

Climate-smart Forestry and Forest Resilience

Integrating Adaptation, Mitigation, and Digital Innovation under Climate Change

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1 Introduction

Forests in Sub-Saharan Africa are among the most important natural resources for both regional development and global environmental stability. They provide a wide range of ecosystem services, including biodiversity conservation, carbon storage, water regulation, soil protection, and livelihood support for millions of people. In particular, forest-dependent communities rely heavily on forests for fuelwood, food, medicinal plants, construction materials, and income-generating activities.

At the global level, African forests, especially the Congo Basin rainforest and Miombo woodlands, play a critical role in regulating the Earth's climate system. These ecosystems function as major carbon sinks, absorbing and storing significant amounts of atmospheric carbon dioxide. As such, they contribute directly to global climate change mitigation efforts.

However, the sustainability of these forest systems is increasingly under threat. Climate change, combined with human-induced pressures such as agricultural expansion, population growth, infrastructure development, and unsustainable resource use, is placing growing pressure on forest ecosystems. Rising temperatures, shifting rainfall patterns, increased drought frequency, and more extreme weather events are expected to significantly alter forest structure, productivity, and ecological functioning across the region (IPCC, 2023; FAO, 2023).

In response to these challenges, new approaches to forest management are required. One of the most prominent frameworks that has emerged in recent years is Climate-Smart Forestry (CSF), which integrates climate change adaptation, mitigation, and sustainable forest management into a unified approach. This article explores how CSF, combined with the concept of forest resilience and digital innovation, can support sustainable forest landscapes in Sub-Saharan Africa.

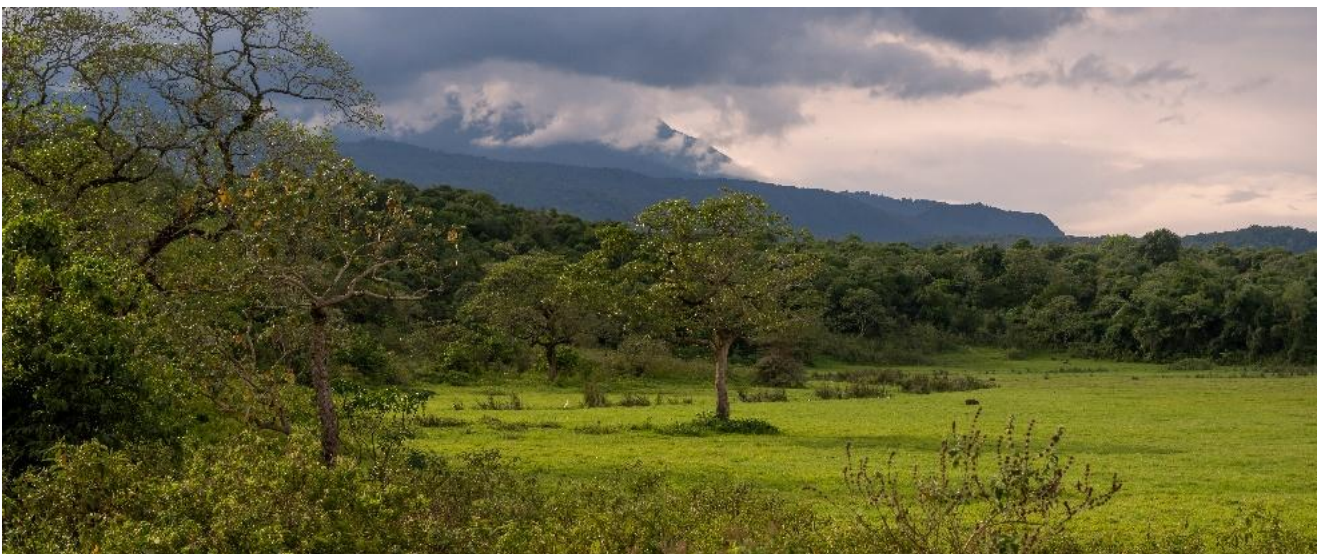


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2 Climate Change Pressures on African Forest Ecosystems

Climate projections consistently indicate that Sub-Saharan Africa will experience significant environmental changes throughout the 21st century. These changes are expected to affect forest ecosystems in multiple and interconnected ways.

Box 1. Key Climate Change Drivers Affecting African Forests

Climate change impacts on African forest ecosystems are driven by multiple interacting factors. These include rising mean temperatures, increasing frequency and intensity of droughts, variability in seasonal rainfall patterns, extreme weather events such as storms and wildfires, and accelerating land-use change. These drivers do not act independently but often reinforce each other, increasing the overall vulnerability of forest landscapes (IPCC, 2023; FAO, 2023).

