



D6.3 Narrative analysis of main policy pathways

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Highlights

- Through a co-design process, stakeholders developed three visions of forests for 2050, as well as pathways to achieve them. All pathways aim to meet Europe's climate and biodiversity targets, but they diverge in how they propose to get there.
- The pathways differ in how strongly they emphasize protection and restoration. Some place more weight on expanding protected areas and restoring degraded forests, while others focus on integrating ecological goals into landscapes rather than setting land aside.
- Forest management varies across pathways. One pathway emphasizes promoting mixed-species stands, longer rotations, and structural diversity as the foundation for resilience; another focuses more on risk control, prioritizing measures that reduce vulnerability to fire, pests, and drought, even if these interventions do not radically change current management systems. In contrast, a third pathway takes a more flexible, place-based approach, arguing that local conditions should determine whether transformation or risk-focused management is more appropriate.
- Wood use and circularity emerge as another area where the pathways diverge. Some envision a strong shift toward long-lived wood products and circular material flows. Others are more cautious, highlighting uncertainties around demand, substitution effects, and the pace at which industries can change.
- Governance is different between pathways and ranges between one pathway that assumes a high degree of policy coherence, with EU-level targets cascading smoothly into national strategies and local implementation, whereas another pathway anticipates a more fragmented landscape, where uneven capacities and competing priorities slow progress and require more adaptive, bottom-up solutions.
- The differences between visions and pathways indicate that Europe's path to reaching climate and biodiversity goals should not follow a single model. Success depends on integrated, adaptive, and well-coordinated approaches tailored to regional realities and governance capacities.

Executive summary

European forests are facing growing pressure from climate change and biodiversity loss. At the same time, policy debates and societal perspectives on how European forests should be managed often diverge, reflecting different priorities related to production, conservation, and the functions forests provide for society. Through three Policy Labs, stakeholders from across Europe, representing policy, science, industry, and civil society, co-designed with ForestPaths experts visions of alternative, aspirational futures for forests by 2050, as well as pathways to achieve them. These visions formed the foundation for the policy pathways, used to identify alternative trajectories for European forests and the forest-based sector toward a climate-neutral and resilient society and economy.

This report brings together stakeholders' visions, an analysis of EU climate and biodiversity policy targets, and actions derived from exploratory scenarios, as identified by stakeholders as most aligned with their visions across two different global socioeconomic scenarios. All these components led to the identification of policy pathways.

Through a co-design process, stakeholders developed three visions of forests for 2050 that all aimed to achieve existing climate and biodiversity goals: (1) Better Forests For All, (2) Resilient Forests for People and (3) Planet, and Adaptive Lands Diverse Operations. These visions represent different aspired future states for 2050. Across visions, stakeholders emphasized the need for more diverse and structurally complex forests, better risk management, and long-term incentives that reward sustainable practices.

In the next step of the co-design process, stakeholders identified policy pathways for each vision. Each policy pathway includes a set of actions that contribute to EU climate and biodiversity targets and align with stakeholders' visions. These pathways were constructed for two global socioeconomic scenarios (Shared Socioeconomic Pathways scenarios 1 and 3) to understand how they might perform in both cooperative and fragmented futures, laying the groundwork for the co-development of policy pathways. The analysis of the resulting six policy pathways narratives highlights the importance of aligning European-level ambitions with national policies and on-the-ground realities, as fragmented governance remains a major barrier. The actions underlying the policy pathways combine adaptive forest management, landscape-level coordination, and stable policy frameworks that give forestland managers and owners confidence to invest in long-term resilience.

Ultimately, this deliverable underscores that Europe's forest transition will be a long-term process, in need for iterative steps rather than being based on a single policy decision. It will require cooperation across governance levels, openness to experimentation, and a willingness to navigate trade-offs transparently, depending on how the world will develop in the future. The pathways developed here do not prescribe a single solution, but they offer a structured way to think about choices (actions), their consequences, and the enabling conditions needed to move forward. As the project continues, these insights will feed into detailed modelling and, eventually, into concrete policy recommendations that can support a coherent and credible strategy for EU's forests in the decades ahead.

List of abbreviations

ALDO	Adaptive Lands Diverse Operations (stakeholder vision)
BF4All	Better Forests for All (stakeholder vision)
CAP	Common Agricultural Policy
CBS	Climate- and Biodiversity-Smart forestry (and wood use)
CCF	Continuous Cover Forestry
CMCC	Euro-Mediterranean Center on Climate Change
EFI	European Forest Institute
EU	European Union
EUDR	EU Regulation on Deforestation-Free Products
EU NRL	EU Nature Restoration Law
GHG	Greenhouse Gases
HNV	High Nature Value (forests/landscapes)
HVP	Harvested Wood Products
KIT	Karlsruhe Institute of Technology
NGO	Non-Governmental Organisation
LUKE	Natural Resources Institute Finland
OEKO	Öko-Institut
PBL	Netherlands Environmental Assessment Agency
PES	Payments for Ecosystem Services
PL	Policy Labs
RCP	Representative Concentration Pathway
RF4PP	Resilient Forests for People and Planet (stakeholder vision)
SSP	Shared Socioeconomic Pathway
WR	Wageningen University and Research

1 Introduction

1.1 Background

Forests are at the heart of the global response to climate change mitigation and biodiversity loss (UNEP-FI 2025). They act as carbon sinks, regulate the water cycle, stabilize local and regional climates, and provide essential habitats for countless plant and animal species (e.g., Azuero-Pedraza et al. 2024). Moreover, forests underpin rural livelihoods, contribute to bio-based economies, and offer vital ecosystem services that support human well-being (Luhás and Mikkilä 2025). As the urgency to curb greenhouse gases (GHG) emissions and halt biodiversity decline intensifies, managing forests sustainably has become one of the most pressing environmental and policy challenges of our time (Betts et al. 2021; Korosuo et al. 2023).

Over the past two decades, scientific and policy debates have increasingly emphasized the need to align climate change mitigation and biodiversity objectives within sustainable forest management, often framing these goals as mutually inclusive rather than competing priorities. However, these two goals have often been pursued in isolation. Studies that examine forest carbon sequestration tend to focus on maximizing biomass production and storage (Favero et al. 2017), while biodiversity research has often targeted habitat preservation and ecological integrity (Hämäläinen et al. 2024; Plumptre et al. 2024).

At the same time, climate mitigation extends beyond forest carbon storage to include avoided deforestation, soil carbon enhancement, harvested wood products (HWP), and substitution effects. These strategies may be complementary but can also involve trade-offs. As a consequence, decision-makers and forest practitioners often lack the integrated knowledge needed to design and implement management strategies that deliver multiple benefits at once (e.g., Feliciano et al. 2023). This challenge becomes particularly relevant in Europe, where forests play a central role in both climate and biodiversity policy.

1.2 European policy context

Within the European Union (EU), forests are recognized as key assets for achieving climate neutrality and biodiversity recovery under the European Green Deal, the EU Forest Strategy for 2030, and the Kunming–Montreal Global Biodiversity Framework (European Commission 2021; Böttcher et al. 2023) (see Box 1). Forests can contribute to the EU’s ambition to achieve net-zero GHG emissions by enhancing carbon sinks in forests and products and avoiding emissions through material and energy substitution (e.g., Verkerk et al. 2022), while safeguarding biodiversity to ensure the long-term stability of forest ecosystems (IPBES 2019; Korosuo et al. 2023).

Box 1. Relevant climate and biodiversity targets (from Böttcher et al. 2023)
Relevant EU climate targets

- **At least 55% net greenhouse gas emission reduction by 2030** compared to 1990 levels, including strengthened contributions from the LULUCF sector (EC 2023)
- **Maintenance and enhancement of forest carbon sinks**, while increasing resilience to climate change and disturbance risks (EU Bioeconomy Strategy (2012, updated 2018), refer to Böttcher et al. 2023)
- **Overall climate neutrality by 2050**. No target has been specified for forests or the LULUCF sector. However, according to the Impact Assessment of the 2040 Climate Target, the LULUCF sector is expected to contribute net removals of approximately 332.5 Mt CO₂ eq. by 2050 (central level for scenarios S2–S3; European Commission 2024).

EU biodiversity targets

- **Halting biodiversity loss** and reversing ecosystem degradation, as set out in the EU Biodiversity Strategy for 2030.
- **30% of total EU land area to be legally protected, with 10% under strict protection** (e.g., in Natura 2000 or strict nature reserves), as set out in the EU Biodiversity Strategy for 2030.
- **Restoration of degraded ecosystems**, with a focus on improving forest structure, diversity, and ecosystem functioning (refer to e.g. the Nature Restoration Law).

Despite this recognition, Europe's forests are under mounting pressure from multiple demands placed on forests, including an increasing demand for wood to support the bioeconomy, as well as many other ecosystem services. At the same time, climate change, including more severe and frequent disturbances (e.g., wildfires, insect outbreaks, and storms) and extreme events (e.g., droughts), poses risks to forest resilience and the permanence of carbon stocks (e.g., Patacca et al. 2023, Seidl et al. 2014). These interacting stressors underscore the need for adaptive and forward-looking policy approaches that account for the complex dynamics of forest ecosystems and their socio-economic context.

Historically, European forest management often prioritized timber production through intensive harvesting, even-aged plantations, and simplification of stand structure (Chudy and Cabbage 2020), which has led to biodiversity loss and taxonomic/structural homogenization in many regions (e.g., Jörg et al. 2010; Muys et al. 2022). Intensive forestry practices, such as large-scale monocultures, clear-cutting, and short-rotation cycles, have contributed to the simplification of forest structures, reducing habitat diversity and species richness (e.g., Felton et al. 2010). In contrast, biodiversity-oriented management systems, such as closer-to-nature forestry, mixed-species stands, and set-aside conservation areas, can enhance ecological resilience but may

result in lower short-term economic returns (Larsen et al. 2022). These contrasting approaches illustrate the management trade-offs European forest policy must address.

1.3 Towards integrated and context-sensitive forest resources management

The EU's ambitious targets to significantly reduce net emissions by 2030 and achieve climate neutrality by 2050 necessitate new mitigation measures across all sectors.

Recent research consistently highlights that there is no universal solution for balancing carbon sequestration and biodiversity outcomes in forests (e.g., Mäkelä et al. 2023; Biber et al. 2020; Fischer et al. 2024; Balducci et al. 2026). Such studies comparing management scenarios find that maximizing one goal often comes with trade-offs and that local context, forest type, management practices, global dimension, and potential leakage effects outside of Europe, or environmental conditions play crucial roles in determining the best approach. For example, Choi et al. (2022) found that afforestation plans require tailored strategies to achieve both carbon and biodiversity objectives, as one-size-fits-all approaches fail to enhance these outcomes equally across regions. The authors concluded that achieving a balance among the various objectives in forest management necessitates a compromise approach that minimizes trade-offs (Choi et al. 2022).

Biber et al. (2020) concluded that sometimes synergistic results are possible, but relationships between carbon storage, wood production, and biodiversity vary significantly by landscape, management intensity, and long-term forest dynamics. In other words, measures that increase carbon storage in, for instance, boreal forests may not yield the same benefits in Mediterranean forest stands, where water scarcity and fire risk play a larger role. Thus, local climatic conditions, forest types, land-use histories, and governance frameworks all shape the results of these actions. Balducci et al. (2026) argue that forest policies must account for trade-offs among carbon pools and taxonomic groups, noting that maximizing aboveground biomass carbon can conflict with biodiversity by favouring homogeneous, fast-growing forests that support fewer species.

This variability underscores the need for integrated, regionally tailored forest management strategies that optimize carbon storage and sequestration, conserve biological diversity, and provide ecosystem services. Achieving this requires moving beyond siloed analyses and developing systemic, cross-sectoral approaches that link forest management practices to broader socio-economic and policy contexts. Such approaches can support the development of adaptive management pathways that are both scientifically grounded and practically relevant for decision-makers at multiple governance levels.

