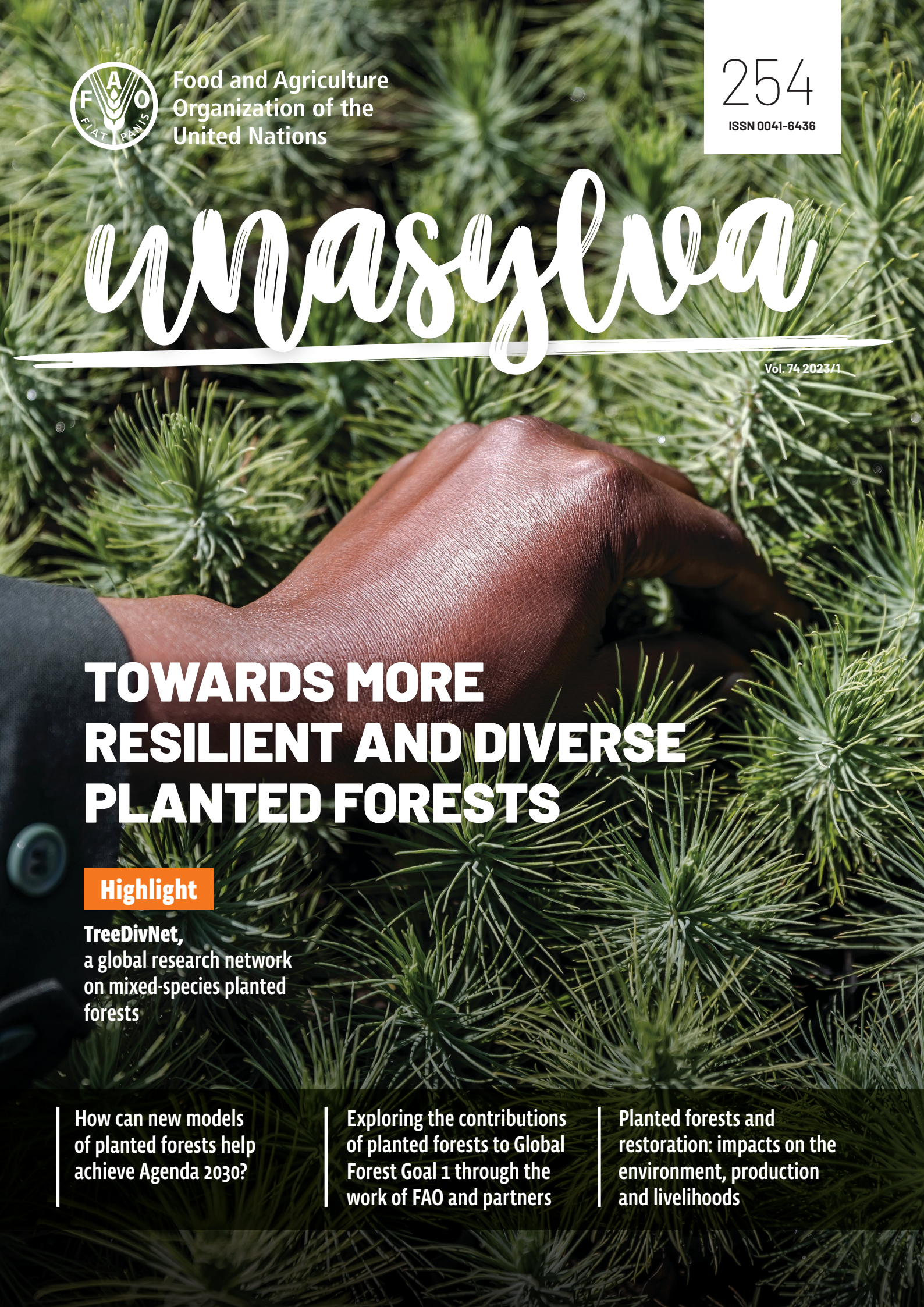
Food and Agriculture Organization of the United Nations

254

ISSN 0041-6436

unasylva

Vol. 74 2023/1



TOWARDS MORE RESILIENT AND DIVERSE PLANTED FORESTS

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TreeDivNet,
a global research network on mixed-species planted forests

How can new models of planted forests help achieve Agenda 2030?