2.1 Rising Temperatures

One of the most certain impacts of climate change is the increasing temperature. Higher temperatures affect forest ecosystems by increasing evapotranspiration, reducing soil moisture, and creating physiological stress for trees. Many tropical forest species are adapted to relatively stable temperature conditions, making them particularly vulnerable to rapid warming trends.

Over time, these changes can lead to shifts in species distribution, reduced growth rates, and increased tree mortality. In some ecosystems, especially those near climatic thresholds, temperature increases may even lead to long-term structural changes in forest composition.

2.2 Changes in Rainfall Patterns and Drought Risk

Changes in precipitation patterns are expected to be highly variable across Africa. While some regions may experience increased rainfall intensity, others are likely to face longer dry seasons and reduced overall precipitation reliability.

This increased variability has significant implications for forest ecosystems. Seed germination, regeneration processes, and nutrient cycling are all closely linked to seasonal rainfall patterns. When these patterns become unpredictable, ecosystem stability can be disrupted.

In addition, prolonged drought conditions increase the risk of tree mortality and make forests more vulnerable to secondary disturbances, such as pests, diseases, and fires.

2.3 Extreme Weather Events

Climate change is also associated with an increased frequency of extreme events, including heatwaves, storms, floods, and wildfires. These events can cause immediate damage to forest structure and have long-term ecological consequences.

Fire is particularly important in many African forest and woodland ecosystems. While fire is a natural ecological process in some systems, changing climate conditions may increase fire intensity and frequency, leading to ecosystem degradation and reduced resilience.

2.4 Land-Use Change as a Compounding Factor

In addition to climate-related pressures, African forests are also experiencing significant land-use change. Agricultural expansion remains one of the leading drivers of deforestation in the region, alongside charcoal production, logging, mining, and infrastructure development.

The interaction between climate change and land-use change is particularly important. Degraded forests are generally less resilient and less able to adapt to environmental stress, creating a feedback loop that further increases vulnerability.

Box 2. Key Climate Change Trends Affecting African Forests

- Increasing temperature trends across Sub-Saharan Africa
- Higher frequency and severity of drought events
- Unpredictable rainfall and shifting seasonal patterns
- Rising risk of forest fires and ecosystem degradation
- Expansion of agricultural land and deforestation pressure

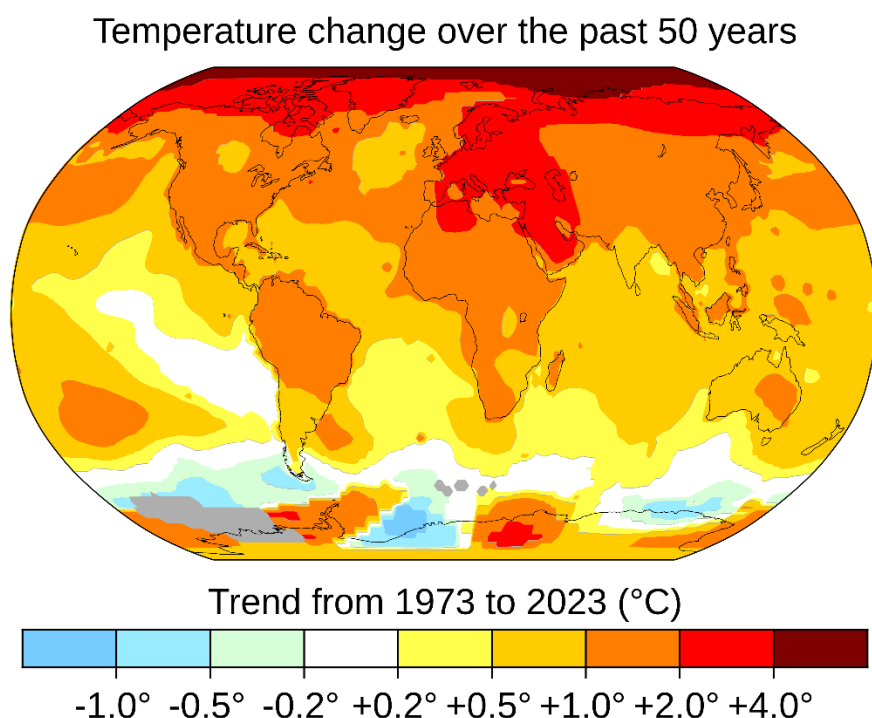


Figure: NASA's Scientific Visualization Studio, Key and Title by uploader (Eric Fisk), Public domain, via Wikimedia Commons. This figure is not covered by the CC BY-NC license of this publication. Refer to the original source for usage.

