. Invasive plant species have thrived in the drier conditions, resulting in further loss of biodiversity.

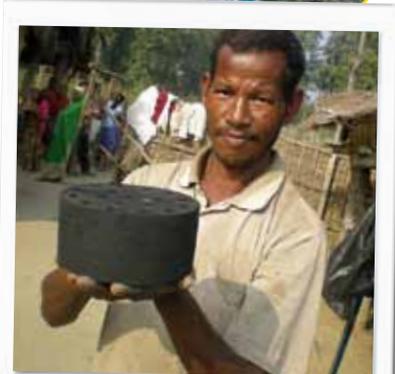
The wetland reed *Typha* (used for mat weaving and fuel) has decreased due to the intense drying out of wetlands. The response has been to use manure as an alternative fuel source, meaning that it is no longer available as crop fertiliser.

Working with local communities, Bird Conservation Nepal (BirdLife in Nepal), has successfully implemented a project integrating biodiversity conservation with livelihoods, which addresses immediate climate impacts and helps build resilience and adaptive capacity for the future. Activities include promotion of bio-fuel production (briquettes made from wetland invaders such as *Iponea* and *Laneria*), and fertiliser production from the invasive water hyacinth *Eichhornia*. Clearing invasive plants to use in these products helps maintain and strengthen the wetland ecosystem. Community mobilisation and training has created new opportunities for indigenous people, and promoted the transfer of local knowledge from one community group to another.

Biodiversity benefits

The area supports eight globally threatened species of birds, as well as the globally Endangered South Asian River Dolphin *Platanista gangetica* and Critically Endangered Fish-eating Crocodile *Gavialis gangeticus*.

Case Study 3.



Briquette from invasive plant

Landscape Management Approach – Ooijpolder ‘climate buffer’ project, The Netherlands

With its largest rivers tamed by dikes and dams, and the Zuiderzee dammed to form the IJsselmeer, The Netherlands thought it had won the battle against water. Water is imprisoned in asphalt, steel, basalt and concrete, but the cost of maintenance is rising by the day. At the same time, The Netherlands is sinking, due, among other things, to intensive draining, and to the disruption of natural processes such as silting and peat formation.

As sea level rises here because of climate change²⁰, the rivers and storage basins on which land drainage depends are less able to carry water to the sea. This is happening already, and more frequently when north-westerly gales and heavy rain combine. Extreme precipitation is causing more flooding in river and stream basins, damaging property and agriculture, and overflowing sewer systems.

Conversely, low river levels in summer, contributed to by retreating glaciers in the Alps, will lead to water shortage and deteriorating water quality, and will affect commercial shipping, farming, recreation, and natural ecosystems.

To counter these national threats, natural ‘climate buffers’ have been developed as part of a landscape management approach to climate change. Buffers can be created by relocating river dikes, developing and restoring overflow areas and reed marshes in the alluvial plain, broadening tributary river mouths to slow outflow into the river, extracting clay and sand along contour lines (a source of sustainable building materials), and digging bypasses or even completely new rivers.

Vogelbescherming Nederland (BirdLife Netherlands) has conducted such a project as a partner in the Ooijpolder ‘climate buffer’ project. The project²⁵ has also restored conditions for wetland biodiversity.

Biodiversity benefits

Climate buffer projects develop a natural succession of wetlands, marshy grasslands and riparian forests. This contributes to the Dutch Ecological Network in assisting species to move as their climate space shifts with climate change.

Case Study 4.



Natural ‘climate buffer’

Coastal

Coastal wetlands such as mangrove forests can reduce the impacts of waves, storms, and sea-level rise by accumulating silt, reducing erosion and absorbing wave power. Protecting and restoring 'green infrastructure', for example through mangrove restoration or managed realignment of coastal wetlands, can be a cost-effective and affordable long-term strategy to defend human communities against climate change impacts.

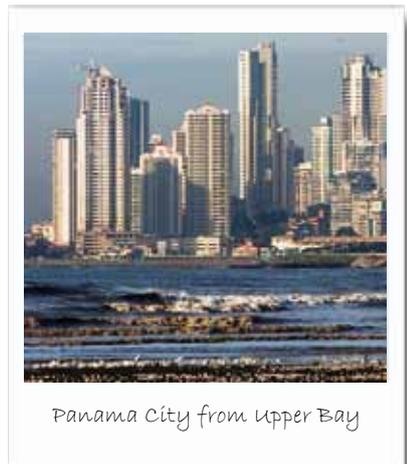
Case Study 1.



