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**IN BRIEF**

# THE STATE OF **THE WORLD'S FORESTS**

**FOREST-SECTOR INNOVATIONS  
TOWARDS A MORE  
SUSTAINABLE FUTURE**

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**COVER PHOTOGRAPH** © Shutterstock.com/khlongwangchao

**THAILAND.** New growth from a tree stump.

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# FOREWORD

The speed at which new challenges to sustainable development are arising is only matched by the rate at which innovations are emerging to deal with them. The incredible ingenuity of humans should give us hope that we can chart a course towards a sustainable planet and avert the threats we face.

Innovation is key for achieving the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs) – it is a focus of SDG 9 and implicit in all the SDGs and the actions needed to achieve them. Innovation is also an important accelerator for agrifood systems transformation and realizing the three major Global Goals: (1) eradication of hunger, food insecurity and malnutrition; (2) elimination of poverty and the driving forward of economic and social progress for all; and (3) the sustainable management and utilization of natural resources.

But innovation does not arise in a vacuum. Among other things, it requires enabling policies; strong, transformative partnerships; investment; an inclusive culture that is open to and encouraging of new ideas; and a willingness to take calculated risks.

FAO recognizes that science and innovation are crucial ingredients for achieving forest-based solutions. We developed our first-ever FAO Science and Innovation Strategy in 2022, thus setting out how we intend to reinforce the use of science and innovation in our technical interventions and normative guidance. The Strategy, endorsed by the FAO Council at its 170th Session following an inclusive and transparent consultation process, is a key tool for implementing the FAO Strategic Framework 2022–31. It emphasizes the need to consider all scientific disciplines, all knowledge and all types of innovation.

This edition of *The State of the World's Forests* (SOFO) report provides highlights on the state of the world's forests and builds on the FAO Science and Innovation Strategy to explore the transformative power of evidence-based innovation in the forest sector. It presents a comprehensive overview of exciting developments, ranging from new technologies to creative and successful policies and institutional changes, to new ways of getting finance to forest owners and managers. Eighteen case studies from around the world provide a glimpse at the wide range of technological, social, policy,

institutional and financial forest-sector innovations – and combinations of these – being tested and implemented in real-world conditions. The publication identifies barriers to and enablers of innovation and enumerates five actions for empowering people to apply their creativity in the forest sector to solve problems and scale up impacts.

FAO's work in forestry is aimed at accelerating progress on forest conservation, restoration and sustainable use towards MORE efficient, inclusive, resilient and sustainable agrifood systems for *better production, better nutrition, a better environment and a better life*, leaving no one behind. This edition of SOFO will inform FAO's work to scale up evidence-based innovation in forestry. I believe it will also support FAO Members and other stakeholders in enabling responsible, inclusive and essential innovation in the forest sector to strengthen sustainability and the resilience of agrifood systems, for a better world and a better future for all.



QU Dongyu  
FAO Director-General

# HEADLINES

→ **Recent data** indicate a significant reduction in deforestation in some countries. But climate change is making forests more vulnerable to stressors such as wildfire and pests.

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→ **Projections** indicate large increases in wood demand by 2050. Nearly three-quarters of the world's population uses non-timber forest products.

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→ **More innovation** is needed in the forest sector, driven by escalating forest stressors, necessitating new forest management approaches; the shift towards a bioeconomy; and opportunities offered by non-wood forest products.

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→ **Four factors** form barriers to scaling up innovation in the forest sector: (1) lack of innovation culture; (2) risk; (3) potential limitations in various forms of capital; and (4) unsupportive policies and regulations.

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→ **Five enabling actions** will help scale up responsible and inclusive – and essential – innovation in the forest sector: (1) raise awareness; (2) boost innovation skills, capabilities and knowledge; (3) encourage transformational partnerships; (4) ensure more and universally accessible finance for innovation; and (5) provide an incentivizing policy and regulatory environment.

