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Collaborative governance for sustainable forestry in the emerging bio-based economy in Europe

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In recent years, a common theme in social science research, natural resource policies and practical management has been the increasing emphasis on partnerships and other forms of collaborative efforts as effective means to reach tangible and sustainable outcomes. Another significant trend is the increasing focus on the role of the forestry sector in managing the challenges of climate change, and the push towards a bio-based, low-carbon economy is at the epicenter of the public debate in several EU countries. Drawing on research on collaborative processes as well as research on policy design, this paper reviews the current trend to rely increasingly on collaborative efforts to improve sustainability, using forest governance in northern Europe as an illustrative case. It pays particular attention to efforts to balance concerned stakeholders through National Forest Programmes (NFPs), and considers these efforts in an international context. It concludes by elaborating on future research directions and policy recommendations that are critical to achieve intended outcomes in forest governance systems characterized by state-initiated collaborative processes as well as various forms of voluntary initiatives.

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Introduction

It is an unquestionable fact that forests matter: for people, various plants and animals and for the planet as a whole. Current estimations show that around 1.6 billion people depend on forests for their livelihood and forests are home to more than 80 per cent of all terrestrial species [1]. Therefore, the ongoing deforestation and land degradation, caused by human activities and climate change, are major and urgent challenges to sustainable development worldwide [1]. Despite improvements (the net loss of

forests continues to slow down, forest biomass per hectare is stable, and voluntary forest certification have increased [2]), the progress in preserving and sustainably managing the world's forests sees large regional differences [3]. Government interventions on all levels have been called for [1,2] and scholars urge policy-makers to recognize that we are breaching planetary boundaries, which require actions to set a new paradigm that allows the continued development of human societies to harmonize with the maintenance of ecosystems in a resilient and accommodating state [4,5].

In discussions on how to manage environmental challenges, at least two current and interrelated trends deserve particular attention in the context of forest governance. First, a common theme in social science research, natural resource policies and practical management has been the increasing emphasis on partnerships and other forms of collaborative efforts as effective means to reach tangible and sustainable outcomes [6,7••]. A recent example is the implementation of the 2030 Agenda for Sustainable Development, which emphasizes partnerships and coherent policies, and an enabling environment for sustainable development at all levels of government and by all actors [2]. Scholars have stressed the need to view forests as complex adaptive systems, which require management at a landscape level, balancing multiple types of ecosystems and taking into account perspectives from a variety of stakeholders [8•]. Meanwhile, what has recently been termed Reflexive Forestry emphasizes the need of putting forestry into a broader natural, social and cultural context, supporting capacity building and societal agreements [7••].

The other significant trend is the increasing focus on the role of the policies governing the forestry sector in managing the challenges of climate change [7••,9•,10•,11,12]. In Europe, one major reason for this trend is the push towards a bio-based economy — a core concept used at the EU level to refer to an economy based on renewable resources — and in particular the transition towards a low-carbon economy [13,14]. Forest biomass, used primarily for heating, cooling and electricity, is an important source of renewable energy and accounts for around half of the EU's total renewable energy consumption [15]. Several European level initiatives describe needs and possibilities to achieve a forest-based bioeconomy, including the EU 2030 Framework for Climate and Energy [16], the Bioeconomy Strategy for Europe [13], the EU Forest Strategy [15], and the land-use and forestry proposal

for 2021–2030 (LU-LUCF) [17] as well as ongoing National Forest Programmes (NFPs) in Member States [9•,18,19].

The boreal forest landscapes in northern Europe are often seen as important in this context as they can be used for production of bio-based fuels and materials, thereby replacing more energy intensive and fossil fuel based products [17,20–22]. However, in the academic literature the optimal management of forestry carbon stocks is debated and contested. The scientific community has primarily tried to sort out what determines the size of C stocks and their components (e.g. [22–24]), associated scientific uncertainties and trends [25], and potential implications for forest biodiversity [26]. Meanwhile, there are notable policy conflicts embedded in the proposed shift to a bioeconomy, not the least the conflict between increased extraction of biomass for energy production and biodiversity protection [4,12,14,27–29]. Such policy conflicts must be mitigated through proper policy design, including various mixes of policy instruments, incentives and collaborative efforts [11,18].

This paper reviews the current trend to rely increasingly on collaborative efforts to improve sustainability, using forest governance in northern Europe as an illustrative case. It pays particular attention to efforts to balance concerned stakeholders through National Forest Programmes (NFPs), and considers these efforts in an international context. It considers research on collaborative processes as well as research on policy design as there is a need for reviews as well as studies that combine these fields of research to identify vital research gaps and policy problems. To study the actual merits and limitations of collaboration, it is important to incorporate the policy design literature with its growing focus on outcomes of a particular design choice.