1.4 The ForestPaths project and Deliverable 6.3

The ForestPaths project has been established to help understand how the EU forestry sector can contribute to climate change mitigation and adaptation, while simultaneously conserving biodiversity and sustaining ecosystem services. The project adopts a co-design approach,

engaging a wide range of stakeholders—including policymakers, forest owners, industry representatives, certification bodies, civil society (e.g., NGOs), and researchers—to jointly explore policy pathways toward a climate-neutral and resilient EU forest sector.

These pathways are developed and refined through an iterative process that combines stakeholder engagement (via Forest Policy Labs and Policy Engagement Forums, see section **Error! Reference source not found.**) with quantitative modelling. Through this process, the project aims to identify Climate- and Biodiversity-Smart (CBS) forest management options (actions) that can deliver multiple benefits and support coherent EU policy design.

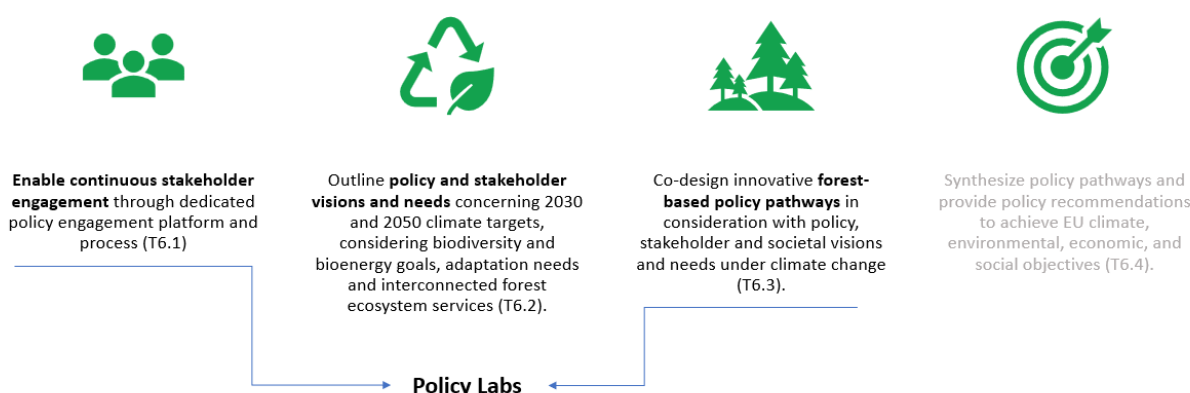


Figure 1. Objectives of Working Package 6 (WP6) and Deliverable 6.3.

Deliverable 6.3 – Narrative Analysis of Policy Pathways builds directly upon the results of Forest Policy Labs 2 and 3, as well as the modelling exercises carried out in Work Package (WP) 5. The purpose of this deliverable is to synthesize and analyze the narratives underpinning the various policy pathways co-developed within the project that aim to reach EU climate and biodiversity policy targets simultaneously.

The analysis compares how bundles of assumptions and actions shape alternative policy pathways. Through this comparative lens, this report seeks to interpret how varying stakeholders' perspectives and priorities have shaped alternative bundles of actions for the EU forest sector transition, organized under three main policy pathways that lead to stakeholders' visions.

1.5 Objectives and analytical focus

The content analysis aims to identify the policy pathways narratives co-designed by stakeholders and informed by modelling insights, which collectively seek to achieve European climate and biodiversity goals. In particular, this deliverable examines the bundles of actions to achieve climate and biodiversity goals as part of larger visions of forests by 2050. This deliverable also investigates the underlying assumptions, contextual drivers, and interdependencies that shape these pathways. Deliverable 6.3 aims to serve as a key step towards subsequent modelling and synthesis activities that ensure the coherence, credibility, and EU policy relevance of the ForestPaths outcomes.

D6.3 Narrative analysis of main policy pathways

By comparing these dimensions across policy pathways, the analysis seeks to shed light on the diverse strategies that may enhance the coherence and effectiveness of future EU forest-related policies.

By articulating stakeholder narratives, assumptions, and action bundles, Deliverable 6.3 connects stakeholder co-design (WP6) with insights from quantitative modelling (WP5), supporting coherent and policy-relevant pathways for achieving EU climate and biodiversity targets.

2 Methods and approaches

2.1 Co-creating policy pathways

The development of policy pathways within the ForestPaths project follows a co-design approach, ensuring that the resulting strategies are both scientifically robust and socially grounded. This process has actively engaged stakeholders from diverse backgrounds—policy, industry, science, and civil society through a series of Policy Labs (PLs). The co-design framework for policy narratives presented in this report combines stakeholder-driven visions with model-based analysis, linking qualitative insights into future forest governance to quantitative assessments of expected climate and biodiversity outcomes.

Stakeholders' visions were elicited, documented, and analysed as structured narratives describing desirable forest systems by 2050. These visions were not treated as abstract statements but were operationalised to allow comparison and subsequent translation into policy pathways.

Figure 2 shows the approach to combine stakeholders' visions, EU policy targets, and the feasible actions derived from exploratory scenarios (analysed in WP5) and indicated by stakeholders as most aligned with their visions under two different Shared Socioeconomic Pathways (SSPs). All these components led to the identification of policy pathways.

To enable systematic analysis, each vision was documented on a standardised vision board created during Policy Lab 2. Vision boards captured each vision's core elements, like qualitative descriptions of desired future conditions, indicative quantitative targets, references to relevant EU climate and biodiversity policy targets, and perceived benefits for forest management. This provided a common analytical basis across all visions.

The central aim of this process is to identify and model the feasibility of various policy and management actions that can realistically lead the EU toward its climate-neutrality and biodiversity-conservation targets across different future socio-economic contexts. By integrating SSPs and participatory foresight methods, ForestPaths aims to create a structured space for dialogue, learning, and iteration between stakeholders and forest sector modelers.

In parallel, vision analysis incorporated a temporal dimension. During Policy Lab 2, stakeholders were asked to situate their visions at intermediate milestones (2030 and 2040) and to develop timelines identifying measures and actions required to reach the 2050 vision. This process enabled the identification of sequencing dynamics regarding policy implementation over time.

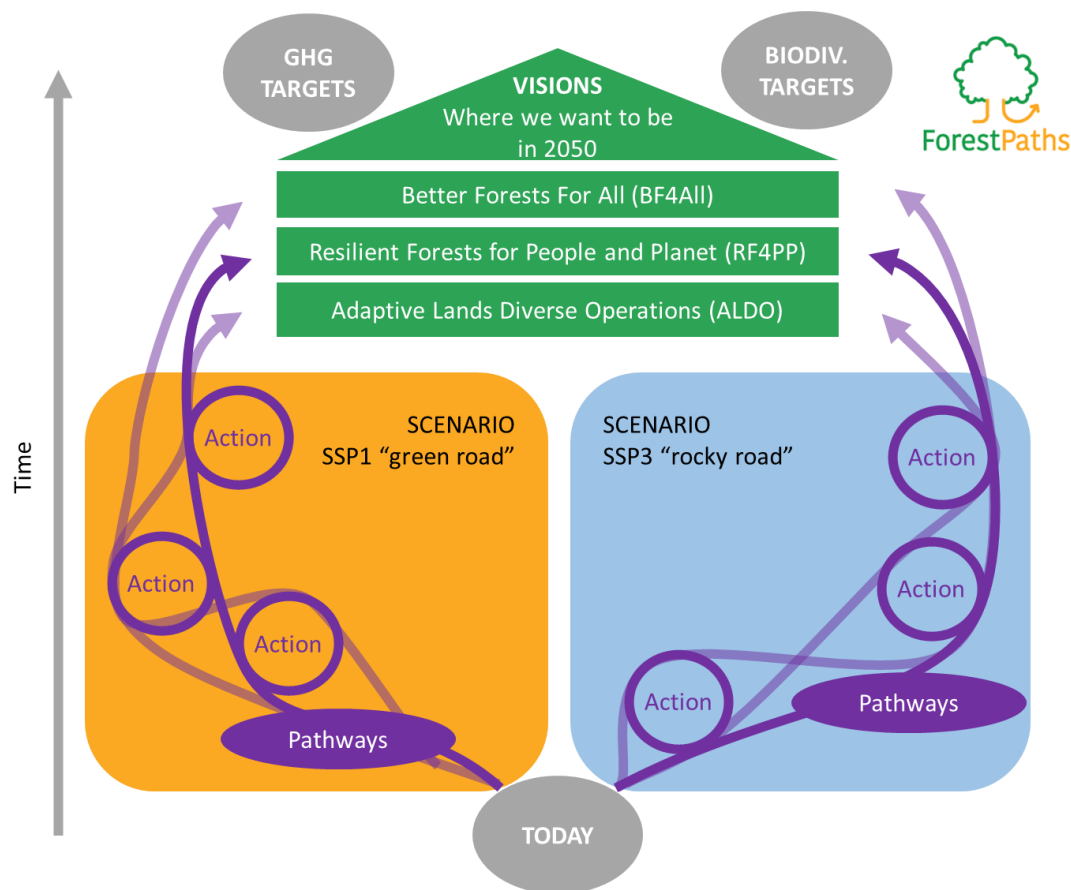


Figure 2. The combination of stakeholders' visions, actions derived from exploratory scenarios, and resultant policy pathways.

To ensure a shared understanding of the core concepts underpinning this framework (as illustrated in Figure 2), the following definitions are used in this report:

- **EU policy targets** are defined as binding or strategic objectives adopted at the European Union level that set quantitative or qualitative benchmarks for climate change mitigation, biodiversity protection, and ecosystem restoration, which policy pathways should at minimum achieve. Such targets are, for instance, halting biodiversity loss or achieving climate neutrality by EU by 2050.
- **Shared Socioeconomic Pathways (SSPs)**, are storylines about how the world might develop, including, population, technology, or economic growth. They give researchers a way to explore how different futures could shape climate risks and the choices societies face.
- **Stakeholder visions** are normative, qualitative representations of desirable future forest and bioeconomy systems, reflecting the values, priorities, and constraints of stakeholders engaged in the co-design process. Stakeholders' visions are elicited through the series of Forest Policy Labs Policy, Forest Engagement Forums, workshops, interviews and scenario dialogues. In other words, those reflect perspectives of policymakers, forest owners and managers, industry, scientists, and civil society.

- **Policy pathways** are time-dependent sequences of policy actions that are efficient in reaching the EU policy targets on climate and biodiversity. Pathways are intended to at minimum achieve EU climate and biodiversity targets.
- **Actions** derived from exploratory scenarios are then concrete, implementable management measures identified through scenario exploration that enable or accelerate the transition towards desired policy pathways under different SSP **settings**.

2.2 Co-design through Policy Labs

To co-design policy pathways, three Policy Labs (PL) have been organized. During the three consecutive Forest Policy Labs, stakeholders collectively shaped the visions and developed corresponding ingredients for the pathways to the visions, under the two different scenarios. Within these professionally designed and moderated workshops, participants were guided through a structured sequence of activities designed to elicit both strategic thinking and practical insights, selecting measures and bundles of actions that, according to stakeholders, may help to reach EU biodiversity and climate policy targets in line with their vision.

Stakeholder mapping (milestone 8) was conducted to identify and analyze all stakeholder groups relevant to the ForestPaths project. Stakeholder identification at both regional and national levels drew on inputs from all work package leaders within the project and demo-case leaders. For each subsequent PL, additional stakeholders were identified allowing the stakeholder map to be further refined and expanded by incorporating new actors from policy, civil society, academia, forestry practice, and industry.

Stakeholders were selected applying the Prospex-CQI method as part of the Stakeholder-Integrated Research (STIR) approach practiced in ForestPaths (Gramberger et al 2014). The Prospex-CQI method enables the identification and selection of participants that span the diversity of stakeholders on a given topic. For the Policy Labs, the stakeholder selection was guided by five main categories: Policy and governance actors (including representatives from European and national institutions and public agencies); forestry and related practitioners (such as forest managers, owners' organizations, and technical agencies), forest value-chain and economic actors (including industry representatives, certification bodies, and market-oriented organizations); research and academia (covering experts in forestry, ecology, climate and socio-economic analysis); and civil society organizations (including NGOs, and organizations representing societal and environmental interests).