Upper Bay of Panama

Protection of the mangrove forests in the upper Bay of Panama has been credited by local communities with reducing the impact of hurricanes. The mangroves act as natural shields not only to the valuable endemic coastal biodiversity, but also to human life, property and sustainable development projects in the adjacent region, by absorbing wave energy, reducing erosion, and protecting fresh water from saline intrusion. They also provide a nursery area for a substantial part of Panama's shrimp and fishing industry, as well as one of the best habitats for migratory shorebirds.

BirdLife Partner Panama Audubon Society (PAS) has provided wetland management training to Local Conservation Groups (LCGs) in the area. Mangrove restoration, as part of an integrated coastal management plan, has contributed to poverty alleviation by improving capacity in sustainable harvesting of fish, molluscs and other mangrove forest resources. This strengthening of local capacities, together with network and advocacy training (e.g. to influence government into legislative reform that controls exploitation), provides a basic platform from which to start designing self-help sustainable development that will help maintain ecosystem services and reduce vulnerability to climate change.



Panama City from Upper Bay



Key stopover site for shorebirds

Biodiversity benefits

This IBA, a Ramsar site, and part of the Western Hemisphere Shorebird Reserve Network, is one of the most important areas for migratory shorebirds in the Americas – the highest single day count was more than 360,000 in October 1998.

Case Study 2.



Samoa

The South Pacific Sea Level and Climate Monitoring Project suggests that sea levels around Samoa are rising by 3.8 mm per year due to thermal expansion and the melting of glaciers and ice caps³⁶. With 74% of Samoa's people and infrastructure in low-lying coastal areas, O le Si'osi'omaga Society Incorporated (OLSSI), Samoa's BirdLife Affiliate, is working with the Matafaa Indigenous village community to protect their IBA, KBA and coastal mangroves. This will help protect their agricultural land from cyclone and tsunami-related flooding and erosion, which is predicted to increase in frequency and intensity with climate change.

"This kind of undertaking, which involves the whole community, is a better use of the support available from the UNFCCC Clean Development Mechanism than any expensive seawall funded through external agencies", said OLSSI's Executive Director, Fiu Matese Elisara. The mangrove conservation project also helps the local people to enhance benefits from existing natural resources such as herbal medicine plants (the primary form of health care), fuel and fibre, fish, and associated biodiversity. This community involvement helps to address the issues in the Samoan National Adaptation Programmes of Action, and demonstrates the invaluable process of involving the Indigenous peoples as resources owners in the process from the beginning, and promoting a genuinely participatory approach.



Coastal mangroves



Matafaa Village Mangrove Conservation Area

Biodiversity benefits

Species that will particularly benefit from mangrove restoration include: Pacific Black Duck *Anas superciliosa*, Pacific Reef Heron *Egretta sacra*, Flat-billed Kingfisher *Todiramphus recurvirostris*, Cardinal Myzomela *Myzomela cardinalis* and Wattled Honeyeater *Fouleharjo carunculatus*.

Such measures can provide multiple co-benefits, for example food and raw materials, livelihood options such as fishing and tourism, conserving biodiversity, and carbon storage¹⁷. In comparison, hard infrastructures, including seawalls and levees (often manufactured from materials with high carbon footprints), can be more expensive to build and maintain, and can impact on important natural processes up and down stream.

Babeldaob Island, Palau

The low-lying islands and atolls of Palau in the Pacific Ocean are especially vulnerable to climate change impacts. These include the increased frequency of drought and storms, saltwater inundation and coastal erosion.