The paper begins by reviewing recent literature on collaborative governance and policy design, with a special emphasis on how outcomes can be assessed and policy failures avoided. It then provides a review of forest governance with current insights from a north-European context. Finally, the paper elaborates on a set of future research directions and policy recommendations that are critical to achieve intended outcomes in forest governance systems characterized by state-initiated collaborative processes as well as various forms of voluntary initiatives.

Cross-boundary collaboration and policy design — bridging the gap
Approaches in the collaborative governance literature
In recent decades, public administration has experienced a changing role of the state towards more inclusion of non-state actors in policy-making [6,30,31,32••,33,34••,35]. According to Denhart and Denhart [30,31] an important

aspect of public institutions is to trust in the efficacy of collaboration and work to bring proper stakeholders to the table in order to seek solutions to the problems communities face. The role of public administration is to take an active role in setting up arenas in which various stakeholders can meet and articulate shared values and collective responsibility for the public interest. For the purpose of this review, 'collaborative governance' is defined as 'the processes and structures of public policy decision-making and management that engage people across the boundaries of public agencies, levels of government, and/or the public, private and civic spheres to carry out a public purpose that could not otherwise be accomplished' [6:18]. The cross-boundary character of collaboration denotes a need for interactions among people from different organizations, sectors or jurisdictions [6].

In recent years, the number of research papers that investigate various aspects of collaborative efforts have grown immensely [6,34••,35]. There is a common understanding that collaboration between a diversity of stakeholders and public agencies with strong interest in the management of natural resources enhance the effectiveness of policy implementation [34••]. Here, effectiveness is primarily understood as the achievement of pre-defined goals or valued outcomes [36]. In the context of forestry, sustainable use primarily covers conserving biodiversity, financial value for land owners and increasing social equality [36]. Yet, to foster meaningful collaboration, stakeholders need to be motivated to participate, be able to participate on equal terms, commit to the decisions made and at the end feel that the time spend was worth the effort [6,37,38]. Overall, this requires inclusive stakeholder participation, transparency of decisions, awareness of collective responsibility, trust building and measurable outcomes [18].

However, although collaborative governance has become important in managing disputes over resources, the actual outcomes, potential synergies and win-win solutions on-the-ground remain largely unexplored [32••,34••,35]. Previous studies of collaborative governance have so far mainly drawn attention to the inputs or process design and sometimes conflate process performance (i.e. results of the collaboration in terms of social capital) with productivity performance (i.e. the actual outcomes on-the-ground) [32••,39,40]. In general, research has found that collaborative efforts are often constrained by a shortage of balanced representation, fairness or direct synergies between various sustainability goals [18,41–43].

From a research perspective, there is insufficient knowledge concerning to what extent implementation failures are due to a lack of legitimacy in the eyes of key stakeholders in the decision-making processes or implementation failures, or a combination of both [18]. This calls for studies that integrate research on collaborative

and participatory approaches with research on policy design, as there is a need to identify how such gaps can be avoided in policy-making. At the same time, researchers struggle with finding optimal ways to measure outcomes at multiple levels and stages, and such studies have started to emerge (e.g. [32••,34••,39–41,43–46]). For instance, Emerson and Nabachi [32••,6] take into consideration three performance levels (actions/outputs, outcomes and adaptation) addressed at three units of analysis (participant organizations, the governance regime itself, and target goals), creating a performance matrix of nine critical dimensions of productivity. This suggests that evaluations of outcomes need to clearly separate process-related inputs from outputs (e.g. legislative changes), and actual outcomes and adaption on-the-ground in relation to target goals, including both intended and unintended consequences [39,46].

Approaches in the policy design literature

Drawing on recent research [11,47–50], this review suggests that a key component for effective outcomes, no matter if policy goals have been settled in collaboration or not, is that there is an outspoken ambition to develop coherent objectives and a consistent set of policy instruments that support implementation on-the-ground. Although collaboration is a key component in decision-making for legitimation purposes, *policy coherence*, or the 'fit' between goals, means and context, occupy a central position translating high-level objectives into policy programmes and measures that can make a difference on-the-ground [50]. More specifically, policy coherence has been defined as 'an attribute of policy that systematically reduces conflicts and promotes synergies between and within different policy areas to achieve the outcomes associated with jointly agreed policy objectives' [47:396]. Furthermore, the selection of a broad range of policy instruments with a preference for less coercive measures, regulatory flexibility and opportunities for win-win outcomes by providing incentives for actors going beyond compliance, are design choices that can increase policy coherence [51]. By recognizing the necessity of policy design, recent studies have argued for the need to combine different policy instruments in so-called *policy mixes* [11,48–50,52,53]. Central concerns in the design of policy mixes are related to questions about how polices emerge, how they interact, which policy instruments or policy actions (e.g. informal, persuasive, economic, voluntary, collaborative) yields superior results, and the likely result of their (re)design [47–50].