The first PL, held in Helsinki, Finland, on September 27-29, 2023, brought together 19 stakeholders, including policymakers, academia, forestry practitioners, civil society, and industry professionals. The stakeholders were asked to consider relevant policy actions given different timescales, governance paradigms, enablers, and barriers to policymaking. This PL was structured around six thematic building blocks, featuring presentations by project partners and participant exercises. The lab covered topics such as the effects of climate change on the forest sector, current governance approaches, an overview of existing policies, and forest sector modelling. It provided key guidance on subsequent actions, including detailed feedback, such as on the scale and resolution of the graphical information to be produced by ForestPaths.

D6.3 Narrative analysis of main policy pathways

Participants' input on policies and actions was grouped into four clusters, which served as building blocks for the development of the vision:

- new governance and information training,
- new adaptation management practices,
- circular bioeconomy,
- and finance and payments.

This input was further evaluated by stakeholders for their potential impact, along with associated trade-offs and synergies. Key findings from the lab included the need for financial mechanisms to support ecosystem services, the desire for more durable and circular forestry products, a call for long-term forest considerations in policies, and the importance of providing practical guidance to forest managers through advisors to ensure regulatory compliance.

The second PL was held in Varese, Italy, from 23-25 September 2024. Its main objective was to develop and explore medium- and long-term visions. The workshop was attended by 18 stakeholders from various sectors, including policymakers, academics, forestry practitioners, civil society, and industry professionals. Nine of them were participants of the previous PL, and the others were new participants.

The stakeholders worked in three separate groups, each developing a separate vision. The groups were intentionally composed to include a mix of perspectives, bringing together participants from different sectors (policy, science, industry, and civil society) as well as varied regional and national contexts across Europe, rather than clustering similar interests in the same group. Although the groups developed their visions independently, moments of exchange were built into the process.

Each group was asked to fill in a 'vision board' defining three key elements to be realised in 2050, including quantification, the values underpinning their vision, compatible and useful policy targets to help achieve the vision, and to consider benefits for forest management. Participants equally provided their assessment of a series of 7 modelling parameters in view of their vision. Taking first steps toward creating pathways to the visions, groups were asked to consider the state of their visions in 2030 and 2040, and to develop a timeline for its realisation. In the last stage of the labs, the modelling teams elaborated on the possibilities for modelling for each vision and consulted with the groups to see what is relevant, what needs to be refined or addressed differently.

The third Forest Policy Lab was held in Berlin, Germany, on November 19-21, 2025. PL3 main objective was to support the co-creation of forest-based policy pathways by engaging stakeholders in an experimental setting with exploratory modelling. The workshop brought together 18 stakeholders from a balanced mix of stakeholders' categories. Participants included representatives from European-level institutions and public agencies, national forest authorities, research institutes and universities, environmental NGOs, certification bodies, and actors linked to forest-based value chains. Nine of the participants participated in the previous Labs, while the remaining nine participants were new to the process.

In a stepwise process, participants identified actions that would help achieve or advance their vision in each of the two scenarios. Stakeholders were first introduced to the scenario framework

(section 2.3) and the overarching targets of the EU's climate and biodiversity strategies (Box 1; Böttcher et al. 2023). They were then presented with the outcome of initial model results without taking any specific actions. In the next step, the ForestPaths experts presented a set of actions (“cases”) created within the project based on scientific analyses and the stakeholder input received (add here ref to forthcoming D5.1). Participants and project representatives then engaged in an extensive exchange on which of these bundles of actions were applicable, how, and to what extent they were applicable, for reaching the stakeholder visions under each scenario.

A series of short presentations on models and their outcomes for specific actions to reach the vision supported the process, characterized by focused discussions on specific numerical and graphic data presented. Actions were refined and further actions defined along the way. The result was the refinement of elements for the pathways, as well as extensive and specific feedback to modellers for the further development of the pathways and for their modelling. Stakeholders also provided extensive feedback to modellers on the interpretation of the visions for the modelling activities, helping modellers refine subsequent modelling.

2.3 From stakeholder insights to first model simulations

Three visions have been determined by stakeholders—Better Forests 4 All (BF4All), Resilient Forests for People and Planet (RF4PP), and Adaptive Lands Diverse Operations (ALDO)—and explored through two distinct global development contexts. We have used the Shared Socioeconomic Pathways (SSPs) (O'Neill et al. 2013; O'Neill et al. 2017) together with the Representative Concentration Pathways (RCPs) (van Vuuren et al. 2011) to capture a range of possible futures for global socioeconomic trends and climate forcing. This combined SSP–RCP framework provides a consistent foundation for analyzing linkages between societal development and environmental change and has become a central tool in large-scale environmental assessments (e.g., O'Neill et al. 2020). The SSPs outline divergent socioeconomic pathways covering factors such as demographic change, economic development, and land-use dynamics while the RCPs specify alternative trajectories of radiative forcing associated with varying GHG concentrations. The two SSPs used in the project were:

- SSP1 (“green road”) describes a world that prioritizes sustainability, cooperation with strong institutions and proactive environmental policies. In this setting, ambitious, transformative actions aligned with ecological integrity, green innovation, and inclusive governance may help to reach the vision.
- SSP3 (“rocky road”) describes a fragmented world characterized by regionalism, limited cooperation, and uneven economic development. In this scenario, adaptive, resilient actions that can still achieve the EU targets despite weaker global governance and resource constraints may help achieve the vision.

The actions and bundles of actions (“cases”), which are elements of the pathways, are to be translated into quantitative parameters and transferred to the modelling teams for simulation. The models then test whether, under each vision and SSP, the proposed policy actions are sufficient to achieve EU-level climate change mitigation and biodiversity targets—for example, by evaluating effects on carbon sequestration, forest health, land-use change, and biodiversity

indicators. The results will be fed back to stakeholders in the fourth PL (end of 2026), finalizing and assessing the pathways together with the participants.

If the model results indicate that the proposed actions meet the stakeholder visions and EU targets, and that identified trade-offs remain within acceptable or manageable limits, the pathway is considered feasible and complete. However, if the results fall short, for example, when trade-offs are substantial, persistent, or affect priority objectives, or when key enabling conditions appear insufficient or unrealistic, then the pathway undergoes iterative refinement. Through this participatory process, each vision is accompanied by a set of co-created, modelled policy pathways, grounded in shared understanding yet stress-tested under contrasting global conditions (scenarios). The co-design framework ensures that diverse perspectives—ranging from ecological priorities and economic feasibility to governance challenges and social values—are integrated into the development, refinement and analysis of the pathway.

The iterative feedback loops between stakeholders and modelers embody the core principle of co-design and Stakeholder-Integrated Research (STIR): combining scientific evidence with experiential knowledge to develop strategies that are credible, legitimate, and actionable.

3 Visions and policy pathway narratives

Before we dive into the content analysis of narratives of main policy pathways, we present three stakeholders' visions (aspirational descriptions of the future) co-developed through the Policy Labs. Then we look at these visions side by side, comparing their similarities, differences, and points of agreement. Next, we introduce the policy pathways, describing the actions and measures associated with each. At the end, we compare the pathways to one another to understand how they align with stakeholder visions.

3.1 Visions

Visions have a normative focus, addressing a desirable endpoint or a vision of what is wanted and where one would like to be in the future. They provide a compelling story of what society or an organization (here represented by different stakeholder groups at PLs) aims to become in the long term. In general, visions are intended to inspire actions and serve as guiding principles for decision-making. Visions are typically broad and encompassing, depicting a preferable future that aligns with societal values and aspirations. Normative visions of a future forest sector in Europe can encompass a range of targets and values that society aspires to achieve in managing its forests sustainably. These visions typically aim to balance environmental, economic, and social considerations, three core pillars of responsible and sustainable forest management.

As part of the co-creation process, stakeholders collaboratively developed three forward-looking visions representing alternative ways toward achieving the European Union's long-term climate and biodiversity targets:

- Better Forests For All (BF4All),
- Resilient Forests for People and Planet (RF4PP), and
- Adaptive Lands Diverse Operations (ALDO).

These visions capture diverse perspectives on how European forests could evolve by 2050 under different governance approaches, societal priorities, and management paradigms. All these visions aspire to achieve existing climate and biodiversity goals (Box 1), but result in a different future of forests. Each vision integrates ecological, economic, and social dimensions but differs in emphasis, reflecting distinct stakeholders' preferences, assumptions, and expectations about the conditions that may shape future forest management in Europe and globally.

By analysing the core content behind stakeholders' visions, the following sections aim to illustrate the diversity of possible futures for European forests that aim to meet EU policy targets. While the visions differ in their entry points (i.e., focusing on expansion, resilience or diversity) they share a common aspiration: to ensure that Europe's forests remain healthy, productive, and valued for generations to come.

3.1.1 Better Forests For All

"Better Forests 4 All" (BF4All) is a long-term vision developed during PL2, centred on fostering ecological resilience, expanding forest coverage, and embracing multifunctional forest landscapes by 2050. The group envisioned healthier, more diverse forests that provide ecosystem

services, enhance human-nature connections, and support biodiversity through landscape-level interventions. Policy Lab 3 discussion confirmed the relevance of multifunctionality as a core ambition of the vision, while clarifying that biodiversity recovery and long-term resilience are not automatic outcomes of forest expansion or diversified forest use.

Core elements of the vision BF4All

- Forest expansion: Strategic increase of forested areas, particularly by establishing “forest frames” around protected and agricultural zones, contributing to improved connectivity and ecological functions. Notably, the stakeholders proposed surrounding agricultural land with forest buffers to enhance biodiversity and carbon sequestration, and reaching the 3-30-300 urban greening benchmark (refer to Konijnendijk 2021) in 70% of urban areas. Insights from Policy Lab 3 indicated that under more challenging socio-economic conditions, competition for land and increased pressure on forest resources could limit the feasibility of large-scale forest expansion unless supported by strong spatial planning and cross-sectoral coordination.
- Multifunctional and diverse forests: Forests should support a range of services and values. By 2050, on average, 20–30% of revenue for forest owners is expected to come from climate- and biodiversity-related markets, promoting financial sustainability beyond timber alone.
- Focus on resilience and adaptation: The vision stresses forest diversity and structure to mitigate tree mortality (targeting tree mortality to less than 10% following disturbances) and align with EU climate change adaptation targets. Emphasis is placed on ecosystem services valuation and species-rich landscapes.



Figure 3. Targets of the vision on 8 dimensions representing modellable target variables. Vision targets were re-evaluated on these facets in Policy Lab 3. Mitig-forest refers to climate change mitigation in forests (changes in forest carbon pools) and product stocks refers to carbon in harvested wood products

Quantifiable statements (links to policy targets)

The BF4All vision defines a set of measurable milestones to guide implementation and assess progress over time. By 2035, tree mortality across European forests should fall below 10%, indicating improved resilience and forest health. In parallel, stakeholders expect 20% of agricultural land to be surrounded by newly established forest frames, strengthening ecological connectivity and supporting biodiversity at the landscape level. Urban areas also play a key role: by 2050, 70% of cities are expected to meet the 3-30-300 benchmark¹ (Konijnendijk 2021), ensuring citizens have access to green spaces, canopy cover, and the well-being benefits associated with nature in daily life. These quantifiable statements provide clear, policy-aligned targets that bridge ecological, social, and spatial dimensions of forest sustainability.

List of policy targets – BF4All vision situation in 2050

By 2050, the BF4All vision aspires to be aligned with key European policy frameworks, particularly the EU Biodiversity Strategy, and contributes to achieving the objectives of the European Green Deal. The long-term vision includes establishing national forest strategies in all Member States, integrating fire prevention, sustainable regeneration of exploited areas, and ecosystem-based management practices. A functional Payments for Ecosystem Services (PES) system is expected to be in place at the EU level, ensuring fair compensation for forest owners and managers who maintain or enhance biodiversity and ecosystem functions.

