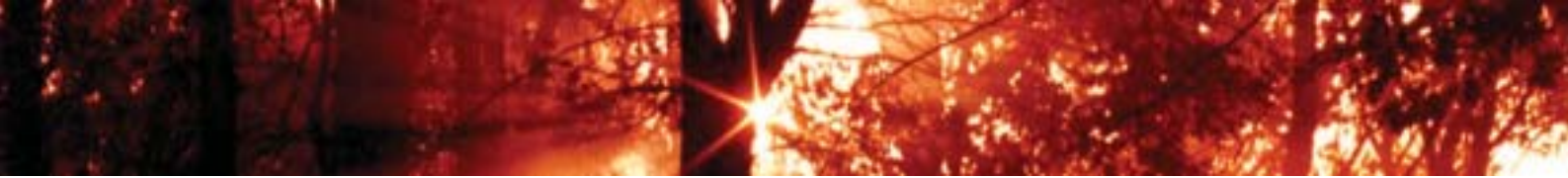




Climate Change and Nature

Adapting for the Future





Conservation strategies have taken little account of the expected impacts of climate change

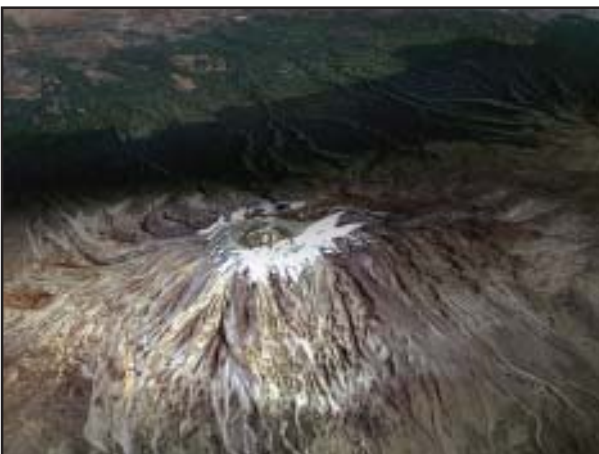
Scant attention has been paid to the changes that are likely to occur to the world's biodiversity over the next few decades due to climate change. Given our investment in protected areas and other conservation strategies, we need to pay more attention to incorporating climate change into our decisions.

Climate change is here and will be with us for a long time to come

The 1990s was the warmest decade in the last hundred years, and 1998 was the warmest year on record. During the last century, global temperatures climbed by an average of 0.6°Celsius, the largest increase in at least one thousand years. Emissions



Mt. Kilimanjaro, 1993 © NASA



Mt. Kilimanjaro, 2000 © NASA

of carbon dioxide are twelve times greater today than a century ago. This is largely due to our use of coal, oil, and gas for energy, but also the burning and conversion of our forests for other land uses. Unless action is taken to dramatically reduce these emissions, the Earth is projected to warm by another 1.4 to 5.8° Celsius during this century. As a comparison, the most recent Ice Age was 5° Celsius cooler than now.

Temperature increases are already affecting the world's physical and biological systems

As a result of this warming, snow cover is decreasing, glaciers are retreating, rainfall patterns are changing, and extreme weather events are more frequent. Diminishing sea ice, coral bleaching, and rising sea levels further add to global distress. These changes are triggering alterations in the range, distribution and population density of a multitude of plants and animals around the globe. Whether the topic is polar bears or poplar trees, there is now compelling evidence that the world is starting to warm up.

Climate change and sea level rise will influence the survival of the world's biodiversity and directly affect human livelihoods

Higher temperatures on land and at sea, as well as changing rainfall patterns, increase the risk of extinction of vulnerable species such as polar bears and amphibians. When exacerbated by habitat fragmentation and other localized stresses, climate change threatens many ecosystems such as the Cape Floristic Province in southern Africa, tropical montane forests, Arctic ecosystems as well as many coral reefs and mangroves around the world. Damage to these ecosystems reduces the services they provide to society and exposes the poorest and most vulnerable communities to more severe and frequent climate-related hazards. This in turn complicates