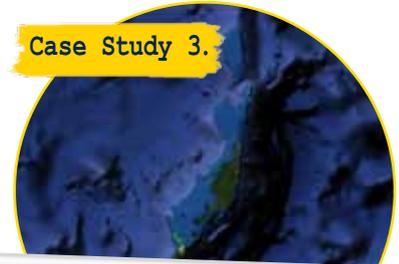
Over the last three years, Palau Conservation Society (PCS), BirdLife's Partner in Palau, has co-ordinated an ecosystem approach to decision-making, to address coastal erosion on Palau's largest island, the location of three IBAs (Middle Ridge, Western Ridge, and Ngerutechei). By providing information on ecosystem changes, and assisting the formation of community alliances such as the Babeldaob Watershed Alliance, PCS has raised awareness of the importance of ecosystems and adaptation in land-use planning and environmental impact assessments (EIAs).

Working with communities and government to ensure that adequate forested coastal buffer zones are in place is helping to mitigate coastal erosion, and minimise the impact on water quality from saltwater inundation. It will also improve the conservation of coastal biodiversity.

Biodiversity benefits

The low-lying islands and atolls of Palau are especially important habitat for endemic and globally threatened species such as the Near Threatened Giant White-eye *Megazosterops palauensis* and the Endangered Micronesian Megapode *Megapodius laperouse*.

Case Study 3.



Forest acts as a coastal buffer

Humber Community Project, United Kingdom

Climate change predictions suggest the sea level around the Humber Estuary will rise by about a third of a metre over the next 50 years. Bigger, more frequent storms are also expected. The existing sea defences will struggle to cope, leading to increased risk of flooding. Vital and protected intertidal habitats are disappearing, squeezed against traditional flood defences such as sea walls and embankments.

The low-lying land around the Humber Estuary is home to about 400,000 people. The area contains major industries, including power stations, refineries and the country's largest port complex (over £7 billion in assets). Of the remaining land, over 80% is farmed. Most of the Humber Estuary is designated as internationally important habitat.

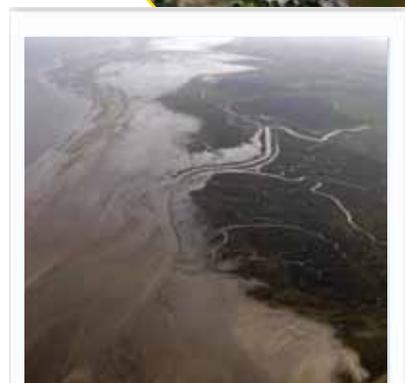
The Coastal Futures-Humber Community Project was set up to support communities experiencing coastal change and sea-level rise along the north bank of the Humber Estuary. The initiative was developed in partnership by the RSPB (BirdLife in the UK), the Environment Agency and Natural England. It was funded by the UK Government, recognising that time and effort invested to support communities in the early stages of strategy or project development can save time and effort later, and allow for the delivery of additional co-benefits.

The project was designed to engage with local people about sea-level rise, the effect this may have on the Humber Estuary, and proposals to manage this – including managed realignment, the process of moving the line of flood defences inland and then breaching the old defence, allowing the sea to naturally create more habitat. This technique means that costly flood walls and embankments don't have to be built as high to provide the same level of protection to communities. It has helped to identify local issues and allowed community concerns and aspirations to be taken into account in the design of schemes¹⁷.

Biodiversity benefits

The vast majority of the Humber Estuary is designated as a Ramsar site, as well as a Special Protection Area and Special Area of Conservation – every winter, over 175,000 waterbirds rely on the estuary for vital re-fuelling¹⁸.

Case Study 4.



Flood defences moved inland

Making it happen...

All stakeholders have a role to play in ensuring successful adaptation, which includes valuing and taking account of the natural world in our actions. Processes should be fully inclusive and participatory at all levels.

The role of ecosystems in climate change adaptation is relevant to, and should be applied at, all scales: local, landscape, national, transboundary and international. Understanding how ecosystems work can provide a useful organising principle in determining the most appropriate scale to work at, and can improve the effectiveness of co-operation between different stakeholders, levels of governance and natural resource-dependent sectors. BirdLife's unique local-to-global structure has enabled structures and processes to be established that contribute to long-term and flexible approaches to climate change adaptation.

