# Hands-on manual for practitioners with management recommendations

## (BIOCONSENT Deliverable D4.2.2)

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## Disclaimer

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# 1. Introduction

As part of WP4 Synthesis and dissemination, Task 4.2 Communication and Dissemination had the objective to disseminate the project findings to key audiences such as policymakers, forest owners and conservation managers, environmental NGOs and civil society actors. It was foreseen to translate project findings into guidance and recommendations to decision-makers in practice on what conservation and restoration efforts have the potential to maximize synergies and minimize trade-offs between biodiversity conservation/restoration and key provisioning, regulating and supporting forest ecosystem services. This deliverable, D4.2.2 Hands-on manual for practitioners, will be complemented by a EU Policy Paper, D4.2.3. It should be noted that deliverable D3.2/D3.3 including the assessment of selected policy and management scenarios with forest simulation models at the regional and European level was delayed and could only be finalised in December 2025. Consequently, this report, prepared in December 2025/January 2026 could not elaborate much on the individual projections of synergies and trade-offs between biodiversity conservation/restoration and key provisioning, regulating and supporting forest ecosystem services.

# 2. Practice Guidance based on BIOCONSENT results

## Why to change forest management?

Climate change affects forest productivity and ecosystem service provisioning. Increasing frequency and, or, intensity of extreme climate events reinforce impacts by forest disturbances such as droughts, bark beetle outbreaks or wildfires. With continuous climate change, disturbance impacts are projected to further exacerbate. Simultaneously, biodiversity loss threatens ecosystem functioning and the EU has established ambitious policy targets in several forest related policy areas. Consequently, enhanced biodiversity conservation and climate change adaptation are urgently needed and necessitate changes in forest management practices.

Forest management does affect resilience and adaptability of forests to climate change and disturbances. Forest managers play a key role in this as they take decisions, select silvicultural practices and decide whether to conserve or sustainably manage their forest land.

## Why forest owners and managers matter

Ambitious policy targets have been set to halt biodiversity loss. However, reaching these targets requires effective implementation and supportive forest management responses from forest owners and managers who must navigate multiple policies and socio-economic influences, and take decisions to manage trade-offs amid complexity and uncertainty. When developing effective policies to guide forest management, it is important to consider the diverse objectives, preferences, and behaviours of the many types of forest owners and managers.

EU forest, biodiversity and climate policy objectives require the involvement of a wide range of private forest owners and public managers, which has important implications for feasibility on the ground. A survey in Sweden, Germany, Poland, Slovenia, and Spain identified distinct owner types based on management objectives, decision making rationalities, and behavioural responses to forest related EU biodiversity and climate resilience policy.

**Different types of forest owners** exist and are motivated by different factors and rationalities.

*Multifunctionalists* – mainly public managers and some large private owners – support EU goals on biodiversity restoration and climate resilience, though balancing them with timber production and other goals is perceived as a difficult task.

*Environmentalists* – mostly small owners plus some public and large private managers – support EU conservation goals but are divided on the management needed to maintain and restore biodiversity.

*Optimizers* – medium and large private owners and some public managers – focus on economic efficiency and often oppose EU environmental rules seen as limiting timber production or adding regulation.

*Traditionalists* – large and small private owners plus some communal and state managers – consistently resist stricter EU conservation objectives, such as Natura 2000 or required restoration measures after climate related disturbance.

*Passives* – small private owners with urban lifestyles, not active in forestry – indirectly support conservation through minimal management and lack of interest in commercial forestry.

These forest owner types appear across Europe, but their prevalence and management behaviour differ with national cultural and institutional settings. This diversity highlights the need to tailor EU forest policy, as well as forest-related biodiversity and climate policy, to national contexts and owner types. Forest owners and managers respond differently to EU forest, biodiversity and climate policy. Support for EU policy goals is strongest among Multifunctionalists and Environmentalists; resistance is greatest among Traditionalists and Optimizers. No single policy tool motivates all owner types, and as such, diverse policy portfolios are required. Mixed policy instruments, adapted to national contexts, are essential to support the implementation of EU forest and forest-related biodiversity and climate policy.

## Are forest managers willing to change management?

In the survey we also investigated willingness to change management in response to climate change. The results indicated rather low intention for behavioural change and consequently the resulting changes in ecosystem service provisioning are quite limited. This suggests that climate change adaptation may already be considered in current business-as-usual management decisions. An alternative interpretation is that management changes will only be triggered in response to more severe disturbances.

**Factors affecting forest management decisions:** Based on survey results from Germany, Spain, and Sweden, the structure and tree species composition of forests are the most important factors influencing the forest management practices considered by forest owners and managers. Although different types of forest owners and managers can be identified based on management objectives and decision-making rationalities, these types do not directly explain the differences in forest management practices that owners and managers currently implement, or want to consider, to strengthen biodiversity in their forests in the future.

Survey results from Germany showed that ecological and economic factors are important for all owner and manager types, along with personal values, goals, knowledge, and experience. The most important policy instrument that forest owners and managers considered for their management decisions was information. Results from Spain suggest that forest road infrastructure, transportation, personal knowledge and experience, and the silvicultural state of the forest, are the most significant factors for all types of forest owners influencing the current forest management. Regarding key factors for changing towards a closer to nature management, all types of forest owners point to subsidies (for both active management and natural development), joint technical management planning, innovations that facilitate forest exploitation, and the availability of labour.

Many factors shape (or have shaped) forest structure, including climate change. Through their combined effect on forest structure, these factors seem to play a crucial role in owners' and managers' current forest management decisions. The role of specific policy instruments in relation to these factors is not fully understood. Behavioural inertia among forest owners and managers is a limiting factor for significant changes in forest structure and composition, as well as biodiversity indicators. Policy-driven incentives can help encourage shifts in forest management, but forest managers and owners often indicated or exhibited limited deviations from current practices in favour of forest biodiversity.