Answers to model parameters

Within the ForestPaths modelling framework, BF4All positions itself as a moderate yet transformative vision, emphasizing ecological integrity, multifunctional management, and balanced resource use. Demand for timber and biodiversity intactness are both expected to increase slightly, while recreation demand and multifunctional forest management show strong positive trends, highlighting the growing recognition of forests as both social and ecological assets. Protected areas are projected to expand modestly, reinforcing biodiversity protection. Wood demand remains stable. Circular economy drives increases in wood-based products and product substitution.

Indicators for 2030 and 2040

By 2030, the BF4All vision foresees tangible progress toward ecological connectivity, sustainable forest use, and circularity across Europe. National forest strategies will be in place in all Member States, supported by a pan-European forest advisory service. Forest expansion efforts will be aligned with biodiversity corridors and ecological restoration goals. At least 30% of timber should be expected to be directed to construction, promoting low-carbon materials, while 50% of non-recyclable wood will be reused, reflecting a strong shift toward circular bioeconomy principles.

¹ This benchmark or planning guideline advocates that every resident in the city should see 3 trees from home, live in a neighbourhood with 30% tree canopy cover, and be within 300 meters of a green space (e.g., a park).

By 2040, European forests should demonstrate significant advances in resilience, multifunctionality, and ecosystem service valuation. A joint EU forest expansion plan will be operational, ensuring transnational coherence in restoration and afforestation efforts. 70% of non-recyclable wood will be reused, and 70% of ecosystem services will be valued and compensated through established mechanisms. It was also stated that there should be 50% less direct human-caused forest damage than today.

3.1.2 Resilient Forests for People and Planet

"Resilient Forests for People and Planet" (RF4PP) is a long-term vision developed during the ForestPaths Second Policy Lab. It is centered on a balanced approach that integrates sustainable wood production, resilience to climate and ecological threats, and the creation of societal value. The vision imagines European forests in 2050 as multifunctional landscapes that are ecologically stable, economically viable, and widely appreciated by society.

Core elements of the RF4PP vision

- Responsible and resilient management: Forests should be actively managed to increase resilience against climate change, reduce damage (natural and anthropogenic hazards, plant disease, fire, pollution and biotic and abiotic adversities) by at least 50%, and maintain ecosystem functions across diverse conditions. Management is supported by robust data collection and monitoring systems.
- Societal and market value: The vision promotes a forest sector that contributes to the bioeconomy through long-lived wood products, while also generating public value via ecosystem services. Doubling wood use in construction and recycled wood rates (to 50–60%) are among its targets.
- Data-driven and inclusive decision-making: Policy and forest operations are informed by consistent and transparent data on forest conditions and societal needs, fostering trust and coordinated planning at national and EU levels.

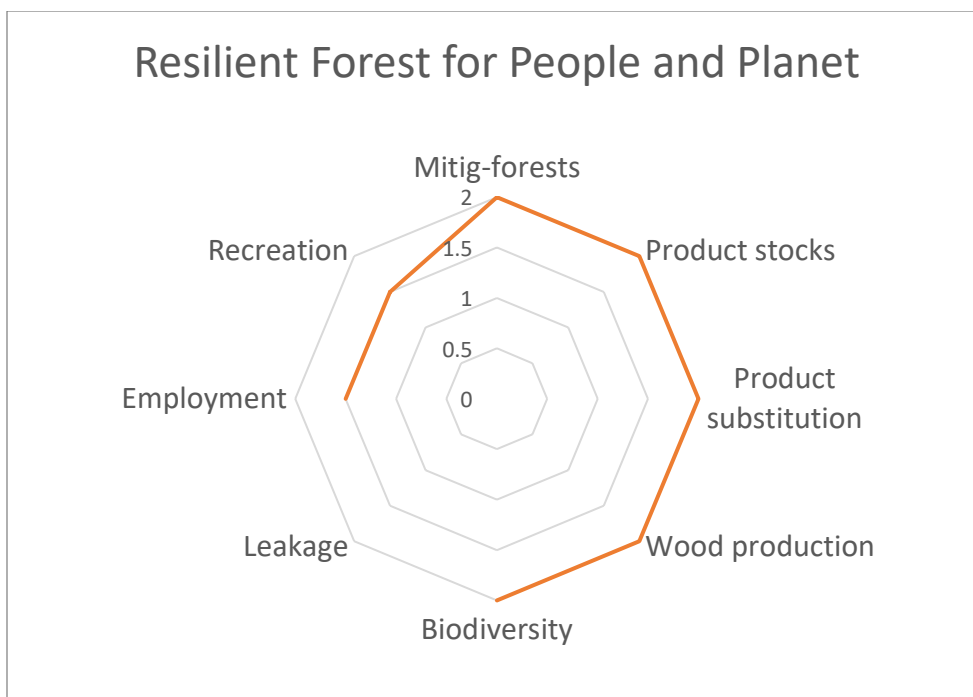


Figure 4. Targets of the vision on 8 dimensions representing modellable target variables. Vision targets we re-evaluated on these facets in Policy Lab 3. Information missing for (avoiding) leakage. Mitig-forest refers to climate change mitigation in forests (changes in forest carbon pools) and product stocks refers to carbon in harvested wood products.

Quantifiable statements (links to policy targets)

The RF4PP vision translates its objectives into measurable milestones that reflect the balance between ecological stability, economic competitiveness, and social well-being. By 2035, the risk and extent of forest damage will be reduced by at least 50%, supported by adaptive management practices, improved prevention systems, and fire-resilient landscapes. The use of wood in construction should double, extending the average carbon residence time of forest-derived materials from two to 15 years, thereby enhancing the sector's role in long-term carbon storage. In parallel, the share of recycled wood will double to reach 50–60%.

List of policy targets – RF4PP vision situation in 2050

By 2050, RF4PP envisions a Europe where forests are at the heart of a competitive, circular, and low-carbon economy. The policy framework integrates forests into the EU Bioeconomy Strategy, the EU Climate Law, and national forest plans that align with global sustainability goals. All forest products will adhere to sustainability certification standards, while a pan-European Forest Risk and Resilience Framework ensures coordinated responses to droughts, pests, and fires. The forest sector will actively contribute to EU climate neutrality by providing renewable materials and storing carbon through long-lived wood products. This policy landscape combines environmental stewardship with innovation and competitiveness.

Answers to model parameters

In the modelling dimension, RF4PP vision demonstrates a strong orientation toward both economic and ecological resilience. Timber demand is projected to increase markedly, partly due to the circular bioeconomy and substitution of carbon-intensive materials. Carbon storage also shows a strong positive trend, reflecting the active use of forests for climate change mitigation while maintaining ecosystem stability. Biodiversity follows a clearly positive trajectory, based on a landscape-integrated approach that balances productivity with ecological integrity. Protected areas are expected to grow modestly, ensuring flexibility without imposing overly restrictive management measures. Recreation demand shows a robust positive trend, highlighting the growing value of forests for health and well-being. Multifunctional forest management is projected to strengthen significantly, underscoring the vision's focus on integrating economic, social, and ecological functions. Clear felling is minimized, while thinning and close-to-nature management practices increase, promoting long-term forest health and structural diversity.

Indicators for 2030 and 2040

By 2030, the RF4PP vision aims to establish the structural foundations for a climate-adapted, innovative, and competitive European forest sector. Regulatory frameworks will encourage the use of wood in construction, strengthening links between forestry and industrial sectors as part of a broader circular-economy transition. A skilled workforce will increase through education and training programs, aligning with the adoption of data-driven management systems and national monitoring frameworks that track forest carbon, biodiversity, and socio-economic indicators. The new EU Forest Strategy and the EU Forest Monitoring Law will be in place, providing a harmonized basis for sustainable management and transparency. At the same time, a cultural shift in public attitudes toward forests, supported by education and social media initiatives, will strengthen citizen awareness and engagement with sustainability and resilience objectives.

By 2040, resilience will be visibly embedded in both ecological and economic dimensions of the forest sector. Biodiversity will be actively maintained, and visible forest damage will be reduced, marking a measurable improvement in forest health. The Forest Advisory Network, as suggested by stakeholders, will be established to ensure cooperation and knowledge transfer among EU Member States. A circular wood economy will be operational, complemented by a functional biodiversity credit market that incentivizes ecological protection. The forestry sector's contribution to state budgets will grow through sustainable value chains and circular production models. Finally, public understanding of forest benefits, ranging from ecosystem services to climate regulation and recreation, will be well established across Europe, reflecting the successful integration of resilience into policy, practice, and culture.

3.1.3 Adaptive Lands Diverse Operations

“Adaptive Lands Diverse Operations” (ALDO) is a long-term vision developed during PL2 as well. It envisions European forests in 2050 as ecologically diverse, climate-resilient, and rooted in local knowledge and stewardship. The vision centers on adaptive forest management, increased

societal engagement, and forests that sustain biodiversity, ecosystem services, and strong human-nature relationships.

Core elements of the ALDO vision

- **Locally adapted management:** Forests are managed using practices tailored to local conditions, including traditional knowledge, diversified species selection, and support for community stewardship.
- **Ecological resilience and diversity:** Forests are structured for long-term resilience, featuring mixed stands, buffer zones, and enhanced biodiversity. Policies support high-nature-value landscapes and CBS forestry.
- **Human-nature connection:** Emphasis is placed on education, recreation, and stakeholder involvement to foster societal responsibility and long-term appreciation of forests as living ecosystems.

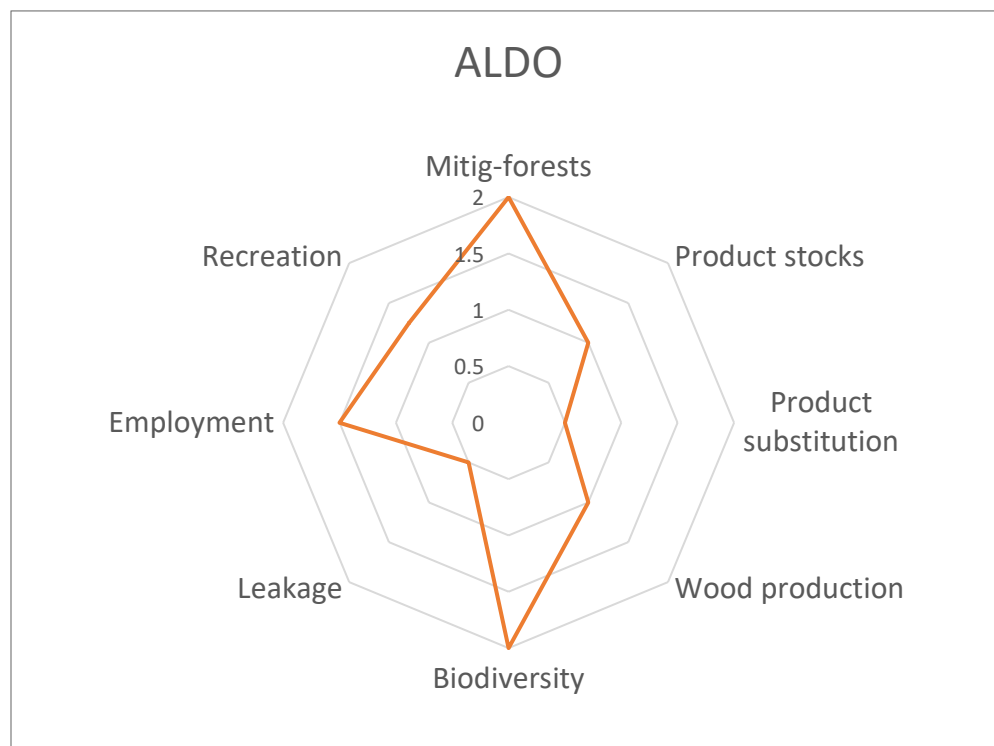


Figure 5. Targets of the vision on 8 dimensions representing modellable target variables.

