

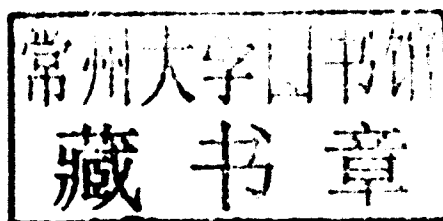
# Climate change guidelines for forest managers



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Researchers for the national forest assessment in Viet Nam, supported by an FAO project, use laser technology devices to measure tree height and diameter (©FAO/Joan Manuel Baliellas)

***Back-cover photo:***

Forest monitoring in the Pacific Islands, which have some of the most vulnerable ecosystems to climate change (© Henry Scheyvens)

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# Foreword

Forests play a significant role in climate change mitigation by acting as “sinks”, absorbing carbon from the atmosphere and storing it in biomass and soils, but, when cleared or degraded, they are also significant sources of greenhouse gas emissions. Forests, therefore, are important components in strategies for adapting to climate change. Without direct management interventions, climate change is likely to jeopardize forest ecosystem health, resilience, productivity, biodiversity and carbon storage, and forest degradation and loss will continue to contribute to climate change.

The strong relationship between forests and climate implies that a dramatic change in one will influence the other. This feedback could be negative in some situations and positive in others. Sustainable forest management can help reduce the negative effects of climate change on forests and forest-dependent people, and it can help ensure that forests play their role in mitigating climate change. Forest management decisions made now will affect forests many decades into the future. Thus, it is important for managers to plan now for climate change.

FAO is publishing these guidelines to support forest managers in responding to climate change challenges and opportunities at the forest management unit level. Articulating specific goals and objectives for climate change can assist forest managers to incorporate climate change considerations into forest management plans and practices. These guidelines will also be of interest to a wider range of stakeholders concerned about forests and climate change.

The guidelines are complementary to the FAO publication *Climate change for forest policy-makers*, which sets out an approach for integrating climate change into national forest programmes to support sustainable forest management. Countries are invited to use the two documents and to adapt them, as necessary, to fit national and subnational circumstances.



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This publication has been produced thanks to the generous contributions of time and expertise by a large number of experts. Initiated in 2010, the process to prepare the guidelines included national consultations in Kenya, Nepal and Peru – FAO thanks all participants in, and the people who supported, these workshops.

International expert consultations on the guidelines were convened in Kathmandu, Nepal (June 2011) and Lima, Peru (November 2011). FAO thanks all participants in those consultations for their valuable inputs. FAO also thanks Francis E. Putz for facilitating the consultations and for preparing the first and subsequent drafts of the guidelines on the basis of inputs received during the expert consultations.

The guidelines benefited from peer reviews by Marc Dumas-Johansen, Fred Kafeero, David Rhodes, Maria Ruiz-Villar and Ian Thompson.

The guidelines were evaluated in two workshops in Kenya and Peru facilitated by Donald Ogwen in Kenya and Pedro Carlos Alberto Llerena Pinto in Peru. FAO thanks both facilitators and all participants in the validation exercises (see Annex 3) for their contributions to the finalization of the document.

The FAO team responsible for the preparation of the guidelines comprised Simone Rose, Susan Braatz and Cesar Sabogal. The document was edited by Alastair Sarre and typeset by Kate Ferrucci.

The development and production of these guidelines was made possible thanks to the generous financial contribution of the Government of Finland under the FAO-Finland Forestry Programme – Sustainable Forest Management in a Changing Climate.

# Acronyms and abbreviations

<b>CBD</b>	Convention on Biological Diversity
<b>CIFOR</b>	Center for International Forestry Research
<b>CO<sub>2</sub></b>	carbon dioxide
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FMU</b>	forest management unit
<b>GHG</b>	greenhouse gas
<b>ITTO</b>	International Tropical Timber Organization
<b>NGO</b>	non-governmental organization
<b>SFM</b>	sustainable forest management
<b>REDD+</b>	reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change

# Executive summary

The effects of climate change and climate variability on forest ecosystems are evident around the world and further impacts are unavoidable, at least in the short to medium term. Addressing the challenges posed by climate change will require adjustments to forest policies and changes to forest management plans and practices.