BirdLife is engaging with policy and practice at local, national and international levels, and leading by example on land that Partners own or manage with local people. This involves building the capacity of national NGOs, building effective links to government planning processes, and providing sound, science-based information and guidance. We are helping to improve understanding of the role of ecosystems in national, sub-regional and regional plans, as well as in individual projects, and using evidence from case studies to contribute to 'learning by doing', and to national adaptation plans. Also, as part of a coalition of conservation organisations and businesses, BirdLife has developed the new Integrated Biodiversity Assessment Tool (IBAT). This allows integration of biodiversity considerations at the earliest stages of adaptation and other project planning, helping governments, funders and companies to ensure that development doesn't damage the natural resource base (including biodiversity) of the country.

What governments can do (at home)

BirdLife believes that to create a climate-resilient society, adaptation priorities need to be agreed in-country, through nationally-led, inclusive and participatory processes. As countries develop, implement and revise their climate change adaptation plans and strategies in the light of growing climate change impacts, BirdLife urges all governments to:

- **base policy on sound science, recognise ecosystems** as cross-cutting and underpinning for adaptation, and **address them within national adaptation frameworks, strategies and plans**, including Least Developed Countries' National Adaptation Programmes for Action (NAPAs)
- **fully involve local communities and resource users in adaptation planning, implementation, monitoring and evaluation**, recognising that important information and traditional knowledge may be held by local NGOs and indigenous groups
- **link or integrate national adaptation plans with other strategic plans and processes**, such as national sustainable development and poverty reduction strategies, and national land-use plans, mainstreaming the value and significance of ecosystems and their services throughout, prioritising vulnerable ecosystems communities depend on
- **work with other nations to address trans-boundary interests** such as shared water resources, migratory species and ecosystems
- **link plans and action to other global commitments** agreed nationally, such as the CBD and the Ramsar Convention
- **significantly step up efforts to protect nature and biodiversity**, as a prime strategy to ensure ecosystem resilience and sustainable adaptation
- **use environmental mainstreaming tools** such as strategic environmental assessments (SEAs) and EIAs in planning and policy, and in project and programme delivery, and ensure that these tools include ecosystem resilience-proofing of plans and projects
- help **foster shared learning, and develop capacity** regarding climate change and the role and value of ecosystems. This is needed within all relevant government departments and national agencies, as well as at sectoral and community levels. It should be gender sensitive
- channel experience of implementation and delivery into appropriate work streams of the UNFCCC, through 'learning by doing'
- support co-ordinated efforts to enable **sustainable management of natural assets** and trans-boundary resources, and to ensure the effective, inclusive engagement of local communities
- address the value and **importance of ecosystems within guidelines for adaptation funding** at the national level.

Rapid climate change is a daunting and new challenge for everyone, and our ability to understand and plan for what climate change may bring is made harder by the uncertainty in projections from climate modelling. Finding appropriate and sustainable solutions should be informed both by the best available science, and by local and traditional knowledge. Climate change plans and strategies need to learn from current and emerging projects and initiatives – supporting a ‘learning by doing’ approach, with regular review and adjustment as circumstances change.

Recognising this, and learning from its own work at different levels, BirdLife makes the following recommendations to *governments, local communities, different sectors*, and the *international community*, to help embed the value and importance of ecosystems into adaptation implementation (policy, processes, planning and action).

BirdLife is helping to support this through the local engagement focus of the many projects conducted by the BirdLife Partners. BirdLife’s Local Conservation Groups (LCGs) network is an initiative for promoting *local involvement and local solutions* to biodiversity conservation and development issues. LCGs help to: identify local vulnerabilities and priority concerns; galvanise local support; raise local awareness; provide a cost-effective mechanism for recording change and identifying threats; and provide an avenue for linking conservation of the environment to development and the livelihoods of local people.

LCGs are also a mechanism for articulating and feeding local concerns and findings back to national and international decision- and policy-makers. BirdLife’s national and regional frameworks provide local groups with support, co-ordination, information on best practice, and access to decision-makers.