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# SUMMARY

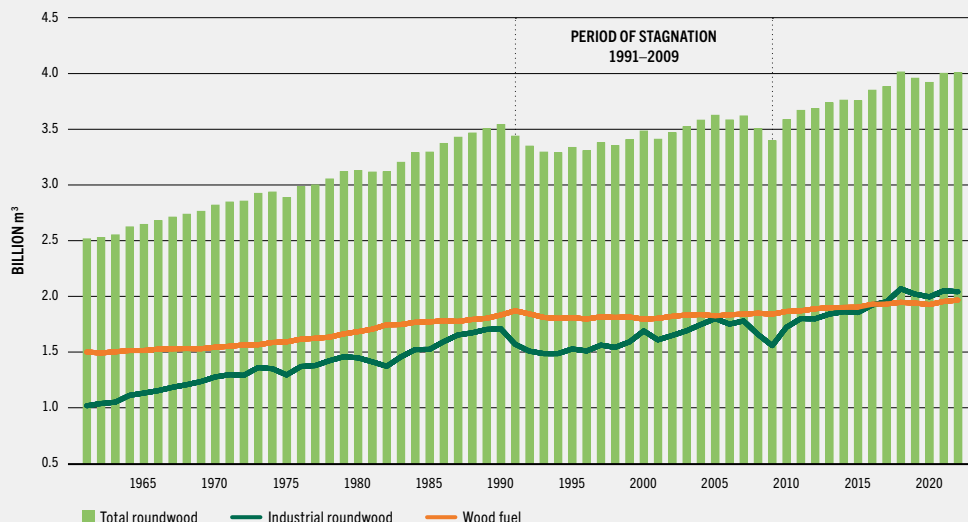
## 1 WITH THE WORLD FACING ESCALATING THREATS, FORESTS PROVIDE SOLUTIONS TO GLOBAL CHALLENGES.

- ▶ The rapid pace of change, and the urgency of addressing global challenges, demand inventive solutions that are diverse, flexible and adaptable and can be scaled up quickly. It is imperative, therefore, to tap into human creativity and embrace innovation, including in the forest sector.
- ▶ The present publication, SOFO 2024, provides highlights on the state of the world's forests and builds on the FAO Science and Innovation Strategy to explore the role of innovation in promoting forest conservation, restoration and sustainable use in the context of agrifood systems transformation.

## 2 ALTHOUGH DEFORESTATION IS SLOWING, FORESTS ARE UNDER PRESSURE FROM CLIMATE-RELATED STRESSORS AND FOREST PRODUCT DEMAND IS RISING.

- ▶ **Recent data indicate a significant reduction in deforestation in some countries.**  
For example, deforestation is estimated to have declined by 8.4 percent in Indonesia in 2021–2022 and by 50 percent in Brazil's Legal Amazon in 2023. The rate of gross global mangrove loss decreased by 23 percent between 2000–2010 and 2010–2020.
- ▶ **Climate change is making forests more vulnerable to abiotic and biotic stressors such as wildfire and pests.**  
Wildfire intensity and frequency are increasing. Boreal forests accounted for nearly one-quarter of carbon-dioxide emissions due to wildfire in 2021. Fires emitted an estimated 6 687 megatonnes of carbon dioxide globally in 2023, which was more than double the carbon-dioxide emissions by the European Union due to the burning of fossil fuels in

**FIGURE 2** WORLD ROUNDWOOD PRODUCTION, COMPRISING INDUSTRIAL ROUNDWOOD AND WOODFUEL, 1961–2022



Source: FAO. 2023. FAOSTAT: Forestry Production and Trade. [Accessed on 15 October 2023]. <https://www.fao.org/faostat/en/#data/FO>. Licence: CC-BY-4.0.