Quantifiable statements (links to policy targets)

The ALDO vision translates its qualitative goals into a set of measurable outcomes reflecting diversity, inclusion, and resilience. It foresees a reduction in tree mortality from climate disturbances, supported by adaptive management and the promotion of mixed, resilient forest structures. The establishment of mixed forest stands across Europe should represent a concrete step toward ecological diversification and climate adaptation. Socially, the vision aims for a 50% increase in local stakeholders involved in forest management, highlighting a shift toward

participatory governance and shared responsibility in forest decision-making. At the same time, access to natural areas will be significantly expanded, ensuring that citizens, communities, and future generations can directly benefit from and contribute to sustainable forest stewardship.

List of policy targets – ALDO vision situation in 2050

By 2050, the ALDO vision supports a forest policy landscape grounded in diversity, adaptability, and local empowerment. The vision reinforces the EU Biodiversity Strategy through strengthened ecological networks and the widespread adoption of adaptive forest management across Europe. In line with the European Green Deal, Member States should have integrated biodiversity, resilience, and climate adaptation into their national forest strategies. Policy frameworks will include enhanced PES mechanisms and revised Common Agricultural Policy (CAP) instruments that promote multifunctionality and support ecosystem-based management. Incentives for traditional and local forestry practices will ensure that cultural knowledge and site-specific management methods remain integral to sustainable forest governance. Furthermore, an integrated EU land reform will link urbanization and afforestation processes, supporting spatial planning that strengthens ecological connectivity and rural development. Collaborative management models, such as community forestry and local stewardship agreements, are expected to be established as standard governance practices, guaranteeing participatory decision-making and long-term social engagement in forest landscapes.

Answers to model parameters

Within the modelling framework, ALDO represents a biodiversity- and carbon-oriented scenario that integrates ecological protection with locally adaptive economic use. Timber demand shows a moderate positive trend, reflecting sustainable growth driven by circular bioeconomy applications. Carbon storage and biodiversity intactness both demonstrate strong positive trends, confirming the vision's commitment to ecosystem health, habitat diversity, and landscape heterogeneity. Recreational demand also increases, underscoring the growing value of forests for well-being and tourism.

Protected area extent expands moderately, while the strictness of protection remains neutral to maintain flexibility for adaptive management. Multifunctional forest management strengthens significantly, balancing production, conservation, and social functions. Clear felling is reduced, and thinning is promoted. At the same time, wood demand through forestry is projected to rise slightly, both in forests and in products, supporting sustainable value chains.

Indicators for 2030 and 2040

By 2030, the ALDO vision envisions strong momentum toward locally adaptive and participatory forest governance. National targets for recreational forests will promote community-based management, fostering human–nature connections and social inclusion. Recognition of High Nature Value (HNV) practices will support biodiversity-friendly management approaches adapted to local contexts. At the same time, investments in forest research and Climate-Smart Forestry will advance innovation in adaptive practices and restoration. Broader forestry education and

scientific literacy will help bridge the gap between scientific and local knowledge, while improved deliberative policy-making processes will strengthen transparency and inclusivity in forest decision-making.

By 2040, forests under the ALDO framework will display greater structural diversity and ecological health, with the share of monocultures reduced below 80% across all regions. Expanded buffer zones and regeneration areas will enhance resilience and connectivity. Economic and social indicators will reflect increased forest-based jobs and ecotourism, alongside functional markets for ecosystem services that reward sustainable practices. Youth engagement in forestry will grow significantly, reinforcing intergenerational knowledge transfer and cultural continuity. At this stage, ALDO will represent a mature and inclusive model balancing ecological resilience, economic viability, and cultural diversity.

3.1.4 Visions cross-comparisons

Overlapped priorities between all visions

- All three visions stress resilience, multifunctional management, and biodiversity as essential.
- They each emphasize forest education, communication, and improving the human-nature connection.
- All call for better EU-level coordination, but with local implementation.

Better Forests 4 All (BF4All)

Distinctive Features

- Strongest focus on landscape-scale planning and spatial connectivity, such as the use of forest buffers and urban greening.
- Relatively moderate stance on carbon storage, preferring not to rely solely on forests as carbon sinks.
- Emphasizes public engagement and ecosystem services valuation, but places slightly less emphasis on forest production competitiveness compared to "Resilient Forests for People and Planet".

Orientation emerging from Policy Lab 3

- Clarified that the vision's multifunctionality is feasible only under explicit governance choices and targeted measures.
- Under favourable socio-economic conditions, stakeholders considered progress possible through diversified management, landscape-level planning, and increased use of long-lived wood products. However, biodiversity recovery and resilience were consistently assessed as fragile without dedicated interventions. Under more challenging contexts, increased harvesting pressure, competing land-use demands, and delayed bioenergy phase-out risk undermining both ecological and social objectives. Participants therefore emphasised that trade-offs between production and biodiversity are unavoidable and must be addressed explicitly rather than assumed to balance out.

Resilient Forests for People and Planet (RF4PP)

D6.3 Narrative analysis of main policy pathways

Distinctive Features

- Strongest emphasis on science-based forest management and data-supported decision-making.
- Advocates a proactive, market-oriented bioeconomy approach grounded in circularity.
- Aims to integrate forest productivity and sustainability with carbon pricing and PES mechanisms.

Orientation emerging from Policy Lab 3

- In Policy Lab 3, the vision reframed resilience as a long-term property that can not be adequately captured through mid-century indicators alone. Stakeholders recognised that while adaptive management and diversification improve robustness under favourable conditions, gains in resilience remain uneven and uncertain across regions. Under more adverse socio-economic contexts, disturbance risks, limited governance capacity, and constrained investment significantly reduce feasibility. Participants also highlighted trade-offs between maintaining high carbon stocks and increasing vulnerability to disturbances and questioned whether current indicators adequately represent functional resilience.

Adaptive Lands Diverse Operations (ALDO)

Distinctive features

- Strongest focus on traditional/local knowledge and adaptive practices.
- Emphasizes stewardship, education, and participatory governance.
- Prioritizes forest diversity and ecological value over market competitiveness.

Orientation emerging from Policy Lab 3

- During Policy Lab 3, stakeholders reinforced the vision's rejection of one-size-fits-all solutions. They stressed that biodiversity gains depend primarily on how forests are managed over time rather than on large-scale withdrawal from management. Under favourable conditions, early and well-supported transitions to extensive, biodiversity-oriented practices were considered feasible. Under more constrained contexts, intensification pressures and limited incentives risk eroding biodiversity gains, making sequencing, voluntariness, and governance support critical. Concern was expressed regarding bioenergy expansion and leakage risks.

3.2 Policy pathways

3.2.1 Pathways based on the vision Better Forests for All

The BF4All vision reflects a shared aspiration among stakeholders to strengthen forest resilience, multifunctionality, and societal benefits, while supporting the European Union's climate and biodiversity objectives. Stakeholders consistently highlighted forest expansion, diversified management, and improved resilience as central elements of this vision. At the same time, discussions made clear that the extent to which these elements can be realized depends strongly on broader socioeconomic developments. For this reason, stakeholders explored how the BF4All

vision could unfold under two contrasting futures: SSP1, characterized by sustainability-oriented development, and SSP3, marked by regional rivalry and fragmented governance.

SSP1 pathway description

Under SSP1, stakeholders saw relatively favourable conditions for advancing the BF4All vision. Stronger environmental governance, lower pressure on land from population growth, and greater public support for sustainability create space for more ambitious forest-related policies.

A central feature of this pathway, as with its underlying vision, is the combination of forest expansion and increased protection. Stakeholders envisaged a gradual increase in both strictly protected and non-strictly protected forest areas, with particular emphasis on old-growth forests and areas of high biodiversity value. At the same time, forest expansion was not understood as a large-scale conversion of agricultural land, but rather as the creation of forest “frames” around cities and agricultural landscapes. These forested buffers were seen as a way to enhance recreation, connectivity, and ecosystem services, while remaining compatible with food production. The approach closely aligns with emerging EU policy frameworks, including the Nature Restoration Law, which should have clear targets and should be implemented.

Forest management under SSP1 is suggested to shift progressively toward greater diversity and resilience. Continuous Cover Forestry (CCF) plays an important role, alongside climate-adapted species selection during the regeneration phase. Stakeholders emphasized that diversification should not follow a single model but rather reflect local and regional conditions and climate risks—for example, avoiding spruce on dry or drought-prone soils. While participants acknowledged trade-offs between harvest levels and carbon storage, there was broad agreement that forest-based mitigation should not fall below baseline levels in this scenario. Leakage was expected to decline over time, supported by reduced dependence on imports and stronger EU regulations.

Changes in wood use were also considered essential. Under SSP1, demand for energy wood continues to decline, while wood use should increasingly shift toward long-lived products, particularly in construction. Higher recycling rates for post-consumer and demolition wood were considered critical to supporting a circular bioeconomy and reducing pressure on forests. Overall, timber demand is expected to remain relatively stable, but material efficiency and substitution effects contribute positively to climate change mitigation.

Social dimensions are evident in this pathway. Recreation demand is expected to increase, supported by forest expansion near urban areas and more diverse forest structures. Although employment was not a primary focus of the BF4All vision, stakeholders anticipated that jobs would become more diversified and stable, linked to restoration activities, ecosystem services, and recreational uses.

Taken together, participants considered the BF4All vision largely achievable under SSP1, although not guaranteed. Political choices—especially those related to forest expansion, protection targets, and coordinated governance—were considered decisive to success.

SSP3 pathway description

Under SSP3, the realization of the BF4All vision becomes considerably more challenging and more limited than under SSP1. Strong population growth, intensified competition with agriculture,

weaker international cooperation, and nationally focused policies may all limit the scope for the forest sector to transform. Stakeholders therefore described this pathway as one of partial implementation and adaptation, rather than full realization of the vision.

Forest area dynamics in the EU under SSP3 are expected to be shaped primarily by land-use competition and economic priorities. While there was still support for combining protection and set-aside measures, opportunities to expand protected areas are more limited than under SSP1. Conservation-oriented and extensively managed forests tend to lose ground to intensively managed forests. Afforestation remains part of the pathway but is more selective than in SSP1 and often focused on agricultural margins or degraded land, where conflicts with food production can be minimized.

Under this pathway, forest management continues to emphasize productivity, yet stakeholders stressed that resilience measures cannot be abandoned, even under constrained conditions. Species diversification is applied mainly in areas facing higher climate risks or where it supports the production of long-lived wood products. Some intensively managed forests are gradually shifted toward more extensive regimes, but overall the balance remains tilted toward production. Disturbance risks differ across regions, with relatively lower insect damage projected in parts of Central Europe, but increased vulnerability of spruce-dominated forests in the north.

Wood demand is higher in SSP3 due to population growth, and this strongly shapes the pathway. Rather than maintaining or expanding energy wood use, stakeholders focused on redirecting wood flows toward long-lived products and construction, combined with improved recycling where economically feasible. However, technological, regulatory, and investment barriers limit how quickly and efficiently these changes can be implemented.

Leakage emerged as a problematic issue in this pathway. Participants expected greater reliance on imports, while leakage is increasing unless countered by stricter certification requirements, effective implementation of the EU Deforestation Regulation, and trust-based trade relationships. Unlike in SSP1, leakage cannot be fully eliminated and represents a persistent trade-off between domestic production, biodiversity protection, and global impacts.

Biodiversity indicators and recreational use were both expected to decline compared to SSP1, reflecting reduced public investment and higher pressure on land. Employment remains relatively stable, but opportunities linked to ecosystem service markets are limited under fragmented governance conditions.

Overall, stakeholders judged that the BF4All vision is very difficult to achieve under SSP3, as many of its underlying assumptions—such as coordinated governance and strong environmental priorities—are largely absent or very limited. Nevertheless, the pathway shows that targeted actions, especially diversification, selective protection, and improved wood use efficiency, can still reduce negative outcomes.

Table 1. Priority actions for pathways aligned with the vision BF4All under SSP1 and SSP3.