What communities can do

BirdLife believes that it is essential that communities and local government should be able to participate actively in decision-making, and that decisions at all levels should be informed by local people, local pilot studies and local experience. This engagement can help ensure locally appropriate and sustainable solutions that take account of local needs and vulnerabilities. To help build adaptive capacity, BirdLife recommends that communities should be enabled to:

- **document and communicate local experience and knowledge** of climate-induced changes and how to deal with them, including working with local NGOs and other non-government stakeholders
- **undertake participatory appraisal** of natural resources, climate change impacts, local needs and options for meeting them, and in doing so provide time to learn from others
- **where appropriate and with free, prior and informed consent, share community, traditional and indigenous knowledge** to help ensure effective and locally appropriate adaptation
- **become actively involved in local and national government climate change adaptation** policy, planning and implementation
- **advocate** where possible for sub-national, national, regional and international **adaptation policy that is locally focused and community-based, taking account of traditional knowledge and the importance of ecosystems and their services**
- **request up-to-date climate change information** and relevant meteorological data in readily accessible and understandable formats, which can be shared widely, and which provides early warning of extreme events and a basis for extreme event prediction.

What sectors can do

BirdLife is working with various sectors at international and regional level (e.g. farming, fisheries, extractive industries, tourism, hunting) to raise awareness of the future challenges and to seek support for sectoral policy reform in the light of climate change. The BirdLife Partnership works in the same direction at national and local levels to: engage in multi-stakeholder processes to promote the need to safeguard ecosystem resilience (e.g. international/national sectoral adaptation strategies, renewable energy planning, protected area management etc.); co-operate with specific multi-national companies to increase their environmental performance; advocates sound rules and regulations for sustainable land-use, which helps sectors to gain planning security; and advocates for economic models and economic incentives that reward land-users for safeguarding ecosystems.

BirdLife believes that all sectors need to adapt and should recognise the value and significance of healthy intact ecosystems in doing so.

BirdLife makes the following recommendations to sector leaders:

- apply an ecosystem approach to business planning and delivery, employing **robust social and environmental safeguards** – in particular to ensure that ecosystem resilience is strengthened rather than weakened by the activities of the sector
- develop and **apply sector- and cross-sector-focused knowledge of the value and role of ecosystems**
- **adopt an ecosystem approach to adaptation, and long-term evaluations** when undertaking **cost-benefit analysis and assessments of alternatives** regarding projects and technologies
- **work together with other sectors** in assessing risks posed by climate change and finding adaptation solutions ('convergent adaptation planning')
- **pilot and demonstrate ecosystem-based approaches to adaptation**, and their cost effectiveness. Involve local communities where possible, and integrate other environmentally and socially appropriate engineering and technological adaptation measures where necessary
- **offer capacity building and training for ecosystem-based adaptation**, targeted at policy makers and practitioners at different levels, working with local communities where appropriate.

Sector-specific recommendations include:

- **Agriculture:** Conduct agricultural policy, research and practice that focuses on systems that promote the long-term health of soil, water and (agro-) ecosystems, learning from local knowledge, and maintaining crop and breed diversity.
- **Water:** Employ integrated water resource management, and effectively protect and restore the ecosystems that naturally capture, filter, store and release water.
- **Transport:** Ensure that new transport networks do not negatively affect the ability of local people or biodiversity to deal with climate change, for example by undermining ecosystem services, or blocking species migration routes.
- **Energy:** Ensure that mitigation responses and energy supply solutions do not undermine long-term adaptive capacity, especially where long-term investment is required. For example, biofuels development or expansion should not cause deforestation or other important habitat loss, and should not undermine livelihoods or the natural resource base of local people.

Notes

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What the international community can do

BirdLife has an active international policy and advocacy programme addressing climate change. This is fully informed by Partners working nationally to influence government policy and positions, which is in turn informed by on-the-ground action and participation with local communities. This facilitates reciprocal learning and replication of good approaches. BirdLife is active at UNFCCC and CBD meetings, as well as with other international conventions, agreements and processes, including those of the European Union and the African Union. It is part of several international and regional NGO coalitions, such as the Climate Action Network, a worldwide network of 450 NGOs working to promote action by governments and individuals that will limit human-induced climate change to ecologically sustainable levels. The BirdLife Africa Partnership has recently developed the Africa climate exchange – a website which serves as a one stop shop on information on climate change in Africa, linking the user to information on climate change impacts, mitigation and adaptation¹⁹.