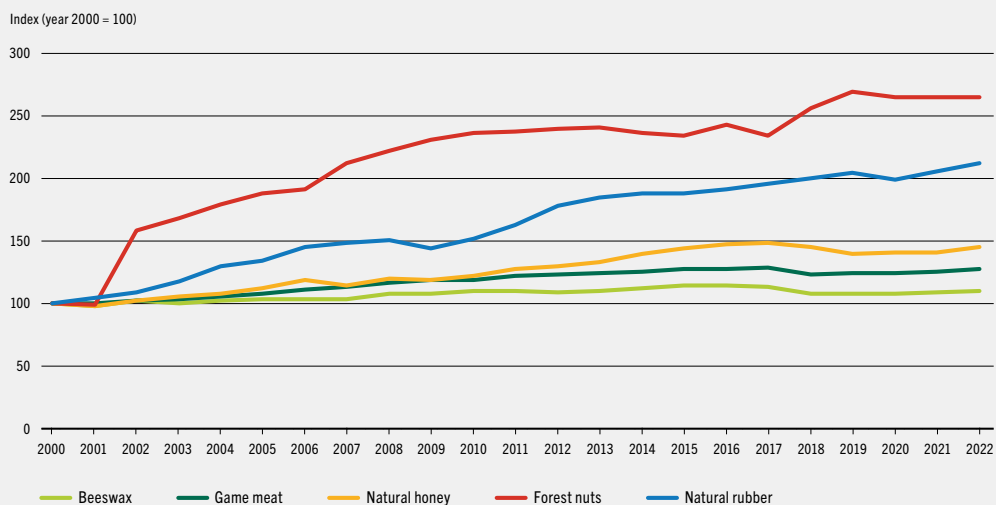
that year. In the United States of America, 25 million ha of forestlands are projected to experience losses exceeding 20 percent of host tree basal area due to insects and disease through to 2027.

- ▶ **Global wood production is at record levels, at about 4 billion m<sup>3</sup> per year.** An estimated 2.04 billion m<sup>3</sup> of roundwood was harvested in 2022, which was similar to the volume in 2021. About 1.97 billion m<sup>3</sup> was harvested in 2022 for woodfuel, constituting just under half (49.4 percent) of the total wood harvest

(Figure 2); the proportion was much higher in Africa, at 90 percent.

- ▶ **Nearly 6 billion people use non-timber forest products**, including 2.77 billion rural users in the Global South. Figure 3 shows trends in the production of five primary non-wood forest products (NWFPs) globally, as reported in FAOSTAT. Data are now available on the international trade of pine nuts and forest mushrooms and truffles: combined, global exports of these products was worth about USD 1.8 billion in 2022.



**FIGURE 3** TRENDS IN PRODUCTION VOLUME OF FIVE NON-WOOD FOREST PRODUCTS, 2000–2022

Note: Nuts and natural rubber experienced the highest production growth between 2000 and 2022 (165 percent and 113 percent, respectively); honey, game meat and beeswax had smaller increases. There is increasing consumer awareness of the health benefits associated with the consumption of edible forest products such as nuts and honey and growing interest in natural and sustainably sourced ingredients. New technologies have also helped drive growth in production volume. Natural honey and beeswax include both forestry and agricultural products.

Source: FAO. 2023. FAOSTAT: Crops and Livestock Products. [Accessed on 29 December 2023]. <https://www.fao.org/faostat/en/#data/QCL>. Licence: CC-BY-4.0.

<https://doi.org/10.4060/cd1211en-fig03> ↓

- ▶ **Projections to 2050 indicate significant increases in wood demand, albeit in a wide band.** Global roundwood demand could increase by as much as 49 percent (between 2020 and 2050), driven mainly by demand for industrial roundwood, although this projection is subject to considerable uncertainty (Figure 5). Wood-use efficiency increased by 15 percent between 1961 and 2022.
- ▶ **Given rapidly changing environmental conditions and rising demands on forests,**

**more innovation is needed in the forest sector.** Three imperatives will drive such innovation: (1) escalating stressors, including climate change, which will require new forest and land management approaches; (2) the shift towards a bioeconomy in which wood will be a major input; and (3) the opportunities offered by the vast range of non-wood forest products for potentially billions of smallholders.

**FIGURE 5** PROJECTIONS FOR GLOBAL ROUNDWOOD DEMAND FOR 2030 AND 2050



NOTE: This figure excludes the FAO category of “other roundwood” (i.e. roundwood used for tanning, distillation, match blocks, poles, etc.), which accounts for 3–4 percent of total roundwood production.