Actions (What?)	Actions (When?)	Actions (Where? Location, or forest type)
/SSP1		
Protect/Restore		
Increase strictly protected forest areas	Gradual until 2030	High-biodiversity forests; old-growth; Natura 2000
Expand non-strictly protected areas	2025-2030	Semi-natural and multifunctional forests
Forest expansion / Afforestation	Medium-long term	Urban areas, around cities, around agriculture, near rivers, degraded land
Implement EU Nature Restoration Law targets	By 2030 milestones, to 2050	National and regional priority areas
Connectivity between forest areas	Medium term	Fragmented landscapes
Manage		
Diversify forest species	Immediate–long term	Monoculture stands
Diversify forest management	Immediate	Managed forests
Implement continuous cover forestry (CCF)	Gradual transition	Suitable managed forests
Climate-adapted species selection after harvest	At regeneration	Climate risk zones
Reduce spruce on dry soils	immediate	Drought-prone areas
Balance carbon uptake vs. harvest	ongoing	All managed forests
Wood use		
Shift to long-lived wood products	Medium term	Construction sector
Increase recycling of post-consumer wood	Medium term	Urban areas
Prevent leakage via regulation	immediate	increase regulations, focus on imports, implement EUDR
SSP3		
Protect/Restore		
Regarding the expansion of non-strictly protected areas, SSP3 wishes to be similar to SSP1; they should be in line with the EU NRL.		
Manage		
Under SSP3, compared to SSP1, the stakeholders suggested that the focus on increasing intensively managed forest share, shifting selected managed forests from intensive use to extensive one in medium term.		
Wood use		
The difference compared to SSP1 was with respect to increasing timber demand, driven mainly by population growth.		
Additional cases/hints (applying to both SSP1 and SSP3)		
Strengthen recreation functions	Medium term	Urban & peri-urban forests
Define multifunctional forest strategies	Immediate	EU / national level
Set national indicator targets	Short term	EU member states level

Actions (What?)	Actions (When?)	Actions (Where? Location, or forest type)
Use proxy biodiversity indicators	Immediate	-
Support forest expansion near cities	Medium term	-
Promote CCF and diversification	Ongoing from now	Managed forests

3.2.2 Pathways based on the vision Resilient Forests for People and Planet (RF4PP)

SSP1 pathway description

By 2050, European forests are expected to be healthy, diverse, and resilient and deliver multiple benefits for people and nature. These forests support a competitive circular, low-carbon economy providing renewable materials for construction, biochemicals, and long-lived wood products while maintaining biodiversity and supporting recreation and cultural values. Forest management is active, responsible, and adaptive with decisions based on trusted data and broad social acceptance.

The pathway is clearly committed to integration rather than segregation. Multifunctional landscapes are favoured and increases in strictly protected areas are not preferred. The pathway allows some harvesting within protected areas. Gross deforestation is prevented, but the emphasis is on proactive measures to increase forest area and tree cover, such as afforestation, including agroforestry. Along the pathway, the EU tree-planting target is doubled to 6 billion trees, assuming these areas are available for timber supply, emphasizing the need for the actions' economic viability.

Multifunctional forest management is a key element in this pathway. Forest management practices shift to foster resilience and diversity with immediate actions wherever possible. Vulnerable stands with low species or structural diversity are prioritized for mixed-species planting, CCF, light thinning, and longer rotations. Fire prevention becomes a standard feature in high-risk areas, supported by landscape-level planning. Multifunctional forestry is promoted across regions, combining timber production with biodiversity conservation and recreation. Near settlements, harvests are reduced to enhance social and cultural benefits. Active management also targets wood quality, producing large-diameter, high-grade timber for construction and long-lived products. To secure regeneration, deer populations are controlled actively.

Quantifiable milestones anchor the progress. The pathway accelerates the transition to a circular wood-based economy. The lifespan of wood products is extended, increasing the average carbon residence time from two years to fifteen years. Recycling rates double to reach 50–60%, and innovation drives diversification into biochemicals and advanced materials. By 2035, the risk and extent of forest damage are reduced by $\geq 50\%$. By 2040, resilience is visibly embedded, and by 2050, forests are central to a competitive, circular, low-carbon economy, coordinated by a pan-European risk-and-resilience framework. The pathway assumed that forests are largely certified. PES are mainstreamed, and a Forest Advisory Network provides site-specific guidance to foster resilience.

Key elements of this policy pathways under SSP1 (refer also to Table X below) are:

- **Payments for Ecosystem Services (PES):** Forest owners receive payments for flood regulation, water quality, and biodiversity. In this pathway (SSP1), forest areas are valued, and PES could account for about half of forest owners' income. Funding sources come from within and beyond the forest sector, for example, through compulsory compensation funds.
- **Training, education, communication:** The aim is to grow a skilled workforce of young practitioners and promote forest knowledge and social acceptance.
- **Advisory networks:** Strong local forest advice on resilience practices is being built up. There will be coordination of supply chains for market optimization.
- **Certification and sustainable supply chains:** All products are covered by trusted sustainability certification.
- **Data and monitoring:** There is consistent, transparent EU/national monitoring of forest conditions, carbon, biodiversity, and socio-economic outcomes. This will be based on open and trusted data to guide policy and practice. This includes improved tracking of carbon in wood products to balance the contributions of forest and product carbon stocks to mitigation.

SSP3 pathway narrative

While the narrative under SSP3 shares structural similarities with SSP1 in terms of recognizing the role of forests and sustainable management, the context and emphasis differ significantly. Under SSP3 conditions, mainstreaming PES requires considerably more effort than under SSP1, where the forest sector is already prioritized. Funding for certification schemes is also more challenging in SSP3, as SSP1 assumes greater financial support for forest sustainability initiatives.

Managing disturbances is a critical priority in SSP3, alongside diversifying tree species to enhance resilience. This pathway enables more intensive forest management, increasing wood availability for material substitution and contributing to climate change mitigation. Fire suppression is emphasized even more strongly in the SSP3 than in the SSP1 narrative because of higher disturbance risks as climate change intensifies.

Innovation in wood-based construction demands a stronger push in SSP3 than in SSP1, as technological progress and market uptake are slower and require active promotion. Furthermore, better training, education, and communication are vital in SSP3 to overcome generally low adaptive capacity, high vulnerability, and difficulty in implementing coordinated sustainability measures. Increased public awareness and a sense of urgency can serve as leverage points to accelerate change.

Key elements of this policy pathway under SSP3 (refer also to Table 2 below) are:

- **PES:** Regional framing in SSP3 and aspects of self-sustaining can leverage PES.
- **Innovation in wood products** requires an even stronger push compared to SSP1, as technological progress and market uptake are slower. Active promotion and targeted incentives are necessary to accelerate adoption.

D6.3 Narrative analysis of main policy pathways

- Capacity building: Strengthening training, education, and communication is critical to address generally low adaptive capacity, high vulnerability, and the difficulty of implementing coordinated sustainability measures.
- Public engagement: Increased public awareness and an increased sense of urgency can serve as powerful leverage points to drive behavioral change and support policy implementation.

Table 2. Priority actions for pathways aligned with the vision RF4PP under SSP1 and SSP3.

Actions (What?)	Actions (When?)	Actions (Where? Location, or forest type)
SSP1		
Protect/Restore		
No strict PAs	Now	
Avoid set aside areas	Now	
Avoid gross deforestation	Now	
Afforestation	Now	Includes agroforestry
Manage		
Diversify tree species	Now	Wherever possible, focus on vulnerable stands with low species diversity, exclude PA.
Suppress fires	Now	Wherever possible focus on forests at risk
More resilient forest structure	Now	Wherever possible, focus on vulnerable stands with low structural diversity
Multifunctional forestry	Now	Wherever possible
Active management for better wood quality	Now	Wherever possible
Wood use		
Increase life-span of products, including recycling	Now	Wherever possible
Wood use diversification including biochemicals	Now	Wherever possible, focus on broadleaved species?
Innovation for in wood in construction	Now	Wherever possible
Additional cases// mentioned policy measures		
Use Payments for Ecosystem Services		
Better training, education and communication		
Better forest advice and advisory network for forest management		
Better advice and coordination of supply chains and market optimization		
Certification / more sustainable supply chains		
Control deer pressure to improve regeneration		
Balance between forest stocks and product stocks		
Important to show that forestry can offer viable business cases and provide jobs		
SSP3		
Protect/Restore		
Same as in SSP1 but in SSP3 agroforestry considered even more important		
Manage		

Actions (What?)	Actions (When?)	Actions (Where? Location, or forest type)
Same as in SSP1 but diversifying tree species more important in SSP3. Diversification wherever possible focusing on diversifying coniferous monocultures, especially on sites with expected high climate change impacts with broadleaved species. In addition, fire suppression is more important in SSP3 than SSP1 with focus on forests at risk. Generally, under SSP3 forest management may be more intensive and produce more wood for substitution.		
Wood use		
Same as in SSP1, but boosting innovation for wood in construction is more important in SSP3 than in SSP1, as with less pressure on resources, there may be less innovation and recycling.		
Additional cases/ policy measures		
Same as in SSP1, but in SSP3, regional framing and aspects of self-sustaining can leverage payments for ecosystem services. Better training, education, and communication are even more important in SSP3 than in SSP1. Increased public awareness and sense of urgency can be used to leverage changes.		

3.2.3 Pathways based on the vision Adaptive Lands Diverse Operations (ALDO)

SSP1 pathway description

In a SSP1 world, the move toward ALDO happens slowly but steadily. Forests are managed with more focus on healthy ecosystems, local needs, and people working together to care for the land.. The measures included in the pathway lead to forests that are ecologically rich, climate-resilient, and managed based on local and traditional knowledge systems. Instead of depending on a single management model, the pathway highlights diversity in forest structures, practices, and social engagement, understanding that resilience comes from heterogeneity across landscapes and communities. Involvement of local stakeholders will demonstrate not only technical progress but also a renewed human–nature relationship based on shared responsibility and long-term stewardship.

The avoidance of gross deforestation across Europe is a critical protective measure considered by stakeholders. At the same time, Europe continues to expand protected forest areas, aiming to protect 30% of terrestrial land by 2030. Stakeholders, especially those focused on protecting remaining primary forests, emphasize the need to avoid indirect land-use changes when allocating protected areas. Within this protected network, about one-third of the area is designated as strictly protected, focusing on representative habitats and better ecological connectivity. These strictly protected areas, which cover no more than 10% of the total forest area, are free of agricultural and forestry activities, allowing natural processes to occur.

Beyond formal protection, the pathway enhances ecological networks through targeted afforestation. In the case of ALDO, afforestation aims to connect fragmented and degraded forest patches by converting cropland into agroforestry systems. This approach reflects traditional practices and supports multifunctional landscapes where trees simultaneously contribute to carbon storage and biodiversity. Additionally, forest owners are encouraged to voluntarily set aside less productive forest areas, such as those on steep slopes or near rivers. With incentives and subsidies, these set-aside areas complement, rather than replace, strictly protected forests and provide extra space for biodiversity and carbon storage.

The pathway emphasizes biodiversity improvement in managed forests, ensuring that production landscapes support ecological objectives. Forest management practices are gradually shifting toward greater structural and species diversity. A key change is moving from even-aged forestry to CCF. This transition to CCF should occur in all forest areas, except in forests that are unhealthy or affected by disturbances like bark beetle outbreaks, wind damage, or fire risk. Management intensity is adjusted to support this transition: thinnings are intensified to support stand differentiation and regeneration. Over time, the proportion of forests managed under CCF increases, and the transition should be initiated in all suitable forests by 2050. Crucially, the strategy avoids depending on a single management method, recognizing that diversity in management systems itself strengthens resilience. Clearcutting is therefore not completely eliminated but becomes more restricted depending on the status of the forests and supply and demand for wood. Clear cutting is limited to forests not managed by CCF. In forests managed by clearcutting, rotation lengths are gradually extended, and retention forestry is increasingly adopted where site conditions permit. These measures are guided by site-specific principles, ensuring that retention, rotation length, and harvesting practices reflect local ecological conditions, as well as wood supply and demand relationships, which vary over time (e.g., more supply in years of abundant bark beetle outbreaks).