BirdLife believes that the international community (including governments, conventions, international and regional institutions, multinationals and financial bodies) has a vital role to play, not least by securing an ambitious and well-resourced global deal to address climate change. Recognising the need for common but differentiated responsibilities, BirdLife urges the international community to:

- **secure a legally binding agreement** that cuts global emissions by the amount needed to limit global average temperature rises to less than 2° Celsius above preindustrial levels
- **ensure adequate funding to enable developing countries to adapt to the impacts of climate change, recognising the urgent and immediate needs of the most vulnerable countries.** This funding must be new, additional, stable and flexible, and in the order of \$100 billion per year. It must support planning and co-ordination work, as well as addressing the challenges of climate change on the ground, and should support monitoring, review and valuation
- **Provide support for capacity building** in poor countries to enable them to build resilience, address climate change impacts and to benefit from climate finance
- address the value and **importance of ecosystems within guidelines for adaptation funding** at national or international levels
- developed and industrialised countries (listed in UNFCCC Annex 1) must meet their current commitments and **provide the resources** necessary for immediate implementation of LDCs' National Adaptation Programmes for Action, and **support 'learning by doing', including the role of ecosystems in adaptation**
- **develop technical guidance and capacity to increase the understanding and integration of ecosystems in adaptation** under the Nairobi Work Programme of the UNFCCC
- co-ordinate new or ongoing climate change work and activities on ecosystems and adaptation under **other international agreements or programmes** with the UNFCCC to **share knowledge and experience, and ensure effective use of resources**
- encourage international climate funds and governments to **allocate resources to community-level projects, including those that strengthen local ecosystem resilience** and reduce local people's vulnerability to climate change
- developed countries and regions have to **urgently reform their relevant policies** (such as on trade, agriculture, energy, resource use) to reduce harmful impact on ecosystems or people in developing countries.

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p.2. Rhinoceros Hornbill/ T Laman.

p.3. *Typha* cutting, Nigeria/ J Barnard/BirdLife; Briquette making, Nepal/ B Pandeya.

p.5. Sustainable fishing, Nepal/ B Pandeya; Watershed protection, Tumbesian forests, Ecuador/ D Thomas; Livestock grazing, Burkina Faso/ Wil Meinderts/FotoNatura.

p.6. Assessing needs, Pakistan/ R Nawaz; Natural forest, Pakistan/ G Duke/ BirdLife; Terraced agriculture, Pakistan/ G Duke/ BirdLife; Western Tragopan/ K Howman.

p.7. Forest Watershed, Haiti/ Fondation Segun; Forests regulate water flow, Ecuador/ D Thomas.

p.8. Agroforestry, Kenya/ Nature Kenya; Grazing management, Kenya/ D Thomas; Bee-keeping, Kenya/ Nature Kenya; Abbott's Starling/ M Goodey.

p.9. Soil management, Indonesia/ Burung Indonesia; Organic farming, Indonesia/ Burung Indonesia; Small-scale vegetable production, Philippines/ M Gonzales/ Haribon Foundation.

p.10. Collecting water, Burkina Faso/ Wil Meinderts/FotoNatura; Cutting *Typha* to unblock channels, Nigeria/ J Barnard/BirdLife.

p.11. Briquette from invasive plants, Nepal/ B Pandeya; climate buffer project 't Meertje, The Netherlands/ Gijs Kurstjes/Kurstjens Ecologisch adviesbureau.

p.12. Key stopover site for shorebirds, Panama/ K Kaufmann; Panama City from Upper Bay, Panama/ K Kaufmann; Matafaa Village Mangrove Conservation Area, Samoa/ O le Si'osi'omaga Society Incorporated; Coastal mangroves, Samoa/ O le Si'osi'omaga Society Incorporated.

p.13. Forest acts as a coastal buffer, Palau/ PCS; Managed flood defences moved inland, UK/ @Environment Agency.



BirdLife International is a global Partnership of national non-governmental conservation organisations that strives to conserve birds, their habitats and global biodiversity, working with people towards sustainability in the use of natural resources. The Partnership operates in over one hundred countries and territories worldwide and is supported by over 10 million people. As a global community, we are the leading authority on the status of birds and their habitats. BirdLife promotes sustainable living as a means of conserving birds and all other forms of biodiversity. Partners work together on shared priorities, programmes and policies, learning from each other to achieve real results for conservation and development.

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