SOURCES: The trend projections were estimated for this report by L. Hetemäki, University of Helsinki, based on data for the period 2012–2022; data for the USDA (2023) projections were obtained from Johnston, C.M.T., Guo, J. & Prestemon, J.P. 2023. RPA forest products market data for U.S. RPA Regions and the world, 2015–2070, historical (1990–2015), and projected (2020–2070) using the Forest Resource Outlook Model (FOROM), 2<sup>nd</sup> Edition. In: *Forest Service Research Data Archive*. <https://doi.org/10.2737/RDS-2022-0073-2>

<https://doi.org/10.4060/cd1211en-fig05>

### 3 INNOVATION IS REQUIRED TO SCALE UP FOREST CONSERVATION, RESTORATION AND SUSTAINABLE USE AS SOLUTIONS TO GLOBAL CHALLENGES.

► Innovation is a key enabler of progress towards achieving the Sustainable Development Goals. It is also an important accelerator for achieving

the three Global Goals of FAO Members and enhancing the potential of forests and trees to address global challenges. A vast range of innovations is already having profound influences on the forest sector.

- Five types of innovation are enhancing the potential of forests and trees to address global challenges:
  - (1) **technological** (in three subtypes of digital, product/process and biotechnological). For example, open access to remote-sensing



## BOX 8 INNOVATIVE WOOD AND NON-WOOD FOREST PRODUCTS THAT COULD CONTRIBUTE TO THE BIOECONOMY

**Wood in the built environment.** Wood in construction constitutes an option for long-term carbon storage, thus helping mitigate climate change. It is gaining momentum as a preferred material in the built environment, in part because of technological innovations such as mass timber and wood-derived coatings that can replace fossil-based products. Thermally modified, furfurylated and acetylated wood are examples of technological improvements designed to create long-lasting wood products without the use of toxic treating chemicals. Stranding and veneer technologies are enabling the use of fast-grown timber resources such as eucalypt and poplar plantations for mass timber products.

Significant testing has taken place to understand and manage the fire risk posed by the use of mass timber in buildings. Consequently, good models and understanding of the predictable char rate now exist, and policy standards and regulations, such as Eurocode 5 in the European Union and PRG320 in North America, take fire performance into account. A review of large-scale fire tests on cross-laminated timber indicated that, when adequately protected, the use of this material does not contribute significantly to fire risk, although the review also highlighted the need for more research.

**Wood biomass for biorefineries.** Biorefineries – manufacturing plants that convert raw biomass into raw materials and end products – typically separate the three primary polymers of biomass into cellulose, hemicellulose and lignin. They are increasingly being used as platforms to produce innovative materials and products that can replace fossil-derived resources.

**Wood-based textiles.** The manufacture of textiles using wood cellulose fibres grew by 6.3 percent annually between 2000 and 2018 (a significantly higher growth rate than for cotton and synthetic fibres), with wood-based

textile fibres accounting for 7 percent of the global market in 2019. The next generation of textile fibres will start incorporating recycled textile fibres, thus supporting greater circularity of materials.

**Cellulose-based plastics.** Cellulose-based plastics are a type of bioplastic manufactured using cellulose or derivatives of cellulose. They are manufactured using softwood as the dominant raw material, although they can also be obtained from agricultural residues such as corn stover and sugarcane bagasse.

**Energy storage.** Forestry companies are joining forces with battery producers to replace fossil-derived raw materials such as graphite with carbonized hard lignin extracted from wood. Nanocellulose manufactured from biomass is also being used increasingly in electrochemical energy systems – being porous, lightweight and strong, nanocellulose can enable better ion and electron transfer and therefore increase system efficiency.

**Platform chemicals.** Significant progress has been made in refining wood polymers into platform chemicals using chemical, hydrolytic and biological conversion for diverse applications, from pharmaceuticals to biobased coatings and adhesives. Novel adhesives, coatings and foams are being commercialized to replace fossil materials such as phenol and polyurethane with lignin and nanocellulose. This has significant environmental advantages: for example, the use of birch wood at a biogenic technology biorefinery in Sweden to produce wood-based butanediol, a solvent used in chemical industries, emits 52 percent less carbon dioxide than its fossil-based alternative.