Climate Change and Nature - Adapting for the Future

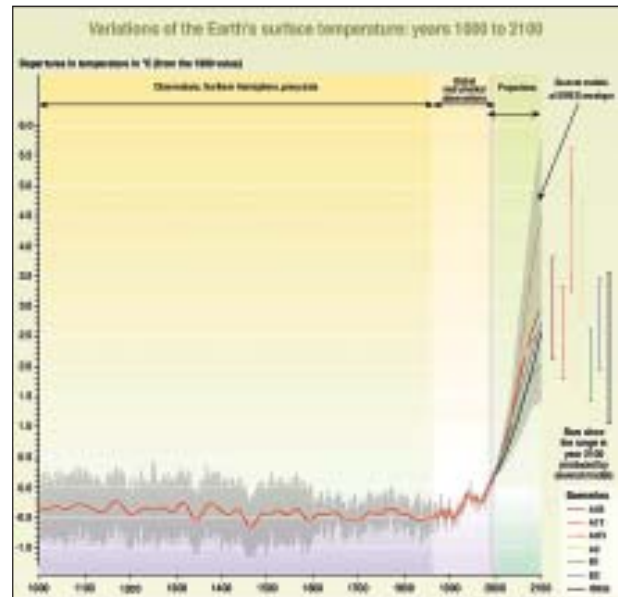
global efforts to reduce poverty and promote more sustainable livelihoods.

We need to adapt to climate change

Although governments and businesses are starting to take responsibility for their emissions, we are now past the point where the warming of the Earth can be avoided. Worse still, the emissions reductions that have been agreed so far are too modest to have any significant impact on the warming trend. Since we cannot prevent all climate change, we must attempt to adapt to it. While more aggressive reductions in greenhouse gas emissions are undoubtedly needed, effective and efficient sustainable development depends upon climate change adaptation becoming a part of natural resource policy and practice.

Conservation strategies must deal more effectively with risks and uncertainties

Existing climate data and models have highlighted general changes to the global climate. However, uncertainties remain about the rate and severity of change at the regional and local level. Global warming



Forecast of global temperature rise (courtesy IPCC)

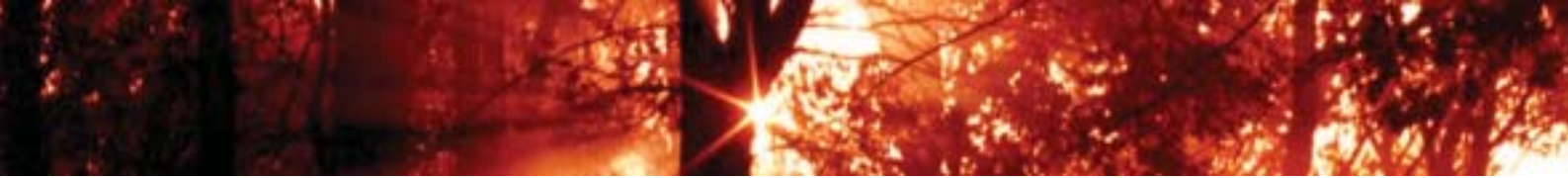
does not mean the same amount of warming everywhere. Some places may even become cooler. The challenge facing the nature conservation community is therefore less about dealing with specific projected impacts, and more about developing strategies to manage the uncertainties created by climate change. A precautionary approach is needed that reduces current risk, plans for the movement of species and keeps future management options open.



Based on a figure provided by Rowan Martin, Harare, Zimbabwe

We need to adopt an adaptive management style - adjusting our actions based on learning

Any management programme needs to be flexible enough to adjust to ongoing and future change. Adaptive management is a systematic process of continually improving policies and practices by learning from the results of previous actions. This means going beyond a static management plan and moving towards a dynamic approach that tests assumptions, monitors results and adapts management actions accordingly. Such a management style should aim to enhance current biodiversity and learn how to accommodate the alterations in species range, distribution and population density triggered by climate change.



Suitable indicators to monitor and evaluate management performance are being developed for climate change (see box).

Adapting to climate change requires better use of knowledge and information

New modeling tools and techniques are becoming available that can project potential changes in species range and distribution on land and at sea. For example, coupling climate data and models with information about biodiversity status and distribution can provide a more detailed understanding of past and



future responses to climate change. These analyses should inform adaptive management strategies for climate change. Investing now in enhancing current biodiversity should be carefully weighed against the cost of delaying actions to address the inevitable impacts of climate change.