3 Forest Impacts: Biodiversity, Productivity, Carbon, and Livelihoods

The combined effects of climate change and land-use pressures are expected to significantly impact both ecological systems and human communities.

3.1 Biodiversity Loss

African forests are among the most biodiverse ecosystems globally. However, climate change is altering habitat suitability for many species, leading to shifts in distribution and increased risk of local extinction. Species with limited mobility or narrow ecological niches are particularly vulnerable.

Biodiversity loss has broader implications for ecosystem stability. Diverse ecosystems are generally more resilient because functional redundancy allows ecological processes to continue even when certain species decline (IPBES, 2019).

3.2 Declining Forest Productivity

Forest productivity is closely linked to climate conditions such as temperature, rainfall, and soil moisture. Under climate change, reduced water availability and increased heat stress are expected to negatively affect forest growth and regeneration.

Lower productivity has direct economic consequences, including reduced availability of timber and non-timber forest products. For forest-dependent communities, this can translate into reduced income and increased vulnerability.

3.3 Carbon Storage and Climate Feedback

Forests play a key role in global carbon cycling. However, disturbances such as droughts, fires, and deforestation can reduce carbon storage capacity and release stored carbon back into the atmosphere (Hubau et al., 2020).

This creates a negative feedback loop, where forest degradation contributes to further climate change, which in turn increases stress on forest ecosystems.

3.4 Impacts on Livelihoods

Millions of people across Sub-Saharan Africa depend directly on forests for their livelihoods. Climate-induced forest degradation can reduce access to essential resources, increase food insecurity, and limit income-generating opportunities.

The vulnerability of these communities is often linked to limited access to alternative livelihoods and institutional support systems.

Table 1. Summary of Climate Change Impacts on Forest Ecosystems and Communities. Sources: Author's synthesis based on IPCC (2023), FAO (2023), and IPBES (2019).

Impact Area	Ecological Effect	Socioeconomic Effect
Biodiversity	Species loss, habitat, and species composition shifts	Reduced ecosystem stability, resilience, and ecosystem service provision
Productivity	Mixed productivity responses, although declining growth and regeneration are projected for many forest ecosystems	Reduced availability of forest resources and economic opportunities
Carbon Storage	Potential short-term increases in some areas, but declining carbon sequestration in many regions under prolonged climate stress	Increased climate vulnerability and reduced mitigation potential
Livelihoods	Ecosystem degradation, reduced availability of forest products, and resource scarcity	Reduced livelihood and subsistence resilience, fewer alternative income opportunities, food insecurity, and lower adaptive capacity



Figure: Montane forest in Mount Kilimanjaro, Tanzania. © Eric, Abdobe Sock, # 2101708102.
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4 Forest Resilience as a Foundation for Adaptation

Resilience is a central concept in understanding how forest ecosystems respond to environmental change. It refers to the ability of a system to absorb disturbances, adapt, and continue functioning (Holling, 1973; Folke et al., 2010).

A resilient forest is not necessarily unchanged, but it retains its core ecological functions, including biodiversity support, carbon storage, and ecosystem service provision (Thompson et al., 2009).

Table 2. Key Components of Forest Resilience. Sources: Author's compilation based on Holling (1973), Walker et al. (2004), Folke (2006), Thompson et al. (2009), and IPCC (2023).

Component	Description	Example in African Forests
Resistance	Ability to withstand disturbances	Drought-tolerant Miombo species
Recovery	Ability to regain functionality after disturbance	Natural regeneration after fire
Adaptive Capacity	Ability to adjust to changing conditions	Species diversity supporting ecosystem stability
Transformation	Ability to reorganize when conditions fundamentally change	Shifts in species composition under long-term climate change
Sustainability	Maintenance of ecosystem services over time	Continued provision of fuelwood, biodiversity, and carbon storage

Key drivers of resilience include:

- biodiversity and species diversity
- structural complexity
- natural regeneration capacity
- landscape connectivity
- adaptive management systems

In African forest contexts, resilience is especially important due to high climatic variability and strong dependence on natural resources.

Box 3. Key Concept: Forest Resilience

Forest resilience refers to the capacity of a forest ecosystem to resist, absorb, adapt to, and recover from disturbances while maintaining its essential structure, functions, and processes. Resilience does not imply stability or absence of change, but rather the ability of ecosystems to persist and reorganize under changing environmental conditions such as droughts, fire, pests, and land-use pressure. High resilience is strongly associated with biodiversity, landscape connectivity, and sustainable forest management practices (Folke et al., 2010; IPCC, 2023).