Alongside structural changes, species diversification becomes a guiding principle across all forest types. Mixed-species stands are promoted everywhere, reducing vulnerability to climate extremes and disturbances. The pathway supports assisted migration along the southern climate borders of tree species, helping forests adapt more quickly to changing climate conditions. In southern Europe, fire suppression remains a necessary management focus, while in other regions, measures such as increased deadwood are emphasized to enhance biodiversity. Across most of Europe, management practices boost deadwood, and they increase the presence of veteran trees and forest microhabitats.

To support long-term climate change mitigation beyond forests, the pathway reshapes how wood is used. Wood harvested from European forests is increasingly directed toward long-lasting wood products, maximizing carbon storage over long periods. Products with the greatest storage capacity are prioritized. At the same time, wood use for bioenergy is reduced as quickly as possible, reflecting stakeholder concerns about competition with material uses and ecosystem impacts. Circularity plays a vital role in balancing reduced harvesting intensity with material demand. Recycling and cascading use of wood are enhanced across all sectors, extending the lifespan of wood products and easing pressure on forests. These measures, along with decreased bioenergy demand, aim to prevent leakage, i.e., the shifting of environmental impacts to other world regions. When leakage risks do emerge, negative effects are prevented through adjustments in other sectors, such as agriculture.

SSP3 pathway description

In a SSP3 world, the pathway toward ALDO develops in a very similar fashion to SSP1 (refer to Table 3), but all measures are considered on a larger scale or with greater intensity. Exceptions are forest protection to avoid too much pressure on forest management and wood production). More specifically, there is no strict protection of forests in the SSP3 world, strict protection should

occur on non-forested land. Furthermore, the transition to CCF management is not accompanied by an increase in thinning intensity.

Table 3. Priority actions for pathways aligned with the vision ALDO under SSP1 and SSP3.

Actions (What?)	Actions (When?)	Actions (Where? Location, or forest type)
SSP1		
Protect/Restore		
1. Avoid (gross) deforestation	Not discussed	Everywhere
2. Increase protected land in Europe	30% by 2030	Primary forest
	1/3 of the protected land strictly protected by 2030	Focus strict protection on representative habitats & improving connectivity
15. Afforest	Not discussed	Afforestation should focus on connecting patches of fragmented (degraded) forests, not protected forests
13. Set aside forest (least productive)	Voluntary set aside incentive (e.g., subsidy) from base year onwards	On voluntary bases; likely in forests on slopes, near rivers, etc.
Manage		
4. Switch from even-aged to continuous-cover forestry	Reduce share of forest managed by clearcutting	Clearcutting can be maintained in “unhealthy” forests (e.g., bark beetle, wind damage or where there are risks of fire)
	Steadily increase the share of forest managed by CCF. Transition should be initiated in all suitable forests by 2050.	In forests that are suitable for CCF
5. Diversify species mix	Not discussed	Everywhere
7. Intensify thinnings	Not discussed	In forest suitable for intensive thinning
8. Lengthen rotations	Change gradually over large areas of disturbed forests affected by bark beetle, wind damage or where are risks of fire, not immediately, but gradually.	In suitable forests
10. Shift to retention forestry	Not discussed	Not discussed
11. Suppress fires	Not discussed	Only in southern Europe
Wood use		
16. Shift to long-lived wood products	Not discussed	Everywhere
18. Reduce wood use for bioenergy	As soon as possible	Everywhere
Additional cases/hints		
Wood recycling	Not discussed	Everywhere
Prevent leakage	Always	Everywhere
Increase biodiversity in managed forests /	Measures to increase deadwood	Everywhere except Southern Europe
	Expand veteran trees	Everywhere

Actions (What?)	Actions (When?)	Actions (Where? Location, or forest type)
	Increase presence of microhabitats	Everywhere
Agroforestry		Agricultural systems.
Assisted migration	Not discussed	Southern climate borders of species
SSP3		
Protect/Restore		
Same as in SSP1, but more of everything and less protection (to avoid too much pressure on forest management / wood production). Strict protection in SSP1, not in SSP3.		
Manage		
Same as in SSP1, but more of everything. No increase in thinning intensity, focus is only on conversion to CCF		
Wood use		
Same as in SSP1, but more of everything		
Additional cases/hints		
Same as in SSP1, but more of everything		

3.2.4 Comparison of policy pathways in terms of their underlying actions

The comparative table summarises actions across the three pathways and their SSP1 and SSP3 variations provides a lens for understanding not only what is proposed, but also how consistently actions appear across different futures. While the analytical chapters reveal the logic and ambition behind each pathway, the table makes an important structural pattern visible: most core activities recur across pathways, yet their roles, priorities, and feasibility change substantially depending on the socioeconomic context, notably in SSP1 and SSP3 settings (“green road” vs “rocky road”).

It is important to highlight that this comparison also helps identify barriers, synergies, and trade-offs across all three pathways (Table 4). Differences in how actions are framed and prioritised under contrasting socioeconomic contexts may point to potential implementation barriers, while recurring combinations of measures indicate areas where actions may reinforce each other. At the same time, the variation between pathways makes underlying trade-offs more visible, showing where objectives may compete or require balancing.

Across all three policy pathways a high degree of convergence can be observed in the types of actions identified, particularly in the areas of diversification of forest management, promotion of multifunctionality, and shifts toward circular wood use. As shown in the Table 4, these actions are almost universally present in SSP1 variants and, to a large extent, retained in SSP3. However, the table also reveals that under SSP3 they are more often marked by conditionality and adaptation, rather than by the transformative intent, as visible in SSP1.

Table 4. Comparison of three sets of policy pathways with respect to their underlying actions under SSP1 and SSP3 variants, divided by exploratory scenario groups.

Actions	Pathways aligned with BF4All vision		Pathways aligned with RF4PP vision		Pathways aligned with ALDO vision	
	SSP1	SSP3	SSP1	SSP3	SSP1	SSP3
Protect/Restore						
Increase strictly protected forest areas	x				x	
No strictly protected forest areas			x	x		?
Expand non-strictly protected areas	x	x				
Set aside forest (least productive)					x	x
Avoid set aside areas			x	x		
Avoid gross deforestation			x	x	x	x
Forest expansion / Afforestation	x	x	x	x	x	x
Implement EU Nature Restoration Law targets	x	x				
Connectivity between forest areas	x					
Manage						
Diversify tree species mix in forests	x	x	x	x	x	x
Diversify forest management	x	x	x	x	x	x
Intensify thinnings					x	
Lengthen rotations					x	x
Implement continuous cover forestry (CCF) or retention forestry	x				x	x
Climate-adapted species selection after harvest	x	x	x	x		
Reduce spruce on dry soils	x					
Balance carbon uptake vs. harvest	x					
Increase intensively managed forest share	x	x		x		
Suppress fires			x	x	x	x
Active management for better quality wood			x	x		
Wood use						
Shift to long lived wood products	x	x	x	x	x	x
Reduce wood use for bioenergy					x	x
Increase recycling of post-consumer wood	x		x	x	x	x
Prevent leakage via regulation and certification	x	x			x	x

Actions	Pathways aligned with BF4All vision		Pathways aligned with RF4PP vision		Pathways aligned with ALDO vision	
	SSP1	SSP3	SSP1	SSP3	SSP1	SSP3
Increase in timber demand		x				
Wood use diversification including biochemicals			x	x		
Innovation in the use of wood in construction			x	x		
Additional cases/hints						
Strengthen recreation functions	x	x				
Define multifunctional forest strategies	x	x				
Set national indicator targets	x	x				
Use proxy biodiversity indicators	x	x				
Support forest expansion near cities	x	x				
Use Payments for Ecosystem Services			x	x		
Better training, education and communication			x	x		
Better forest advice and advisory network for forest management			x	x		
Better advice and coordination of supply chains and market optimization			x	x		
Certification / more sustainable supply chains			x	x		
Control deer pressure to improve regeneration			x	x		
Balance between forest stocks and product stocks			x	x		
Important to show that forestry can offer viable business cases and provide jobs			x	x		
Increase biodiversity in managed forests /					x	x
Agroforestry					x	x
Assisted migration					x	x

The three policy pathways co-developed in ForestPaths share common ambitions but differ in how they envision the path to Europe's climate and biodiversity targets. A side-by-side comparison reveals several emerging patterns; however, given the large number of actions involved, such comparisons should be interpreted with caution.

First, the pathways differ in how strongly they emphasize protection and restoration. Some place more weight on expanding protected areas and restoring degraded forests, while others focus on integrating ecological goals into working landscapes rather than setting land aside. These

differences reflect contrasting assumptions about how much land can realistically be withdrawn from production and how quickly restoration can deliver measurable benefits.

Forest management approaches also vary across pathways. While one pathway leans toward a broad transformation of management practices, promoting mixed species stands, longer rotations, and structural diversity as the foundation for resilience, another focuses more on risk control, prioritizing measures that reduce vulnerability to fire, pests, and drought, even if these interventions do not radically change current management systems. In contrast, a third pathway focuses and takes a more flexible, place-based approach, arguing that local conditions should determine whether transformation or risk-focused management is more appropriate.

Wood use and circularity emerge as another area where the pathways diverge. Some envision a strong shift toward long-lived wood products and circular material flows, assuming that markets and regulation will support this transition. Others are more cautious, highlighting uncertainties around demand, substitution effects, and the pace at which industries can adapt. These differences shape expectations about future harvest levels and the balance between carbon stored in forests and carbon stored in products.

Perhaps the most striking contrast lies in governance between policy pathways but also depends on SSP selection. For instance, while one pathway assumes a high degree of policy coherence, with EU-level targets cascading smoothly into national strategies and local implementation, another pathway anticipates a more fragmented landscape, where uneven capacities and competing priorities slow progress and require more adaptive, bottom-up solutions. On the other hand, the third pathway falls somewhere between, acknowledging the need for coordination while recognizing that governance diversity is unlikely to disappear.

Despite these differences, the pathways share several common threads. All emphasize the need for more diverse forests, better monitoring, and long-term incentives that reward sustainable practices. All recognize that trade-offs among carbon, biodiversity, and wood supply cannot be eliminated entirely, but they can be managed more transparently. And all highlight the importance of stable policy frameworks that give forest owners and managers the confidence to invest in long-term resilience.

Taken together, the comparison shows that Europe's forest transition will not follow a single blueprint. Instead, it will require a mix of approaches that reflect regional realities, governance capacities, and societal expectations. The pathways differ in emphasis, but they converge on the idea that integrated, adaptive, and well-coordinated action is essential for meeting Europe's climate and biodiversity targets.

4 Concluding remarks

Many expectations are placed on Europe's forests. The three visions and their policy pathways presented in this report illustrate that there is likely no single preferred route toward achieving the EU's long-term climate and biodiversity ambitions. Instead, each pathway reflects a different balance of priorities, assumptions, and governance conditions, and which may even vary under alternative global developments.

A clear message emerging from this analysis is that context matters more than a single management recipe. Forests across Europe differ widely in structure, ownership, vulnerability, and economic role, and these differences shape what is feasible on the ground. Over the three Policy Labs, stakeholders emphasised that, in their opinions, measures seen as effective in one region may not work, or may even create new challenges, in another. Their views highlight the importance of flexible, adaptive approaches that can be shaped to local conditions while still supporting shared EU-level climate and biodiversity targets.

The comparison of pathways also highlights the importance of a long-term forest management perspective. Many of the actions identified by stakeholders, such as diversifying forest structure, restoring degraded areas, or shifting toward circular wood use, require decades of consistent efforts. Across all pathways, stakeholders converged on several common needs: more diverse and resilient forests, better monitoring and advisory services, and financial mechanisms that reward ecosystem services rather than short-term outputs. These shared priorities provide a solid foundation for future policy development, even if the exact mix of actions will differ from place to place.