In 2010, FAO prepared guidelines to support policy-makers in integrating climate change concerns into new or existing forest policies and national forest programmes. This document serves as a companion to those 2010 guidelines. It has been prepared to assist forest managers to better assess and respond to climate change challenges and opportunities at the forest management unit level. Proposed actions are intended to be relevant to all kinds of forest manager – such as individual forest owners, private forest enterprises, public-sector agencies, indigenous groups and community forest organizations. The actions are applicable in all forest types in all regions and for all management objectives. They are generic, so their adaptation to local circumstances is required.

Adaptation and mitigation are the two main responses to climate change. Mitigation addresses the causes of climate change and adaptation its impacts. In the forest sector, adaptation encompasses changes in management practices designed to decrease the vulnerability of forests to climate change and interventions intended to reduce the vulnerability of people to climate change. Mitigation strategies in the forest sector can be grouped into four main categories: reducing emissions from deforestation; reducing emissions from forest degradation; enhancing forest carbon sinks; and product substitution.

Sustainable forest management (SFM) is consistent with climate change adaptation and mitigation and provides a comprehensive framework that can be adapted to changing circumstances. Efforts to advance towards SFM have provided a wealth of knowledge, experience, best-practice guidance, tools, mechanisms and partnerships that can be applied to help meet climate change challenges and which informs this document. Using SFM as an overall framework helps ensure that adaptation and mitigation measures are synergistic and balanced with other forest management objectives and take into consideration the economic, social and environmental values of forests.

This document provides guidance on what forest managers should consider in assessing vulnerability, risk, mitigation options, and actions for adaptation, mitigation and monitoring in response to climate change. Recommended actions for climate change adaptation address impacts on: forest productivity; biodiversity; water availability and quality; fire; pests and diseases; extreme weather events; sea-level rise; and economic, social and institutional considerations. A range of mitigation actions is provided, along with guidance on the additional monitoring and evaluation that may be required in forests in the face of climate change.

# Contents

Contributors .....	v
Foreword .....	viii
Acknowledgements .....	ix
Acronyms and abbreviations .....	x
Executive summary .....	xi
<b>1. Introduction .....</b>	<b>3</b>
Audience and purpose .....	4
Scope .....	5
Content and organization .....	5
<b>2. Climate change and forests .....</b>	<b>7</b>
Climate change processes and projections .....	7
Adaptation and mitigation in forestry .....	8
What does climate change mean for forest managers? .....	9
<b>3. Sustainable forest management and related approaches for effective climate change responses .....</b>	<b>13</b>
Sustainable forest management .....	13
Global, regional and national policies on climate change .....	15
<b>4. Management responses to climate change .....</b>	<b>19</b>
Vulnerability and risk assessment of climate change impacts and mitigation options .....	21
A guiding framework for adaptation actions .....	24
A guiding framework for mitigation actions .....	55
<b>5. Monitoring and evaluation .....</b>	<b>63</b>
<b>6. Conclusion .....</b>	<b>69</b>
<b>Annex 1. Glossary .....</b>	<b>73</b>
<b>Annex 2. Knowledge tools .....</b>	<b>87</b>
<b>Annex 3. Participation in the validation workshops .....</b>	<b>103</b>

**Figures**

1	Forest managers need to respond to a wide range of factors, all of which may be influenced by climate change.....	3
2	The process for integrating adaptation and mitigation measures into forest management plans and practices.....	20

**Boxes**

1	Forest management and forest managers .....	4
2	Carbon sinks and sources.....	7
3	Adaptation and mitigation.....	9
4	Sustainable forest management.....	13
5	Matching genetic variation with the new climate in the Sahel .....	30
6	The Ferny Creek Bushfire Alert System.....	36
7	Catastrophic forest disturbances.....	39
8	Community-based tsunami early warning system in Peraliya, Sri Lanka.....	45
9	Taking back the mangroves with community management.....	54