Box 4. Mini Case: Resilience and Restoration in Zambia's Miombo Woodlands

The Miombo woodlands in Zambia represent one of the most extensive dry forest ecosystems in Sub-Saharan Africa and provide essential ecosystem services such as fuelwood supply, biodiversity conservation, and carbon storage. However, these forests are increasingly affected by climate variability, including prolonged droughts, rising temperatures, and changing rainfall patterns, as well as human pressures such as agricultural expansion and charcoal production.

Recent forest landscape restoration initiatives in Zambia have highlighted the importance of combining natural regeneration processes with community-based forest management. These approaches enhance ecosystem resilience by allowing degraded landscapes to recover while maintaining local livelihoods. Strengthening adaptive capacity through participatory governance and sustainable resource use has become a central strategy for improving long-term forest sustainability in the region (CIFOR-ICRAF, 2023; FAO, 2023).



Figure: Miombo woodland. © Ntahonsigaye, CC0, via Wikimedia Commons. The figure made available by the creator under the [Creative Commons CC0 1.0 Universal Public Domain Dedication](https://creativecommons.org/licenses/by-nc/4.0/). This figure is not included in the by the CC BY-NC license of this publication. Refer to the original source for usage.

5 Climate-Smart Forestry: A Holistic Framework

Climate-Smart Forestry (CSF) has emerged as an integrated approach that combines three main objectives:

- **Adaptation:** reducing vulnerability and strengthening resilience
- **Mitigation:** enhancing carbon sequestration and reducing emissions
- **Sustainable production:** ensuring long-term ecosystem services and livelihoods

Box 5. CSF Integration Logic

Climate-Smart Forestry is not a single management tool but an integrated framework that connects ecological processes, governance systems, and socio-economic objectives. Its effectiveness depends on the alignment of policies, local practices, and technological innovations across multiple scales of forest management.

Key Message: Successful Climate-Smart Forestry requires coordinated action among forest managers, local communities, policymakers, researchers, and technology providers. Adaptation, mitigation, and sustainable production objectives are most effective when implemented as mutually reinforcing components of a broader forest landscape strategy.

CSF recognizes forests as complex social-ecological systems rather than purely ecological resources. It therefore integrates ecological processes, governance systems, and socioeconomic dimensions into a unified management framework.

Box 6. Climate-Smart Forestry Framework

Climate-Smart Forestry operates through three interlinked dimensions:

1. **Adaptation**
Reducing vulnerability and increasing the resilience of forest ecosystems to climate change impacts.
2. **Mitigation**
Enhancing carbon sequestration and reducing greenhouse gas emissions through sustainable forest management.
3. **Sustainable Production**
Ensuring the long-term provision of forest goods, ecosystem services, and livelihood benefits.

These three pillars are mutually reinforcing and must be implemented in an integrated manner to achieve effective forest landscape sustainability (FAO, 2022; IPCC, 2023).

6 Key Adaptation Strategies

Implementing Climate-Smart Forestry requires a combination of ecological, social, and technological interventions that enhance the adaptive capacity of forest landscapes. Rather than relying on a single solution, effective adaptation depends on multiple complementary strategies that strengthen resilience while maintaining ecosystem services and livelihood benefits.

6.1 Species Diversification

Species diversification is widely recognized as one of the most effective strategies for increasing forest resilience. Forests composed of multiple species are generally better able to withstand climate-related disturbances because different species respond differently to drought, heat stress, pests, and diseases. This diversity reduces the risk of widespread ecosystem failure and helps maintain essential ecological functions under changing environmental conditions. In restoration and reforestation programs across Africa, mixed-species approaches are increasingly favored over monoculture plantations due to their greater ecological stability and adaptive capacity.

6.2 Forest Restoration

Restoring degraded forest landscapes is a key component of both climate adaptation and mitigation. Restoration activities, including assisted natural regeneration, enrichment planting, and landscape-scale reforestation, help recover biodiversity, improve soil health, and strengthen ecosystem functions. In regions where forests have been degraded by agricultural expansion, unsustainable harvesting, or wildfire, restoration can significantly improve resilience by enhancing the capacity of ecosystems to recover from future disturbances while simultaneously increasing carbon sequestration (UNEP, 2021).

6.3 Agroforestry Systems

Agroforestry integrates trees with agricultural production systems and provides multiple environmental and socioeconomic benefits. Trees improve soil fertility, increase water retention, reduce erosion, and create more stable microclimatic conditions for crops. At the same time, they diversify household income sources and reduce pressure on natural forests. For many smallholder farmers in Sub-Saharan Africa, agroforestry represents a practical and cost-effective adaptation strategy that supports both livelihood resilience and sustainable land management.

