

THE HIDDEN MAGIC OF OLD-GROWTH FORESTS

Heickel, F.L, Møllerhaug, V.H, Rege, R.S, Strømsheim, S., Wildgruber, S.L,

What is an old-growth forest?

In central Europe, approximately 30% of the land area is forested, yet less than 0.2% of this is considered old-growth forest, most of which is in mountainous regions (Wirth et al., 2009). Human activities such as wood gathering, charcoal production, and animal husbandry have been the main pressures on these forests. Pollen records indicate that such impacts began around 6300 years ago, gradually pushing old forests out of much of Europe and restricting them to the upper montane and subalpine belt (Wirth et al., 2009).

Although there is no single clear accepted definition of old-growth forest, the concept generally reflects that forests age differently depending on tree species and biome (Wirth et al., 2009). In this paper, we define old-growth forest or old forest, as forest that contains structural features and species characteristic of late-successional stages, such as deadwood and trees approaching their natural longevity, and that has not experienced major anthropogenic disturbance (Barredo et al., 2021). An analysis of 118 international studies shows that forests classified as “old forests” have a median age of around 300 years, with a typical age range of 210–400 years (Barredo et al., 2021).

Ecological importance

Old forests play a crucial role in maintaining biodiversity, and their loss will impact species that depend on late-successional habitats (Barredo et al., 2021). Research shows they support a high diversity of specialized species due to their stable and heterogeneous conditions over long periods (Aksenov et al., 1999; Peter et al., 2001). Ancient forest plants, or old forest plants, are typically slow colonizers and indicate long-term ecological continuity (Hermy et al., 1999). Species like wood anemone, dog's mercury, and wood sorrel are important indicators of forest quality and biodiversity, two central goals in conservation biology, which are closely linked to sustainability (*Goal 15: Life on Land - The Global Goals*, n.d.; Piccolo et al., 2022). Dead wood is especially important, often hosting more biodiversity than living trees while also contributing to the carbon cycle (Wirth et al., 2009). Old forests tend to store more carbon per unit area than younger or managed forests, meaning that deforestation of old forests results in higher carbon emissions than younger forests (Barredo et al., 2021).

Due to net forest expansion, there is a slow exponential decrease in the old forests in Europe (Bergès & Dupouey, 2021). The estimations for the French decrease in those forests

compared to the beginning of the 19th century are about 20%; in Switzerland, they went from 20% to 11% in less than two decades; in Flanders (Belgium) 37% of the forests have been cleared after 1931 (Bergès & Dupouey, 2021). The biggest threat to old forests is the conversion to other land uses. The increase in forest exploitation (until the 19th century), removing firewood or litter, may have caused long-lasting soil mineral depletion. The conversion of ancient woodlands into non-native coniferous plantations was on such a large scale that during the last century, old forests were now only considered 'ancient semi-natural woodlands' in some countries in Europe (Great Britain, Belgium, and Germany) (Bergès & Dupouey, 2021).

When ecosystems degrade, Nature's Contributions to People (NCPs) often decline, affecting services like clean water, air, food, and climate regulation (*Nature's Contributions to People | IPBES Secretariat*, n.d.). Old forests maintain many of these contributions, but because they now cover only a small area in Europe, protecting them has become a high conservation priority (Petruzzello & Sottosanti, 2023). Protecting them is essential for sustainability and for achieving goals such as halting biodiversity loss.

Connection to SDG15

Working toward protecting old forests is an important part of UN's sustainability goal number 15 "Life on land" (*Goal 15: Life on Land - The Global Goals*, n.d.). When discussing old forests, protection and sustainably managing the forest are the most important part of this goal. You can not easily restore this type of ecosystem if it's been cut down since, as the word itself explains, they are very old. In Norway there is only 2,4% that counts as old-forest and only a fraction of this is ancient forests (*Redd Gammelskogen*, n.d.). Therefore, we need to protect the little we have left.

As discussed, the biggest threat to the old forests are human activities, mainly deforestation for different purposes (Wirth et al., 2009). This falls under target 15.2 "End deforestation and restore degraded forests" (*Goal 15: Life on Land - The Global Goals*, n.d.). By ending deforestation of old forests, we can protect this threatened ecosystem and prevent the loss of remaining old-growth forests. This is not only important for the forest itself, but for the diverse wildlife that is found here. These old forests are the natural habitat of a lot of species, many of which are threatened by extinction (*Status for truede arter i skog | Artsdatabanken*, n.d.). This also makes the protection of the old forests relevant for target 15.5 "protect biodiversity and natural habitats". By looking at these two sub-targets we understand why it's so important to work on protecting the ancient forest when working toward the UN sustainable goal number 15.