**Non-wood forest products.** Many wild forest-based foods, including fish, are rich in micronutrients and have high nutritional content. New and existing technologies such



**BOX 8** (Continued)

as multi-elemental analysis, isotopic ratio mass spectrometry, infrared spectroscopy and nanotechnologies are increasingly being used to explore the nutritional value of forest foods for healthy diets. Growing interest among consumers in healthy and sustainable lifestyles has led to the exploration of bioactive compounds and nutritional attributes in non-wood forest products

to produce “nutraceuticals” as functional foods and alternative sources of ingredients. Innovative microfiltration techniques have enabled the increased use of natural wax in food, cosmetics, medicine and packaging. Forests also contain a huge diversity of insects with potential for use in the rapidly growing edible-insect industry.

- » data and the facilitated use of cloud computing are enabling digital methodologies that generate high-quality forest data and improve forest management processes;
- **(2) social, (3) policy** and **(4) institutional** – such as new efforts to better engage women, youth and Indigenous Peoples in developing locally led solutions, the promotion of multistakeholder partnerships and cross-sectoral approaches in land-use policies and planning, and support for cooperatives to increase the bargaining power of smallholders; and
  - **(5) financial** – such as innovations in public- and private-sector finance to enhance the value of standing forests, boost restoration efforts and increase access to loans for smallholders for sustainable production.

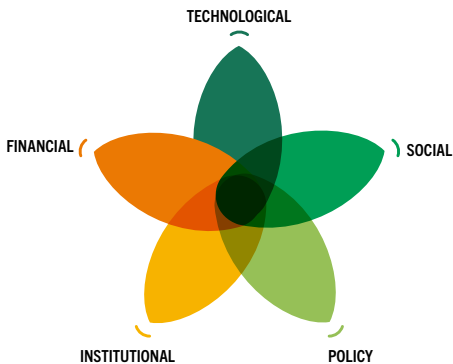
Combinations (“bundles”) of these innovation types can unleash powerful forces for change.

- **Four factors form barriers to scaling up innovation:** (1) lack of innovation culture; (2) risk; (3) potential limitations in various forms of capital; and (4) unsupportive policies and regulations. An organizational culture that recognizes and embraces the transformative potential of innovation can help de-risk innovation processes and empower stakeholders to respond to current and future challenges.
- **Innovation can create winners and losers, and inclusive and gender-responsive approaches are needed** to avoid harm and ensure the fair distribution of benefits among men, women and youth in all socioeconomic and ethnic groups. Efforts to promote innovation must consider and integrate the local circumstances, perspectives, knowledge, needs and rights of all stakeholders.

## 4 EIGHTEEN CASE STUDIES ILLUSTRATE THE DIVERSE WAYS IN WHICH FOREST-SECTOR INNOVATION CAN BRING ABOUT POSITIVE CHANGE.

- The presentation of case studies is an important means for exploring and demonstrating the potential of forest-sector innovation. Examples examined in this document showcase cutting-edge processes, tools and technologies in various regions and at various scales, providing evidence and knowledge and generating lessons that can be applied in diverse contexts worldwide. Each case study can be viewed as a bundle of innovations because each involves more than one innovation and innovation type (i.e. technological, social, policy, institutional and financial).

### INNOVATION TYPES



They are organized in three categories aligned with forest conservation, restoration and sustainable use.

#### 1. Innovations are assisting efforts to halt deforestation and maintain forests.

Halting deforestation would cut greenhouse-gas emissions significantly while helping safeguard most of the Earth's terrestrial biodiversity and maintain key ecosystem services. Global, regional and national efforts to halt deforestation and maintain the world's forests have produced a proliferation of innovations, such as major advances in real-time forest monitoring to enable REDD+<sup>1</sup> results-based payments and the growth of forest carbon markets. Advances have also been made in the traceability of key commodities towards deforestation-free production, as well as policy innovations to bridge sectors through integrated landscape approaches. Improved understanding of the key forest stewardship roles played by Indigenous Peoples and local communities has fostered innovations towards greater inclusion in policymaking and forest finance.