6.4 Community-Based Forest Management

Local communities play a critical role in the long-term sustainability of forest resources. Community-based forest management strengthens resilience by involving local stakeholders in decision-making, monitoring, and benefit-sharing processes. Experience from countries such as Tanzania and Zambia demonstrates that participatory governance can improve forest conditions, reduce illegal harvesting, and enhance local stewardship of natural resources. By linking conservation objectives with community needs, these approaches contribute to both ecological sustainability and social resilience.

6.5 Digital Monitoring Systems

Digital technologies are becoming increasingly important in supporting adaptive forest management. Tools such as Geographic Information Systems (GIS), remote sensing, satellite monitoring, and drones provide valuable information on forest cover change, fire risk, degradation patterns, and restoration progress. Access to timely and reliable environmental data enables forest managers and policymakers to make more informed decisions and respond more effectively to emerging climate-related challenges. As digital infrastructure continues to expand, these technologies are expected to play an increasingly important role in Climate-Smart Forestry implementation across Africa.

Together, these strategies demonstrate that effective climate adaptation in forestry is not based on isolated interventions but on integrated approaches that combine ecological resilience, sustainable governance, and technological innovation. Their coordinated implementation can help create forest landscapes that are better prepared to cope with future climate uncertainty while continuing to provide essential ecosystem services and livelihood opportunities.

Box 7. Key Concept: Adaptive Capacity and Climate Adaptation

Adaptive capacity is the ability of a forest ecosystem or socio-ecological system to adjust to climate change impacts, minimize potential damage, and take advantage of emerging opportunities. In forest systems, adaptive capacity is influenced by biodiversity, genetic variation, ecosystem connectivity, soil conditions, institutional governance, and management practices. Strengthening adaptive capacity is a key requirement for effective Climate-Smart Forestry implementation, particularly in climate-vulnerable regions such as Sub-Saharan Africa (IPCC, 2023; FAO, 2023).

Key Message: Adaptation strategies are most effective when they enhance the adaptive capacity of both forest ecosystems and the communities that depend on them.



Figure: Agroforestry system in Zambia with *Faidherbia albida* trees and maize. Figure by Charlie Pye-Smith, World Agroforestry Center in flickr. Figure made available through CC BY-NC-SA 2.0. This figure is not included in the by the CC BY-NC license of this publication. Refer to the original source for usage.

7 Digital Innovation in Forest Governance

Digital technologies are increasingly transforming the way forests are monitored, managed, and protected. As climate change and land-use pressures become more complex, traditional field-based monitoring alone is often insufficient to provide timely information for effective decision-making. Consequently, digital innovation has become an important enabling component of Climate-Smart Forestry.

Technologies such as Geographic Information Systems (GIS), remote sensing, satellite imagery, and drone-based monitoring allow forest managers to track changes in forest cover, assess ecosystem health, identify degradation hotspots, and evaluate restoration outcomes with greater accuracy and efficiency. These tools support evidence-based decision-making by providing spatially explicit information that can be integrated into forest planning and management processes.

Box 8. Digital Tools for Climate-Smart Forestry

Emerging digital technologies are transforming forest monitoring and management across Africa. Geographic Information Systems (GIS), remote sensing platforms, unmanned aerial vehicles (drones), and open-access environmental databases provide new opportunities for tracking forest change, assessing ecosystem health, and supporting evidence-based decision-making.

These technologies can improve the effectiveness of Climate-Smart Forestry by enabling early detection of forest degradation, monitoring restoration efforts, and supporting adaptive management under changing climatic conditions.

Key Message: Digital innovation enhances the capacity of forest managers and local institutions to make timely, data-driven decisions that strengthen forest resilience and sustainability.

Beyond monitoring functions, digital technologies also contribute to greater transparency and accountability in forest governance. Open-data platforms and online forest monitoring systems make environmental information more accessible to governments, researchers, civil society organizations, and local communities. Improved access to information can strengthen stakeholder participation and support more inclusive governance arrangements.

For many countries in Sub-Saharan Africa, digital solutions offer practical advantages where financial resources, technical capacity, or field infrastructure may be limited. Satellite-based systems can cover large and remote forest areas at relatively low cost, helping to improve the effectiveness of conservation, restoration, and climate adaptation initiatives.

While technological innovation can improve monitoring and decision-making, successful forest governance ultimately depends on how information is translated into practical management actions and community engagement.

Box 9. Case Study: Participatory Forest Management in Tanzania

In Tanzania, Participatory Forest Management (PFM) has emerged as a key strategy for promoting sustainable forest governance and enhancing local community involvement in forest conservation. Under this system, local communities are granted rights and responsibilities to manage village forest reserves, contributing to reduced deforestation rates and improved forest conditions in several regions.