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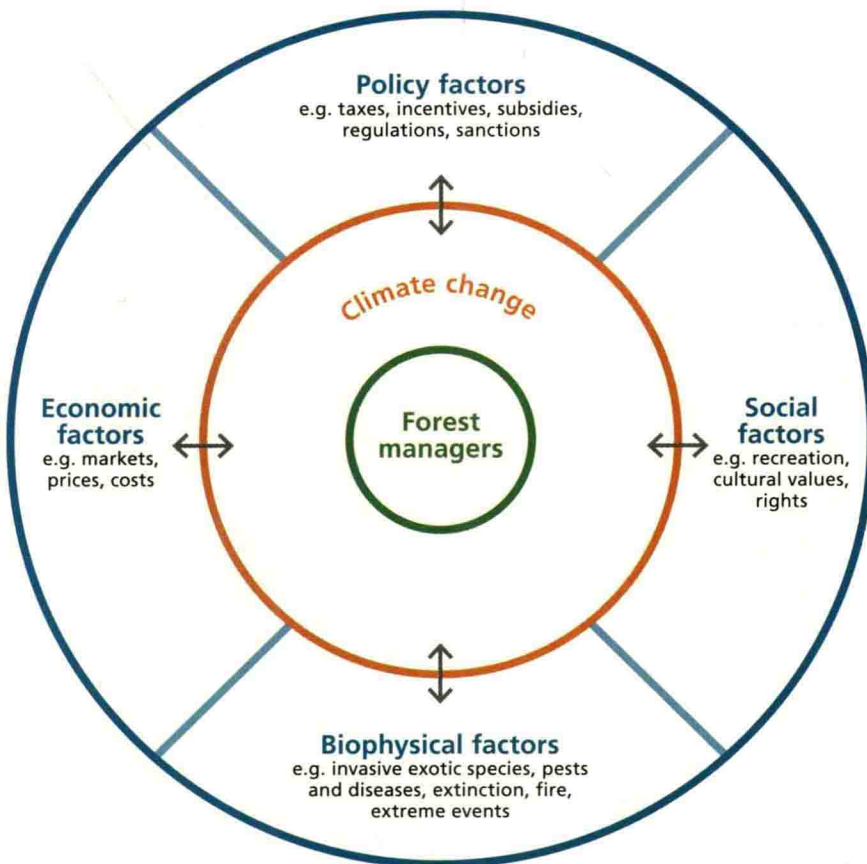


*Sunset over forest-covered mountains, Province of Bac Kan, Viet Nam.  
Climate change is impairing the ability of forests to deliver critical goods  
and ecosystem services, to the detriment of the livelihoods of forest dwellers,  
forest-dependent communities and others who benefit from forests.*

# 1. Introduction

The effects of climate change and climate variability on forest ecosystems are evident around the world and further impacts are unavoidable, at least in the short to medium term. In some cases, climate change is impairing the ability of forests to deliver critical goods and ecosystem services, such as wood and non-wood products and clean water, to the detriment of the livelihoods of forest dwellers, forest-dependent communities and others

FIGURE 1  
Forest managers need to respond to a wide range of factors,  
all of which may be influenced by climate change





who benefit from forests. Meeting the challenges posed by climate change will require adjustments to forest strategies and changes to forest management plans and practices. Delays in taking action will increase the cost and difficulty of making those adjustments.

Climate change is only one of many factors that forest managers must deal with (Figure 1), but its impacts are projected to increase and to have wide-ranging repercussions. While some forests will benefit from increased temperatures and changes in precipitation, most will experience losses of important species, declines in yields, and increases in the frequency and intensity of storms and other disturbances. Adjusting forest management plans and practices to reduce vulnerabilities and facilitate adaptation to climate change is likely to incur additional costs, but these will probably be less than the costs of remedial action in the aftermath of climate-inflicted damage. Forest managers usually bear any increases in management costs, but they may not always benefit from the savings that are made when they take action in response to climate change. Nevertheless, well-informed forest managers will be able to benefit from financial and policy incentives to support climate change mitigation and adaptation actions, and this will help offset the additional costs of managing for climate change.

## AUDIENCE AND PURPOSE

These guidelines have been prepared to assist forest managers (Box 1) to better assess and respond to climate change challenges and opportunities at the forest management unit (FMU) level. The document provides guidance on how to identify, assess and prioritize options for adjusting forest management plans and practices in response to and in anticipation of climate change. These guidelines will also be of interest to stakeholders outside the forest sector, since forest management responses to climate change will influence and be influenced by other sectors and stakeholders.

### BOX 1

#### Forest management and forest managers

##### What is forest management?

Forest management encompasses the administrative, economic, legal, social and technical measures involved in the conservation, protection and use of natural and planted forests. It involves various degrees of human intervention to safeguard forest ecosystems and their functions and resources for the sustained production of goods and the provision of ecosystem services.

##### Who is a forest manager?

A forest manager is an individual or entity responsible for overseeing the management of forest lands or the use and development of forest resources to meet specific objectives. Individual forest managers may have formal education in forestry, equivalent qualifications or local knowledge, and experience in forest-related matters.