Six case studies present innovations aimed at increasing the quality of, and access to, forest-monitoring data and improving land-use planning and

<sup>1</sup> Reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks

management as means for halting deforestation and maintaining forests. These include a model for fostering multistakeholder governance to scale up integrated sustainable landscape management in Kenya and Nigeria; the use of new data on the role of forests in agricultural productivity to finance forest conservation in Brazil; harnessing the power of partnership and technological innovation to reduce commodity-driven forest loss in Ghana; the introduction of new tools and techniques in community forestry in Colombia; and combining science, technology and traditional knowledge to support Indigenous Peoples as forest custodians and enable locally led integrated fire management.

## **2. Innovative approaches are bolstering the restoration of degraded lands and expanding agroforestry.**

Almost 75 percent of the world's total land area, particularly forests, rangelands and wetlands, has been negatively affected by degradation and transformation, and this figure is likely to increase to more than 90 percent within 30 years. Forest and landscape restoration (FLR) is gaining momentum in response to this challenge, as demonstrated by the UN General Assembly's declaration of the Decade on Ecosystem Restoration (2021–2030). FLR typically involves entire landscapes in which many land uses interact, and its objective is to restore the biological productivity of degraded areas and create long-term carbon sinks in restored soils and

vegetation. Restoration through agroforestry has the potential to address diverse global challenges. Agroforestry systems tend to be more resilient than conventional agriculture to environmental shocks and the effects of climate change.

Six case studies provide examples of innovations in FLR and agroforestry with potential for scaling up. They include developing a new national policy to better support agroforestry in India; integrating the socioeconomic objectives and nutritional needs of local communities with restoration to combat desertification in the Great Green Wall of the Sahara and the Sahel; the use of geospatial and other digital technologies to collate and disseminate restoration good practices and monitor progress in the implementation of the United Nations Decade on Ecosystem Restoration; enhancing the resilience of traditional water taro gardens in Vanuatu by incorporating new technologies, practices and plant varieties; improving the local governance of forest resources to deliver benefits for agriculture and forest restoration in Morocco and Tunisia; and a long-term project to link agroforestry to carbon trading in Mozambique.

## **3. Innovations are helping to sustainably use forests and build green value chains.**

Forests and the renewable products derived from them can reduce reliance on non-renewable resources (which currently account for around

70 percent of all material demand) while also supporting livelihoods and rural economies. Reversing the trend of increasing material extraction while promoting sustainable consumption and production patterns is essential for achieving the SDGs. Sustainably meeting increased resource demand for forest-based biomass will require boosting supply through a range of means, including increased resource-use efficiency and the avoidance of wood loss and waste in harvesting. In addition to creating and adopting innovations for harvesting and wood processing, further efficiency gains can be obtained through the cascading use of wood raw materials. As the global approach to forest management increasingly emphasizes the multiple values of forests, and the demand for healthy and sustainable products continues to rise, numerous noteworthy innovations are also emerging regarding NWFPs. NWFPs provide nearly half the world's population – including 70 percent of those living in extreme poverty – with crucial lifelines by helping meet a wide range of fundamental needs, including food security.

Six case studies present innovations aimed at enhancing the sustainable consumption and production of forest products to support a bioeconomy and rural livelihoods. They include delivering collateral-free microfinance to small forest businesses through the power of collective organizations in Viet Nam; using new diagnostic tools and methodologies to catalyse legal-reform processes for sustainable wildlife management in 13 African countries; harnessing digital technologies to improve the efficiency of timber-tracking and promote sustainable supply chains in Guatemala; improving connectivity along timber supply chains to reduce waste and increase the viability of sustainable forest management in Brazil, Guyana, Panama and Peru; applying new wood-processing technologies in Slovenia and the United States of America to promote a bioeconomy and enhance earthquake resilience; and enabling farmer-led innovation in sustainable forest and agricultural production through Farmer Field Schools.