PFM has demonstrated that strengthening institutional and community-level governance structures can significantly enhance forest resilience by reducing illegal logging, improving monitoring, and supporting sustainable livelihood options. In recent years, the integration of spatial monitoring tools and remote sensing data has further strengthened management effectiveness by improving transparency and decision-making processes (FAO, 2022; CIFOR-ICRAF, 2023).

Key Message: Community participation and inclusive governance can substantially improve forest resilience while supporting sustainable livelihoods and long-term conservation outcomes.

The Tanzanian experience illustrates how digital innovation and participatory governance can complement one another. Spatial monitoring tools and improved access to environmental information can strengthen local forest management systems, while community participation helps ensure that conservation objectives remain socially inclusive and locally relevant.

Ultimately, technology alone cannot ensure sustainable forest management. The effectiveness of digital tools depends on institutional capacity, technical expertise, data accessibility, and their integration with local knowledge systems. Digital innovation should therefore be viewed as a complement to, rather than a replacement for, ecological understanding and community participation.



Figure: Drone taking pictures of a forest. © Alexey Yuzhakov, Adobe Stock. #169737557. This figure is not covered by the CC BY-NC license of this publication.

8 Integrating Climate-Smart Forestry into Vocational Education and Training

The successful implementation of Climate-Smart Forestry (CSF) depends not only on effective policies, scientific knowledge, and technological innovation, but also on the capacity of educational systems to prepare professionals who can respond to increasingly complex environmental challenges. As climate change continues to reshape forest ecosystems and management practices, forestry education must evolve accordingly. In this context, Vocational Education and Training (VET) institutions play a critical role in strengthening the knowledge, skills, and adaptive capacities required for sustainable forest management.

Integrating Climate-Smart Forestry into VET education requires a shift from traditional approaches to more interdisciplinary, future-oriented learning. In addition to conventional forestry competencies, learners need to develop an understanding of climate change adaptation and mitigation, ecosystem restoration, biodiversity conservation, landscape-level planning, participatory forest governance, and sustainable resource management. Increasingly, forestry professionals must also be capable of using digital technologies such as Geographic Information Systems (GIS), remote sensing, and forest monitoring tools that support evidence-based decision-making under changing environmental conditions.

At the same time, the transition toward climate-smart forestry requires continuous professional development for teachers, trainers, and educational institutions. Educators play a central role in translating scientific knowledge into practical learning experiences and in preparing future forestry professionals to address real-world sustainability challenges. Strengthening the pedagogical, technical, and digital competencies of VET staff can therefore generate long-term impacts that extend beyond individual learners and contribute to broader improvements in forestry education systems.

Practical and experiential learning approaches are particularly valuable in this context. Field-based training, case studies, restoration projects, community engagement activities, and digital learning environments help bridge the gap between theory and practice while promoting critical thinking, problem-solving, and adaptive management skills. These competencies are increasingly important in regions such as Sub-Saharan Africa, where forestry professionals must navigate interactions between climate change, ecosystem degradation, livelihood needs, and sustainable development objectives.

International cooperation and knowledge exchange further strengthen the integration of Climate-Smart Forestry into VET systems. Collaboration among educational institutions, researchers, practitioners, and local stakeholders enables the sharing of expertise, innovative teaching methods, and context-specific solutions. Such partnerships support curriculum development, institutional capacity building, and the modernization of forestry education, helping to ensure that training programs remain relevant to evolving environmental and societal needs.

Ultimately, strengthening Climate-Smart Forestry education represents an investment in both human and institutional capacity. By empowering educators, learners, and training institutions with the knowledge and skills needed to address climate-related challenges, VET systems can make an important contribution to forest resilience, sustainable livelihoods, and the long-term sustainability of forest landscapes.

Box 10. Case Insight: Miombo Woodlands

The Miombo woodlands, which extend across several countries in Southern and Eastern Africa, represent one of the most important forest ecosystems on the continent. Covering large areas of Zambia and Tanzania, these woodlands provide essential ecosystem services, including biodiversity conservation, carbon storage, fuelwood supply, water regulation, and livelihood support for millions of rural households (Chidumayo & Gumbo, 2010). Despite their ecological and socioeconomic importance, Miombo landscapes are increasingly exposed to multiple and interacting pressures.

Despite their ecological and socioeconomic importance, Miombo landscapes are increasingly exposed to multiple and interacting pressures. Climate variability, prolonged droughts, rising temperatures, agricultural expansion, charcoal production, and unsustainable harvesting practices have contributed to forest degradation in many areas. These challenges illustrate the complex relationship between climate change and human land-use dynamics that characterizes many forest systems across Sub-Saharan Africa.