Ultimately, this deliverable underscores that Europe's forest transition will be a long-term process, in need for iterative steps rather than being based on a single policy decision. It will require cooperation across governance levels, openness to experimentation, and a willingness to navigate trade-offs transparently, depending on how the world will develop in the future. The pathways developed here do not prescribe a single solution, but they offer a structured way to think about choices (actions), their consequences, and the enabling conditions needed to move forward. As the project continues, these insights will feed into detailed modelling and, eventually, into concrete policy recommendations that can support a coherent and credible strategy for EU's forests in the decades ahead. The pathways will be analysed using a next-generation modelling framework to evaluate them against one another using actual forest data. Only when the different visions of the future are connected with actual forest projections, can trade-offs and co-benefits between climate mitigation, biodiversity protection, and ecosystem services provision in the EU be analysed and understood better.

Disclaimer

Portions of this report have been reviewed and edited using AI-powered tools, including Grammarly and Microsoft Word spell check, to enhance grammar, spelling, and overall readability. While these tools support text clarity and consistency, the authors remain responsible for the accuracy, interpretation, and content of the information presented.

References

- Azuero-Pedraza CG, Lauri P, Lessa Derci Augustynczyk A, Thomas VM. 2024. Managing Forests for Biodiversity Conservation and Climate Change Mitigation. *Environ Sci Technol*. 58(21):9175–9186. <https://doi.org/10.1021/acs.est.3c07163>
- Balducci L, Haeler E, Paillet Y. et al. 2026. European forest carbon and biodiversity policies have a limited win-win potential. *Nat Commun* (2026). <https://doi.org/10.1038/s41467-026-68668-x>
- Betts MG et al. 2021. Producing wood at least cost to biodiversity: integrating Triad and sharing–sparing approaches to inform forest landscape management. *Biological Reviews*. 96(4):1301–1317 [accessed 2025 Oct 31]. [/doi/pdf/10.1111/brv.12703](https://doi.org/10.1111/brv.12703). <https://doi.org/10.1111/BRV.12703>;ISSUE:ISSUE:DOI
- Biber, P., Felton, A., Nieuwenhuis, M., et al. (2020). Forest Biodiversity, Carbon Sequestration, and Wood Production: Modeling Synergies and Trade-Offs for Ten Forest Landscapes Across Europe. *Frontiers in Ecology and Evolution*. Available from: <https://www.frontiersin.org/journals/ecology-and-evolution/articles/10.3389/fevo.2020.547696/full>
- Böttcher, H., Wolff, F., von Vittorelli, L., Peltoniemi, M., Lehtonen, Viitala, E.-J., Marras, S., Bacciu, V., Menini, A., Schelhaas, M.-J., Wiersma, H., Roest, E., Stancioiu, T., Nita, M. D., Dutca, I. (2023). D6.2 Policy mapping: Synthesis of policy and stakeholder requirements at EU level relevant for the forestry sector. ForestPaths project deliverable D6.2.
- Choi Y et al. 2022. Can a national afforestation plan achieve simultaneous goals of biodiversity and carbon enhancement? Exploring optimal decision making using multi-spatial modeling. *Biol Conserv*. 267:109474 [accessed 2025 Nov 3]. Available from: <https://doi.org/10.1016/J.BIOCON.2022.109474>
- Chudy R, Cabbage FW. 2020. Research Trends: Forest investments as a financial asset class. *Journal of Forest Policy and Economics*. 119(June):1–9. <https://doi.org/10.1016/j.forpol.2020.102273>
- European Commission. 2021. Future Brief 25. Brief produced for the European Commission DG Environment by the Science Communication Unit, UWE Bristol. Available at: https://environment.ec.europa.eu/publications/future-brief-european-forests-biodiversity-climate-change-mitigation-and-adaptation-issue-25_en. Vol 55 Blackwell Publishing Ltd. <https://doi.org/10.1111/1365-2664.13177>
- European Commission. 2023. 2030 Climate targets. Available from: https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2030-climate-targets_en
- European Commission. 2024. Commission staff working document impact assessment report. Accompanying the document communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Securing our future – Europe's 2040 climate target and path to climate neutrality by 2050 building a sustainable, just and prosperous society. Available from: [https://www.europarl.europa.eu/RegData/docs_autres_institutions/commission_europeenne/swd/2024/0063/COM_SWD\(2024\)0063\(PAR03\)_EN.pdf](https://www.europarl.europa.eu/RegData/docs_autres_institutions/commission_europeenne/swd/2024/0063/COM_SWD(2024)0063(PAR03)_EN.pdf)
- Favero A, Mendelsohn R, Sohngen B. 2017. Using forests for climate mitigation: sequester carbon or produce woody biomass? *Clim Change*. 144(2):195–206. <https://doi.org/10.1007/s10584-017-2034-9>
- Feliciano, D., Schelhaas, M.J., Starcevic, A., Staritsky, I., Uzquiano, S., Boonen, S., Lindner, M., Franzini, F., Lovric, M., Tiongco, J., Ofoegbu, C., Peltoniemi, M., Stancioiu, T., (2023). Forest management approaches across Europe. ForestPaths project deliverable D1.1.
- Felton A, Lindbladh M, Brunet J, Fritz Ö. 2010. Replacing coniferous monocultures with mixed-species production stands: An assessment of the potential benefits for forest biodiversity in northern Europe. *For Ecol Manage*. 260(6):939–947. <https://doi.org/10.1016/j.foreco.2010.06.011>
- Fischer, R., Zhunusova, E., Günter, S., Iost, S., Schier, F., Schweinle, J., Weimar, H., Dieter, M. (2024) Leakage of biodiversity risks under the European Union Biodiversity Strategy 2030. *Conservation Biology* n/a, e14235. Available from: <https://doi.org/10.1111/cobi.14235>
- Gramberger, Marc, Katharina Zellmer, Kasper Kok, and Marc J. Metzger. 2014. "Stakeholder Integrated Research (STIR): A New Approach Tested in Climate Change Adaptation Research." *Climatic Change* 128(3–4):201–14. Available from: <https://link.springer.com/article/10.1007/s10584-014-1225-x>
- Hämäläinen A, Runnel K, Ranius T, Strengbom J. 2024. Diversity of forest structures important for biodiversity is determined by the combined effects of productivity, stand age, and management. *Ambio*. 53(5):718 [accessed 2025 Oct 31]. <https://pmc.ncbi.nlm.nih.gov/articles/PMC10992050/>. <https://doi.org/10.1007/S13280-023-01971-9>
- IPBES. 2019. IPBES (2019): Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. S. Díaz, J. Settele, E. S. Brondízio, H. T. Ngo, M. Guéz.
- Jörg B, Fritz Ö, Richnau G. 2010. Biodiversity in European beech forests – a review with recommendations for sustainable forest management. *Ecological Bulletins* 53: 77–94, 2010.
- Konijnendijk C. 2021. The 3-30-300 rule for urban forestry and greener cities. *Biophilic cities journal*, Vol. 4 No. 2. Available from: https://www.researchgate.net/publication/353571108_The_3-30-300_Rule_for_Urban_Forestry_and_Greener_Cities
- Korosuo A et al. 2023. The role of forests in the EU climate policy: are we on the right track? *Carbon Balance Manag*. 18(1):15 <https://cbmjournal.biomedcentral.com/articles/10.1186/s13021-023-00234-0>. <https://doi.org/10.1186/s13021-023-00234-0>

D6.3 Narrative analysis of main policy pathways

- Kumar R, Kumar A, Saikia P. 2022. Deforestation and Forests Degradation Impacts on the Environment. In: Singh, V.P., Yadav, S., Yadav, K.K., Yadava, R.N. (eds) *Environmental Degradation: Challenges and Strategies for Mitigation*. Water Science and Technology Library, vol 104. Springer, Cha.
- Larsen JB et al. 2022. Closer-to-Nature Forest Management. European Forest Institute. From Science to Policy. <https://efi.int/publications-bank/closer-nature-forest-management>. <https://doi.org/10.36333/fs12>
- Luhás J, Mikkilä M. 2025. Social sustainability in the forest-based bioeconomy: A narrative review. *For Policy Econ*. 177:103523 [accessed 2025 Oct 31]. <https://doi.org/10.1016/J.FORPOL.2025.103523>
- Mäkelä, A., Minunno, F., Kujala, H., Kosenius, A-K., Heikkinen, R. K., Junntila, V., Peltoniemi, M., & Forsius, M. (2023). Effect of forest management choices on carbon sequestration and biodiversity at national scale. *Ambio*, 52, 1737–1756. Available from: <https://link.springer.com/article/10.1007/s13280-023-01899-0>
- Muys B et al. 2022. Forest Biodiversity in Europe. European Forest Institute. From Science to Policy. <https://efi.int/publications-bank/forest-biodiversity-europe>. <https://doi.org/10.36333/fs13>
- NRK. 2025. Europa fra grønt til grått. Available from: https://www.nrk.no/dokumentar/xl/europa-fra-gront-til-gratt_-nordmenn-bygger-ned-mest-natur_-viser-europeisk-kartlegging-1.17577504
- O'Neill BC et al. 2013. A new scenario framework for climate change research: the concept of shared socioeconomic pathways. *Climatic Change* 2013 122:3. 122(3):387–400 [accessed 2026 Jan 15]. <https://link.springer.com/article/10.1007/s10584-013-0905-2>. <https://doi.org/10.1007/S10584-013-0905-2>
- O'Neill BC et al. 2017. The roads ahead: Narratives for shared socioeconomic pathways describing world futures in the 21st century. *Global Environmental Change*. 42:169–180 [accessed 2026 Jan 15]. <https://www.sciencedirect.com/science/article/abs/pii/S0959378015000060>. <https://doi.org/10.1016/J.GLOENVCHA.2015.01.004>
- O'Neill BC et al. 2020. Achievements and needs for the climate change scenario framework. *Nature Climate Change* 2020 10:12. 10(12):1074–1084 [accessed 2026 Jan 15]. <https://www.nature.com/articles/s41558-020-00952-0>. <https://doi.org/10.1038/s41558-020-00952-0>
- Patacca M et al. 2023. Significant increase in natural disturbance impacts on European forests since 1950. *Glob Chang Biol*. 29(5):1359–1376 [accessed 2025 Oct 31]. [/doi/pdf/10.1111/gcb.16531](https://doi.org/10.1111/gcb.16531). <https://doi.org/10.1111/GCB.16531>
- Plumptre AJ et al. 2024. Targeting site conservation to increase the effectiveness of new global biodiversity targets. *One Earth*. 7(1):11–17 [accessed 2025 Oct 31]. <https://www.sciencedirect.com/science/article/pii/S2590332223005638>. <https://doi.org/10.1016/J.ONEEAR.2023.12.007>
- Seidl, R., Schelhaas, M.-J., Rammer, W., Verkerk, P.J., (2014). Increasing forest disturbances in Europe and their impact on carbon storage. *Nature Climate Change* 4, 806-810. <http://dx.doi.org/10.1038/nclimate2318>
- Tuan NT. 2025. Forest land use change impacts on carbon stocks: Perspectives from the Northern mountainous region, Vietnam. *Environmental and Sustainability Indicators*. 28:100978 [accessed 2025 Oct 31]. <https://www.sciencedirect.com/science/article/pii/S266597272500399X>. <https://doi.org/10.1016/J.INDIC.2025.100978>
- UNEP-FI. 2025. Growing forest finance at COP30 and beyond: how financial institutions can reap the benefits – United Nations Environment – Finance Initiative. [accessed 2025 Oct 31]. <https://www.unepfi.org/themes/ecosystems/growing-forest-finance-at-cop30-and-beyond-how-financial-institutions-can-reap-the-benefits/>
- van Vuuren Detlef P et al. 2011. The representative concentration pathways: an overview. *Climatic Change* 2011 109:1. 109(1):5- [accessed 2026 Jan 15]. <https://link.springer.com/article/10.1007/s10584-011-0148-z>. <https://doi.org/10.1007/S10584-011-0148-Z>
- Verkerk, P.J., Delacote, P., Hurmekoski, E., Kunttu, J., Matthews, R., Mäkipää, R., Mosley, F., Perugini, L., Reyher, C. P. O., Roe, S., Trømborg, E. 2022. Forest-based climate change mitigation and adaptation in Europe. From Science to Policy 14. European Forest Institute. <https://doi.org/10.36333/fs14>