**FINLAND**

A dress made from wood. Wood-based textiles are replacing those made from plastics, offering a new and sustainable approach to fashion.  
© FAO/Sofia Ilmonen



## 5 INNOVATION MUST BE SCALED UP RESPONSIBLY TO MAXIMIZE THE CONTRIBUTIONS OF THE FOREST SECTOR TO AGRIFOOD SYSTEMS TRANSFORMATION AND OTHER GLOBAL CHALLENGES.

Innovations typically emerge as a result of numerous complex interactions among actors within an innovation ecosystem. Note, however, that innovation ecosystems possess unique characteristics depending on context. In addition, the complexity of the global forest sector means that responsible innovations should be created and adopted in ways that are tailored and appropriate for the specific contexts within which they are being created and adopted. Whether at the organizational, jurisdictional or global levels, robust, well-functioning innovation ecosystems require an appreciation for creativity and collaboration; appropriate knowledge and skills, collective learning systems, governance mechanisms and risk management frameworks; and adequate natural, human and financial resources.

Innovations in the forest sector are likely to be most effective when they integrate science and traditional knowledge through inclusive practical approaches. Investment in integrated research and development is needed to drive technological advances, process optimization and the development of adaptive products; build skills and knowledge; and create templates for

bridging the disparate frameworks of science and traditional knowledge. Governments are often the main supporters of research and development, but the real-world application of innovations is dependent largely on funding and investment from, collaboration with, and uptake by the private sector and civil society.

Innovation can create winners and losers and, if poorly conceived, can exacerbate existing inequalities and marginalization. To minimize such risks, innovation creation and adoption processes should be inclusive and contextually appropriate, and they should support the participation of all forest stakeholders, thereby helping ensure that innovations are right for the place, people and challenge.

► **Five enabling actions can encourage responsible and inclusive innovation that optimizes forest-based solutions to global challenges.**

**1. Raise awareness of the importance of innovation and create a culture that fosters innovation to bring about positive change.**

Innovation requires a conducive culture that encourages curiosity, creativity, questioning and risk-taking. How these cultural elements are harnessed and promoted by an entity (such as a company, institution or country) depends largely on its historical legacies, value systems and beliefs, but the core goal must be to provide a positive context that enables the entity to embrace reflection on its ongoing practices, contemplate change, and identify actions to effect positive

change. In many contexts, developing an innovation culture will require awareness-raising – that is, activities that increase understanding of the benefits that innovation can deliver.

**2. Boost skills, capabilities and knowledge to ensure that forest-sector stakeholders have the capacity to manage innovation creation and adoption.**

A vibrant forest education sector is essential for developing the skills and knowledge necessary to maximize the contributions of forests and trees to the SDGs and to achieve the Global Forest Goals, and an understanding of innovation is a central component of this. The forest education sector will be better able to leverage opportunities in other sectors for scaling up innovation when it is well connected to research and business incubation.

Organizations tend to neglect the need for the “soft” skills that enable effective human interactions, but these are essential components of responsible and inclusive innovation processes. In addition to developing technical skills, therefore, the forest sector should cultivate the necessary soft skills for managing innovation processes, techniques and methodologies.

**3. Encourage transformative partnerships to de-risk forest-sector innovation, provide opportunities for knowledge and technology transfer, and build appropriate safeguards.**

Transformative partnerships involving governments, the private sector,

civil society, research and academia, women and youth, Indigenous Peoples and local communities are needed at all levels to support the creation and uptake of responsible innovations in the forest sector. Innovation hubs and other networking modes promote interactions among stakeholders and enable collaboration, the transfer of knowledge and skills, and positive spillovers (i.e. the unintended effects of interactions that support the scaling up of innovations). The partnerships arising from long-term engagement among diverse stakeholders can be transformative: that is, they can deliver system shifts from unsustainable to more sustainable systems.

The approach taken in the UN Decade on Ecosystem Restoration shows the power of innovative partnerships to enable the creation and uptake of innovations.