At the same time, the Miombo woodlands demonstrate significant adaptive potential. Research and practical experience suggest that these ecosystems possess relatively strong natural regeneration capacity when disturbances are managed sustainably. Restoration initiatives, community-based forest management programs, and improved land-use planning have shown promising results in supporting ecosystem recovery while maintaining livelihood benefits for local communities.

The experiences of Zambia and Tanzania highlight the importance of integrating ecological restoration, participatory governance, and adaptive management within broader Climate-Smart Forestry strategies. They also demonstrate that resilience is not solely an ecological characteristic but a product of interactions between ecosystems, institutions, and local communities.

As one of Africa's most extensive woodland systems, the Miombo landscape offers valuable lessons for forest managers and policymakers seeking to strengthen resilience under future climate change scenarios. The experiences emerging from these regions suggest that long-term sustainability depends not on individual interventions, but on coordinated approaches that combine restoration, community engagement, sustainable resource use, and evidence-based decision-making.

9 Conclusion

African forests are facing increasing environmental pressures from both climate change and human activities. However, they also possess significant adaptive potential.

Climate-Smart Forestry provides a promising framework for addressing these challenges by integrating adaptation, mitigation, and sustainable production within a single approach. When combined with resilience thinking and digital innovation, CSF offers a pathway toward more sustainable and adaptive forest landscapes.

Ultimately, the future of African forests will depend on the ability to combine ecological knowledge, governance systems, technological innovation, and community participation in a coordinated and integrated manner. Strengthening resilience today will be essential for ensuring that forest ecosystems continue to support biodiversity, climate stability, and sustainable livelihoods in the decades ahead.

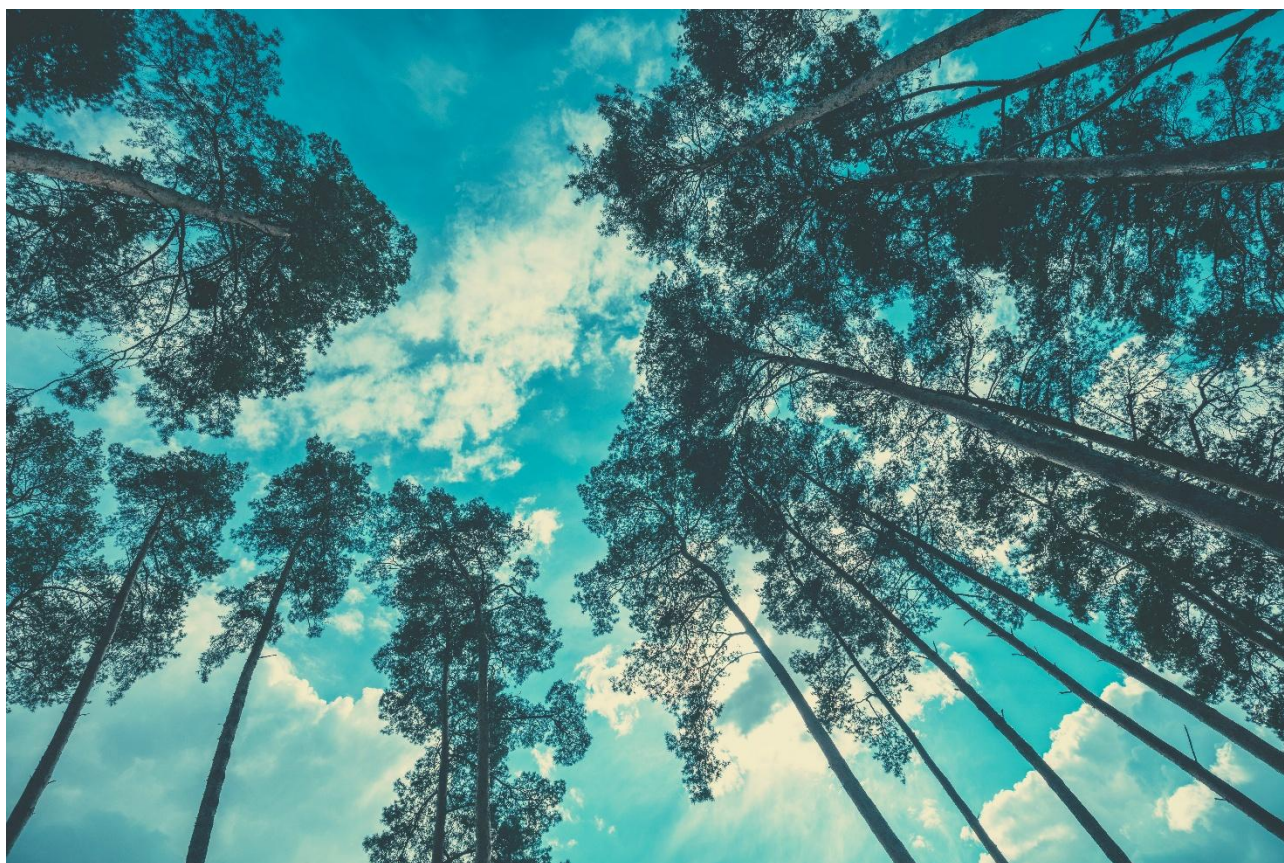


Figure. Pine trees against a cloudy sky. © vvita, Adobe Stock, # 573469746. This figure is not covered by the CC BY-NC license of this publication.