Connection to history

Old-growth forests are important for more than just their ecological function (*The State of the World's Forests 2020*, 2020). They are part of cultural heritage, they give people measurable benefits, and they are places that change people's relationship with nature. Old-forest can change how people view nature, since it shows that it's not a short-term resource; it is a system that needs patience, restraint, and respect. Forests like the Białowieża Forest and the Black Forest (Schwarzwald) are an important part of the culture, history, and traditions of these areas (UNESCO, 2014). Species that only live in long-continuous forests are living proof of ecological history. They connect today's landscapes to hundreds of years of steady growth.

Conclusion

In summary, old-growth forests are important because they are species-rich ecosystems, they provide important ecosystem services, protect cultural history, and make people respect nature. By protecting intact terrestrial ecosystems, stopping deforestation that can't be reversed, and saving habitats that are important for threatened species, protecting old-growth forests directly supports SDG 15. Since their defining features take hundreds of years to develop, it is more realistic and effective to keep what is left than to try to restore what has been lost.

AI STATEMENT

In this text we have used AI for grammar and feedback on structure. We have used AI according to UiB's guidelines.

REFERENCES

- Aksenov, D., Karpachevskiy, M., Lloyd, & Yaroshenko, A. (1999). *The Last of the Last: The Old-growth Forests of Boreal Europe*. ResearchGate.
https://www.researchgate.net/publication/384676511_The_Last_of_the_Last_The_Old-growth_Forests_of_Boreal_Europe
- Barredo, J., Brailescu, C., Teller, A., Sabatini, F. M., Mauri, A., & Janouskova, K. (2021). *Mapping and assessment of primary and old-growth forests in Europe*. JRC Publications Repository.
<https://doi.org/10.2760/797591>

- Bergès, L., & Dupouey, J.-L. (2021). Historical ecology and ancient forests: Progress, conservation issues and scientific prospects, with some examples from the French case. *Journal of Vegetation Science*, 32(1), e12846. <https://doi.org/10.1111/jvs.12846>
- Goal 15: Life on land—The Global Goals. (n.d.). Retrieved May 10, 2026, from <https://globalgoals.org/goals/15-life-on-land/>
- Hermý, M., Honnay, O., Firbank, L., Grashof-Bokdam, C., & Lawesson, J. E. (1999). An ecological comparison between ancient and other forest plant species of Europe, and the implications for forest conservation. *Biological Conservation*, 91(1), 9–22. [https://doi.org/10.1016/S0006-3207\(99\)00045-2](https://doi.org/10.1016/S0006-3207(99)00045-2)
- Nature's contributions to people | IPBES secretariat. (n.d.). Retrieved April 10, 2026, from <https://www.ipbes.net/glossary-tag/natures-contributions-people>
- Peter, M., Ayer, F., Egli, S., & Honegger, R. (2001). Above- and below-ground community structure of ectomycorrhizal fungi in three Norway spruce (*Picea abies*) stands in Switzerland. *ResearchGate*. <https://doi.org/10.1139/cjb-79-10-1134>
- Petruzzello, M., & Sottosanti, K. (2023, October 18). *Old-growth forest | Definition, Characteristics, Locations, & Facts | Britannica*. <https://www.britannica.com/science/old-growth-forest>
- Piccolo, J. J., Taylor, B., Washington, H., Kopnina, H., Gray, J., Alberro, H., & Orlikowska, E. (2022). “Nature’s contributions to people” and peoples’ moral obligations to nature. *Biological Conservation*, 270, 109572. <https://doi.org/10.1016/j.biocon.2022.109572>
- Redd Gammelskogen. (n.d.). Retrieved May 10, 2026, from <https://www.reddgammelskogen.no/>
- Status for truede arter i skog | Artsdatabanken. (n.d.). Retrieved May 10, 2026, from <https://artsdatabanken.no/arter/rodlista-arter/om-rodlista/fordypning/status-truede-arter-i-skog>
- The State of the World's Forests 2020. (2020). FAO and UNEP. <https://doi.org/10.4060/ca8642en>
- UNESCO, U. W. H. (2014). *Biosphere Reserve: a Forest*. UNESCO World Heritage Centre. <https://whc.unesco.org/en/list/33/>
- Wirth, C., Messier, C., Bergeron, Y., Frank, D., & Fankhänel, A. (2009). Old-Growth Forest Definitions: A Pragmatic View. In C. Wirth, G. Gleixner, & M. Heimann (Eds.), *Old-Growth Forests: Function, Fate and Value* (pp. 11–33). Springer. https://doi.org/10.1007/978-3-540-92706-8_2