Exploring the contributions of planted forests to Global Forest Goal 1 through the work of FAO and partners

Planted forests and restoration: impacts on the environment, production and livelihoods

254
ISSN 0041-6436

unasylva

Vol. 74 2023/1

Required citation: FAO. 2023. *Towards more resilient and diverse planted forests*. Unasylva, No. 254 – Vol. 74 2023/1. Rome. https://doi.org/10.4060/cc8584en

ISSN 0041-6436 [Print]
ISSN 1564-3697 [Online]

ISBN 978-92-5-138357-5

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Foreword

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Aerial view of a TreeDivNet tree diversity experiment in Montreal, Canada, captured by drone

July 2023 was the hottest month on Earth ever recorded – and yet another warning that we must urgently address climate change and its widespread impacts. Limiting global warming to 1.5 °C will require immediate deep reductions in greenhouse-gas (GHG) emissions, but we must also actively remove carbon dioxide from the atmosphere. Afforestation, reforestation and ecosystem restoration are among the carbon dioxide removal solutions with the highest mitigation potential. Forests also supply wood products which, if sustainably sourced, can be used as substitutes for GHG-intensive products.

Throughout the world, governments have made major pledges and commitments and launched initiatives,[9] which, combined, constitute a highly conducive platform for increasing the global forest area by 3 percent by 2030, an ambition articulated in the United Nations' Global Forest Goal 1. There are concerns, however, that large-scale tree planting will focus only on a small number of species, which could exacerbate climate risks. Today, most of the world's productive forests are monospecific plantations, which are vulnerable to biotic and abiotic stresses induced by climate change.

As Messier *et al.* (2021)[10] suggest, mixed-species planted forests are a key nature-based solution for climate-change mitigation and adaptation. More resilient than monocultures, these relatively diverse forests are generally less susceptible to biotic and abiotic disturbances such as pest outbreaks and extreme weather events. In addition to wood, they have the potential to deliver multiple ecosystem services at higher levels than monocultures. The biomass production of mixed-species planted forests is often similar to or higher than that of monospecific plantations, and they harbour greater biodiversity. Nev-

[9] Such as the Bonn Challenge, the New York Declaration on Forests, and the UN Decade on Ecosystem Restoration, 2021–2030.

[10] **Messier, C., Bauhus, J., Sousa-Silva, R., Auge, H., Baeten, L., Barsoum, N., Bruelheide, H. *et al.*** 2022. For the sake of resilience and multifunctionality, let's diversify planted forests! *Conservation Letters*, 15(1): e12829. https://doi.org/10.1111/conl.12829

ertheless, there remains a wide gap between robust scientific evidence for the multiple benefits of diverse planted forests and their widespread adoption, as well as societal support for them.

This edition of *Unasylva* has been produced to help close this gap. It has benefited from the wealth of knowledge obtained through the projects MixForChange, funded by the European Biodiversity Partnership, and Cambio, funded by the BNP Paribas Foundation, which respectively are aimed at promoting mixed-species planted forests as nature-based solutions to climate change and at studying the role of tree diversity in countering climate change. Both projects are being implemented in the context of TreeDivNet. This edition also builds on the knowledge accumulated through the International Commission on Poplars and Other Fast-Growing Trees Sustaining People and the Environment (IPC) and from critical insights and perspectives offered by globally leading experts, especially at a workshop on the state of the art in the management of mixed and pure planted forests, which was convened at FAO headquarters in Rome in 2022.

This edition of *Unasylva* shows we have come a long way since the seminal 1992 FAO Forestry Paper by T.J. Wormald, *Mixed and Pure Forest Plantations in the Tropics and Subtropics*. Thanks to projects such as those referred to above, systematic experimentation such as that supported through TreeDivNet, and a great deal of other research, we now have a much stronger evidence base on the ecological functioning of mixed-species forests and their potential for providing ecosystem services. This edition brings together the perspectives of decision-makers, landowners, academia and international organizations, enabling us to distil the most important lessons learned from scientific studies; highlight those planted-forest systems that are most promising for the provision of ecosystem services in support of the Sustainable Development Goals; and identify shortcomings in forest management and policies, and gaps in awareness, that need to be addressed to realize the full potential of diverse planted forests.

We thank everyone who contributed to this edition – especially Ben Caldwell, who initiated this collaboration as forestry officer with FAO a few years ago. We look forward to continuing to support the expansion of more resilient and diverse planted forests.

Jürgen Bauhus, Professor, Faculty of Environment and Natural Resources, Freiburg University

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