10 Recommended reading and other materials on climate-smart forestry

FAO eLearning Academy- Climate-Smart Forestry Course

<https://elearning.fao.org/course/view.php?id=578>

A practical introductory course on climate-smart forestry concepts, suitable for teachers and trainees.

FAO Forestry Programme- Sustainable Forest Management Resources

<https://www.fao.org/forestry/en/>

Provides accessible guidance on sustainable forest management, restoration, and climate adaptation.

UNEP- Forest Landscape Restoration Resources

<https://www.unep.org/explore-topics/forests>

Introductory materials on ecosystem restoration and nature-based climate solutions.

World Bank- Forests and Climate Change Overview

<https://www.worldbank.org/en/topic/forests>

Simple explanations of how forests contribute to climate mitigation and sustainable development.

CIFOR-ICRAF Learning Resources

<https://www.cifor-icraf.org>

Practical knowledge on agroforestry, forest management, and community-based approaches

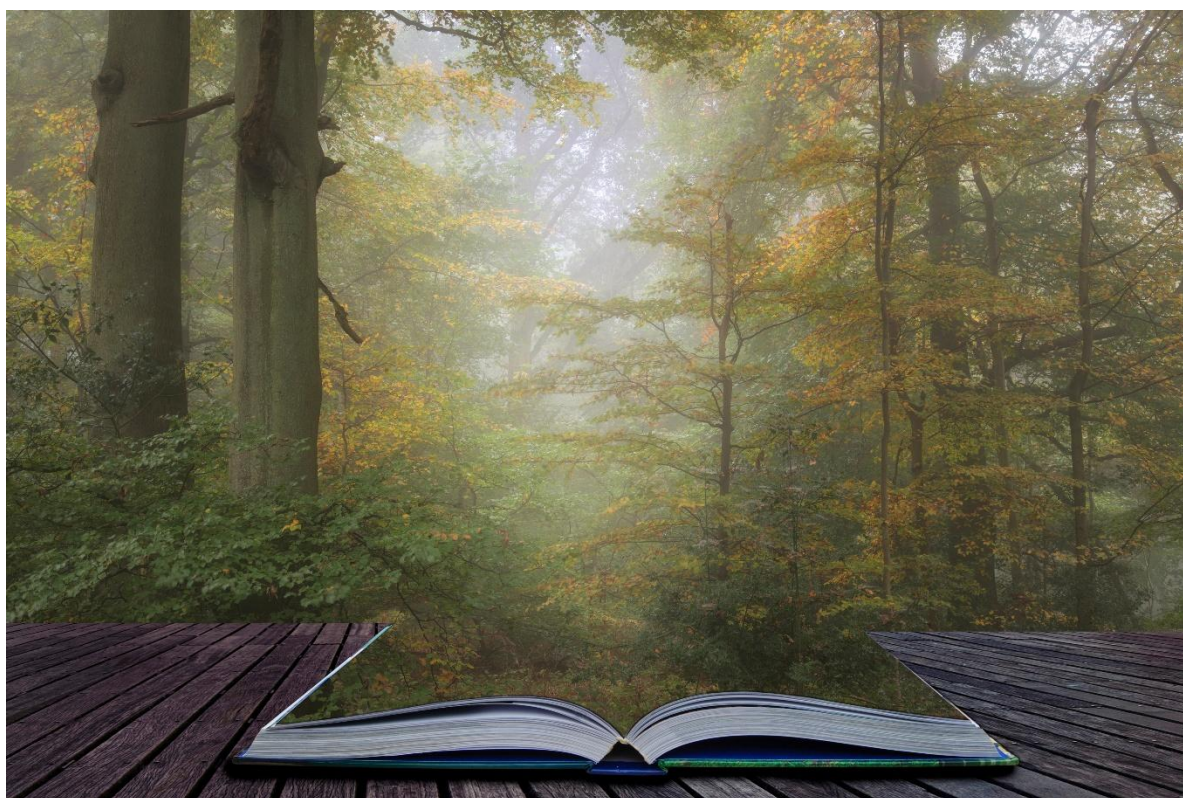


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