

# Wildlife in a changing climate



**Cover images, clockwise from left:**

The Lemuroid ringtail possum (*Hemibelideus lemuroides*), particularly the white form, may be at the verge of extinction (photo: Mike Trenerry); the population of the 'i'iwi (*Vestiaria coccinea*) is declining (photo: John Kormendy); and the golden toad (*Bufo perigrines*) is considered extinct (photo: Charles H. Smith). All have been affected by climate change.

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FAO  
FORESTRY  
PAPER

167

edited by  
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ISBN 978-92-5-107089-5

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## Foreword

For the past twenty years climate change has been high on the international agenda. Together with desertification, soil degradation and biodiversity loss, it is widely recognized as the major environmental threat the world is facing. Evidence is increasing that warming and other climate-related changes are happening more quickly than anticipated, and prognoses are becoming worse.

This publication analyses and presents how climate change affects or will likely affect wild animals and their habitats. Although climate change has already been observed and monitored over several decades, there are not many long-term studies on how the phenomenon is affecting wildlife. There is growing evidence, however, that climate change significantly exacerbates other major human-induced pressures such as encroachment, deforestation, forest degradation, land-use change, pollution and overexploitation of wildlife resources. Case studies are presented in this book that describe some of the body of evidence, in some instances, and provide projections of likely scenarios, in others.

An emphasis of this paper is on tropical terrestrial ecosystems. Subtropical, temperate and boreal regions, as well as coastal areas and inland waters, are covered to a lesser degree. These climatic zones and ecosystems are interconnected in many ways, and in particular for animals, there are no strict boundaries between them.

The publication not only highlights climate-induced changes and their likely consequences, but it also provides useful and up-to-date information on how these could be addressed by skilful measures of adaptive management. The findings and suggested measures explore current knowledge and propose a way forward. As climate change is ongoing, there is a need for more concerted research to inform policy and improved monitoring of its implementation. The increased knowledge would allow to better address this urgent issue and further improve climate policy.



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# Acknowledgements

FAO wishes to express its gratitude to the experts who contributed invaluable inputs to the publication. Trevor Sandwith (IUCN) provided comments during the early phase, and the following FAO colleagues helped review and improve chapters and case studies in their areas of expertise: Gillian Allard, Tullia Baldassari, Susan Braatz, René Czudek, Pieter van Lierop and Douglas McGuire. Special thanks to Rebecca Obstler (FAO) for coordinating the publication's editorial production.

# **Wildlife in a changing climate**

# 1. Summary

The world already faces a biodiversity extinction crisis, and it is likely to be made worse by climate change. This paper examines the likely ecosystem and landscape changes that will occur in forests, mountains, wetlands, coastal areas, savannahs, grasslands and steppes. Impacts include changes in physical conditions, weather patterns and ecosystem functioning. As a consequence, terrestrial, freshwater and marine wildlife will be severely affected unless we manage to cope with climate changes through decisive planning and action. The main focus is on tropical terrestrial wildlife and its habitats, but other fauna, ecosystems and geographical regions are covered as well.

The impacts of climate change will include permanent changes in physical conditions, such as snow cover, permafrost and sea level along with increases in both the irregularity and severity of extreme weather events like droughts, floods and storms, which will lead to changes in ecosystems and ecosystem functioning. Degraded ecosystems are expected to be less resistant to climate change than intact ones.

This paper explores several main consequences for wildlife, including:

- *Ecosystem changes*: These include geographical and altitudinal shifts, changes in seasonality and rates of disturbance, changes in species composition and a rapid increase in invasive species.
- *Species interactions*: Impacts on wildlife species include changes in species distribution, abundance and interactions, for example through shifting phenology and mistiming.
- *Human–wildlife conflicts*: These are likely to increase as humans and wild species compete for the same dwindling resources.
- *Wildland fires*: Increased drought, the drying out of previously wet forests as well as human interference and pressure are leading to more frequent and disastrous fires in ecosystems that are poorly adapted to such events.
- *Health and diseases*: Wildlife, humans and livestock will be affected by the emergence and increased spread of pathogens, geographically and across species boundaries, due to climate, landscape and ecosystem changes.

Also considered are a number of responses to climate change:

- *Maintaining current ecosystems*: This is crucial, particularly where ecosystems are reasonably intact and therefore likely to withstand climate change. A strong and effective network of protected areas is a critical element in this strategy.
- *Adaptive management*: Protection alone will not be enough, however, as ecosystems change around us. Wildlife biologists are now considering new approaches and more radical steps, including the relocation of protected

areas, perhaps on a temporary basis, to allow migration to suitable conditions; translocation of species that have lost optimal ecological conditions; artificial feeding of wildlife in times of emergency; and modification of habitats. All of these approaches are accompanied by risks and costs and will require that strong safeguards are in place to be successful.

- *Restoring ecosystems*: Restoration will also be needed, particularly in ecosystems that are important for climate change resilience but are already badly degraded. These include mangroves, inland waters, forests, savannahs and grasslands.
- *Landscape approaches*: Actions taken in isolation are likely to fail, making integrated approaches vital. Examples of fire, invasive species and disease and pest management are included in the paper to allow consideration of how such integration might be applied in practice.

Addressing wildlife management among the multiple other concerns resulting from climate change will be challenging. Developing and communicating information on the value of wild species and ecosystems to humanity will be an important strategy in building political momentum for conservation, alongside ethical considerations. Developing, managing and retaining an effective system of protected areas is critical for success. The concept of “mainstreaming” biodiversity conservation needs to be applied consistently and carefully. Finally, as we embark on a period of great uncertainty, further research and careful monitoring are needed to ensure that adaptive management and other new approaches can succeed in responding to existing and newly emerging climate pressures.