Multifunctional, nature-based management can create synergies and reduce trade-offs among biodiversity, carbon, and socio-economic goals. Management intensity and specificity are important: biodiversity improvements are most effective when target harvest type, intensity, and regeneration

change simultaneously, rather than separately. Biodiversity-focused practices might not automatically provide climate benefits unless they are paired with broader changes in harvesting behaviour.

## How can forest management support climate change adaptation and biodiversity conservation?

In the LEARNFORCLIMATE and BIOCONSENT projects, we simulated forest resource management to assess the effects of climate and forest management on ecosystem service provisioning, using different simulation models with three alternative forest management scenarios, responding to three coherent EU-level policy scenarios:

- Biodiversity First – prioritises strict protection, bans clearcutting, maximises habitat integrity; carbon storage is maximised in standing forests; timber supply is reduced.

- Multifunctionality – balances biodiversity, climate, and economic needs by combining protected areas, close-to-nature forestry, and sustainable harvesting; delivers moderate-to-high scores across biodiversity, carbon, and economic indicators.

- Wood Bioeconomy First – prioritises biomass and timber production; biodiversity measures focus on sustainable yield rather than ecosystem integrity; carbon storage shifts towards harvested wood products.

The following management changes were implemented in the alternative forest resource projections (examples, detailed documentation can be found in the source deliverables):

- under the Biodiversity First and Multifunctionality scenarios, 10% of forest areas - preferably old stands of high conservation value - were set aside from management in Germany.

- under the Biodiversity First, thinning intensity was decreased, and the rotation period increased on 30% of randomly selected forest areas in Germany and Slovenia.

- under the Multifunctionality scenario, thinning intensity was increased and the rotation period reduced for the 30% highest yielding forest areas.

- under the Wood Bioeconomy First scenario, productive sites with high yields were managed more intensively.

## Effects of management changes on ecosystem service provisioning

Management decisions - especially whether to harvest and how - strongly affect forest ecosystem service provisioning at the stand level. At the regional to national scales, however, the potential change in management is usually less drastic, because forests are slowly changing systems with strong path-dependencies due to the long lifespan of trees. At larger spatial scales, more moderate management changes compensate for more drastic changes in ecosystem services. Past management and effects of climate change constrain current and future management options and ecosystem service outputs.

Management changes under alternative policy scenarios affected some indicators more than others. Whereas water regulation and soil carbon uptake were hardly affected by the explored management changes, other service indicators differed quite strongly.

The biodiversity scenario led to reduced harvest removals and consequently increasing growing stock and carbon pools. In Poland, there was a strong increase of broadleaved species share under this scenario with little change in growing stock but increased carbon storage, due to higher wood density of hardwoods. Synergies between climate mitigation and biodiversity conservation objectives can thus be achieved by promoting broadleaves as the high-conservation value tree species are usually hardwoods that store more carbon per cubic meter of wood than softwood conifers.

Swedish scenario projections indicated that management decisions affect carbon flux quite rapidly, whereas other impacts may take several decades to create larger changes. Strong synergies were found between scenarios that benefited biodiversity indicators and carbon storage, with the multifunctionality scenario providing the most balanced outcomes for ecosystem service provisioning.

Owners' and managers' current responses to adapt management to climate change for restoring biodiversity are limited and not sufficient to drastically halt or affect biodiversity decline and climate change. To meet EU biodiversity and climate change targets, additional incentives may be needed.

## Management choices at landscape level

Spatial implementation of policy targets and effective conservation strategies are important to manage trade-offs between different forest functions, especially between wood provisioning on one side and biodiversity conservation and forest carbon pools on the other. Land sharing and Triad Forest Management were perceived as viable landscape forest management strategies to achieve high levels of ecosystems services provisioning, but there were noticeable differences across regions due to contrasting management traditions and disturbance risks.

The spatial implementation of measures for achieving EU objectives involves deciding where and how to allocate forest use and protection. Stakeholder consultations across six Member States revealed strong contextual preferences and highlighted that no one-size-fits-all approach is feasible. Nordic countries tend towards close-to-nature approaches under Biodiversity First or Multifunctionality scenarios, while Mediterranean contexts may emphasise multifunctional landscapes to sustain rural economies. The evidence suggests that EU-level targets must be implemented through flexible, spatially tailored national strategies that recognise ecological zones, ownership patterns, and socio-economic priorities.

## Policy implications and practice recommendations

Long-term EU forest biodiversity and climate resilience objectives require decision-making under uncertainty. Achieving 2030 and 2050 targets must account for long time horizons and uncertainty arising from interacting societal, economic, technological, environmental, and policy drivers. Short-term policy choices should therefore be assessed for their long-term implications.

Different forest owner types can be distinguished as they react differently to societal, economic, technological, environmental, and policy drivers. However, their decision-making is strongly constrained by forest structure resulting from past management choices and environmental conditions. Survey responses suggest that few owners are planning to actively change forest management beyond changes that they may have already adopted.

Behavioural change is often triggered by disturbance events, which open a window of opportunity to implement adaptive and restorative measures. Targeted engagement strategies for different forest owner types need to be developed, offering incentives and support aligned with their motivations.

Member States should tailor spatial policy implementation strategies to their ecological and socio-economic contexts, considering diverse land ownership and decision-making preferences to mitigate trade-offs between ecosystem services.

With the rapidly changing disturbance regimes and continuing biodiversity threats, monitoring and reporting should be further enhanced to track progress on both biodiversity and climate indicators, ensuring timely corrective actions.

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