The forest sector increasingly seeks to collaborate across sectors (including within and between governments and organizations), in part to gain access to the knowledge and skills of other sectors. Such collaboration (e.g. to share data and to jointly define problems and design programmes) can lead to the development of innovations that otherwise might not arise.

**4. Ensure more and universally accessible financial resources to encourage forest-sector innovations.**

The risks associated with innovation creation and adoption can be high. This is especially so in the Global

South, where trade-offs among competing objectives are often also substantial, thus limiting the investment available. Increasing access to funding and finance – including to small producers and rural communities – is a prerequisite for robust innovation ecosystems and to enable the scaling up of forest-sector innovation. Increasing finance availability can help address systemic issues that are holding back the scaling-up process (e.g. by addressing externalities in sustainable forest management) and incentivize virtuous cycles of investment that reinforce further innovation.

#### **5. Provide a policy and regulatory environment that incentivizes forest-sector innovation.**

Complementary and coherent sets of policies can help stakeholders navigate complexities and path dependencies within an innovation ecosystem by building their capabilities. There is a need to establish policies that help de-risk innovation processes and minimize the potential disparities and unequal benefits of innovation. Cirera and Maloney (2017)<sup>2</sup> described a “capabilities escalator”, in which an innovation ecosystem evolves to increasingly support higher-level capabilities within the ecosystem. This concept offers a basis for guiding the development of robust and

supportive policies. The three stages of the escalator comprise the development of science, technology, engineering and mathematic skills, managerial and organizational capabilities, and basic infrastructure (stage 1); increasing the quality of research and innovation, building technological capabilities and incentivizing research and development (stage 2); and long-term research and development, technological programmes and collaborative innovation projects (stage 3). The right policy mix supports moving from stage 1 to stage 3.

#### **► Unlocking the power of innovation offers a means for more-rapid progress on meeting our collective forest goals and embracing a more sustainable future.**

Billions of people already have a stake in forests and trees because of the benefits they bring, from the provision of wood products and NWFPs, to ecosystem services such as climate regulation and habitat provision, to their positive roles in human health and well-being. Evidence suggests that the world is on the brink of major environmental changes, with consequent potentially highly negative implications for poverty, hunger, food insecurity and malnutrition. Solutions are needed quickly and at scale, and forests and trees have a clear role to play through conservation, restoration and sustainable use. To realize the potential of forests and trees, the power of responsible, inclusive innovations needs to be emphasized and invested in. ■

<sup>2</sup> Cirera, X. & Maloney, W.F. 2017. *The Innovation Paradox: Developing-Country Capabilities and the Unrealized Promise of Technological Catch-Up*. Washington, DC., World Bank. <https://doi.org/10.1596/978-1-4648-1160-9>



# 2024

# THE STATE OF THE WORLD'S FORESTS

## FOREST-SECTOR INNOVATIONS TOWARDS A MORE SUSTAINABLE FUTURE

Innovation is essential for achieving the 2030 Agenda for Sustainable Development and the Sustainable Development Goals. It is also an important accelerator for the transformation to more efficient, inclusive, resilient and sustainable agrifood systems and for achieving global goals such as the eradication of hunger and poverty and the sustainable management and use of natural resources.

But innovation does not arise in a vacuum. Among other things, it requires enabling policies; strong, transformative partnerships; investment; an inclusive culture that is open to and encouraging of new ideas; and a willingness to take calculated risks.

This edition of *The State of the World's Forests* (SOFO) provides highlights on the state of the world's forests and explores the transformative power of evidence-based innovation in the forest sector, ranging from new technologies to creative and successful policies and institutional changes, to new ways of getting finance to forest owners and managers. Eighteen case studies from around the world provide a glimpse at the wide range of technological, social, policy, institutional and financial forest-sector innovations – and combinations of these – being tested and implemented in real-world conditions. SOFO 2024 identifies barriers to, and enablers of, innovation and enumerates five actions for empowering people to apply their creativity in the forest sector to solve problems and scale up positive impacts.



*The State of The World's  
Forests 2024* (full text)



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