Climate susceptibility factors for biodiversity

The following list is indicative of the factors that can help to identify the susceptibility of biodiversity to changes in climate:

1. Bounded distributions such as mountain tops, low-lying islands, high latitudes, and the edges of continents
2. Restricted ranges
3. Poor dispersal capability relative to the projected nearest suitable “climate space,” including:
 - a) Physical limits to dispersal e.g. barriers formed by ocean currents, mountain ranges, desert, fragmented habitat; and
 - b) Limits imposed by species attributes, such as slow-moving, slow-growing, flightlessness in birds and insects
4. Susceptibility to extreme temperatures, droughts, snowfall, winter temperatures, sea surface temperatures, sea level rises or floods

Other indicators:

5. Extreme habitat/niche specialisation such as a narrow tolerance to climate-sensitive variables
6. Close, co-evolved, or synchronous relationships with other species
7. Inflexible physiological responses to climatic variables

Adapting to climate change reinforces a focus on the delivery of ecosystem goods and services within and outside of conservation areas

An increasing emphasis is being placed on approaches to nature conservation that integrate with changing social, environmental, economic and political objectives. These approaches focus on maintaining ecosystem health so that people can directly benefit from the goods and services that ecosystems provide. Protecting upper-catchment forests and restoring wetlands, for example, can reduce the risks from climate-related floods and droughts, thereby protecting people’s welfare and helping to minimize the loss of life and damage to properties and other assets. These investments are likely to be highly cost-effective relative to structural alternatives such as dams and dikes.

We need to focus on managing at the level of landscapes and seascapes

Because many protected areas and other conventional conservation measures assume that the

Climate Change and Nature - *Adapting for the Future*

distribution and composition of species, ecosystems and their services will remain the same *indefinitely*, they are ill-equipped to deal with the expected impacts of climate change. Achieving connectivity among habitats across the landscape or seascape represents the best chance for adapting nature conservation to climate change. Connectivity may be achieved by establishing ecological linkages or by maintaining specific habitats to assist movement of species through an inhospitable environment.

Adapting to climate change will require building new partnerships and capacities

Strategies for achieving connectivity in the landscape or seascape can only succeed if nature conservation is integrated with agriculture, forestry, fisheries and other economic development programmes and policies. At the community level, connectivity must meet people's needs. Only when individuals and communities view landscape or seascape connectivity as in their individual or collective interest will it truly be accepted and implemented. Resources will be needed especially for developing countries to strengthen institutional and individual capacities for managing natural resources more efficiently and equitably. Science-based organizations will need to work hand in hand with natural resource managers to fill knowledge gaps on ecosystem and species responses to climate change, ecosystems functioning and the key attributes of suitable habitats.



We need to communicate and raise public awareness in order for climate change adaptation to be successful

Clear communication of the necessity for adaptation is critical when building public support and endorsement for action. Species loss and ecosystem disturbances such as fire, drought, species invasion, storms, and coral bleaching are powerful events that convince people of the reality of climate change. The economic impact of these events should be clearly articulated. Public discussions about how best to deal with climate change need to be catalysed to generate public and political support for reducing greenhouse gas emissions and promoting adaptation.

Adapting to climate change should start NOW

Climate change strengthens the call for an adaptive management style that focuses on transparency and learning. Such an approach needs to target stakeholders in decision making and implementation at the level of landscapes and seascapes. Coalitions, including governments and their agencies, NGOs, local communities and research institutions, can support immediate actions, plan for the medium term and establish key priorities for the longer term. Whether constituted at the regional, national or international level, these coalitions should aim to bring about change in nature conservation practice to enhance the adaptive capacity of people and nature

to climate change. Several direct actions are listed below.

Policy and planning

1. Improve natural resource planning and management to focus on ecosystem functionality across the landscape and seascape
2. Assess nature conservation legislation and regulation in light of the impacts of climate change
3. Adopt policies that lessen pressures on resources, remove perverse incentives for agriculture, forests, water and fisheries, and incorporate climate change into poverty reduction strategies
4. Develop policies for creating and restoring ecosystems
5. Ensure compliance with existing regulations on the use of land, water and marine resources

Capacity building and awareness

6. Develop awareness campaigns to highlight the value that ecosystem services provide as buffers against climate variability and secure public acceptance for climate change adaptation
7. Strengthen institutional and individual capacities within nature conservation organizations especially in developing countries for dealing with climate change
8. Share information between governments and their agencies, NGOs, communities, and research institutions on potential and observed climate change impacts and extreme events
9. Make resources available for investing in adaptive management especially in developing countries
10. Develop disaster preparedness and recovery systems including forecasting, early warning and rapid response measures

Management

1. Include adaptation to climate change in the management objectives and strategies of conservation areas
2. Create robustness and flexibility within conservation areas to allow for the management of ecosystems and their services in addition to species of conservation interest
3. Enlarge conservation areas where appropriate
4. Create and restore buffering zones and habitat mosaics around conservation areas
5. Implement *ex-situ* conservation and translocation strategies if appropriate

IUCN and its partners look forward to working towards catalysing broad-based and inclusive coalitions to tackle one of the most pressing environmental issues of our time. Only by thinking, working and learning together can we successfully adapt nature conservation strategies to climate change.

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