Although we can expect that a certain degree of inconsistency and incoherence may be unavoidable, party as a result of collaboration and political bargaining, policy-makers need to capture the essence of the public good and simultaneously strive to avoid *policy failures*. Above all, scholars have drawn attention to the risks of layering, drift and conversion [50]. Layering constitutes a major hindrance for successful policy implementation, adding new goals and instruments without abandoning previous ones. Drift occurs when the goals within a policy area change, but without altering the policy instruments. Conversion, on the other hand, includes a change in the actions or instrument mix in order to meet goals in a domain where change is blocked. In the context of forest governance, a policy focus on climate change mitigation strategies may result in the expansion of climate and energy goals and actions, which may conflict with biodiversity protection and societal goals [54]. Furthermore, goals related to climate neutrality (greenhouse gas emission reductions or a fossil fuel-free welfare state), may remain coherent, but the actions used to address such high-level goals could possibly end up inconsistent or counterproductive [50,18]. Another risk emerge if powerful actors accept new arrangements only if they can keep favourable goals or instruments, for example, related to current harvesting levels or biodiversity protection [50]. Central aspects of policy design therefore concern the integration of new policy goals to already existing ones, including to what extent existing instruments are adapted to new goals, and whether the goals are modified in light of already existing legislative and advisory statuses [47,50].

Towards a forest-based bioeconomy in Europe — a pathway to collaboration and policy coherence?

The European bioeconomy approach

Over the past few years, the bioeconomy approach has emerged as a key means to address existential threats to sustainability, not just in Europe, but also globally [55]. Several European governments have embraced bioeconomy as a key economic paradigm offering opportunities for sustainable growth and rural development [56,57]. In 2012, the European Commission adopted the strategy 'Innovating for Sustainable Growth: A Bioeconomy for Europe', which defines bioeconomy in a broad sense as 'the production of renewable biological resources and the conversion of these resources and waste streams into value added products, such as food, feed, bio-based products and bioenergy' [13:9]. The ambitions are manifold as the bioeconomy 'offers a unique opportunity to comprehensively address inter-connected societal challenges such as food security, natural resource scarcity, fossil resource dependence and climate change, while achieving sustainable economic growth' [13:9]. In particular, the transition towards a resource efficient Europe with 'climate-smart forestry' (i.e. to track sinks and sources of carbon in boreal forests) should help form public goals into concrete action [17]. However, for the time being, such shift is characterized by a high degree of uncertainty and complexity, making the design of policy a challenge [11,9•,14,21].

Pathways to a forest-based bioeconomy from a policy perspective

In Europe, the responsibility for forests and forest management rest solely with each Member State, and there is no legally binding common forest policy [58]. Yet, a number of other sectoral policies such as agriculture policy, environmental policy and climate and energy policies increasingly address forest-related issues [59••]. However, this large mosaic of forest-related polices entail different and partly contradictory and uncoordinated objectives, which is often seen as problematic. Insights from recent research suggest that forest-related policy in the EU remains a fragmented field where the integration of relevant sectors and objectives has failed, despite the rhetoric of collaboration and policy integration [58,59••]. Although the EU is often seen as a leading force in the battle against environmental changes, there are trade-offs and policy conflicts between objectives and instruments of EU biodiversity policy, energy policy and rural development policy, making inconsistencies and conflicts often increase during implementation [59••]. While the EU Bioeconomy strategy draws significant attention to the need to foster innovation and optimize the use of biomass, the need to increase policy interactions is recognized [13]. Poor policy coherence is primarily understood as regulatory failures, and lack of coherent approaches between Member States and across sectors, including the incompatibility of market regulation with environmental and social regulation [13]. Furthermore, EU policy emphasizes that stakeholders at all levels must engage in the bioeconomy shift to reach a number of different, and sometimes contradictory, objectives [13,17]. Despite these ambitions, recent research has argued that current EU bioeconomy policy leans strongly towards a weak sustainability approach, which fails to recognize a holistic approach to sustainability that integrates economic concerns, as well as environmental and social safeguards[1] [60].

Collaboration for a bio-based economy: NFPs and forest strategies

To date, collaborative efforts and policy design through NFPs and related forest strategies occupy a central role in translating high-level policy goals in the EU into concrete action plans in the Member States [58]. As a global policy intervention, NFPs have been adopted in more than 100 countries in order to provide permanent national forums for joint deliberation on forest policy by the state, private companies and NGOs [61]. Often labelled third generation policy instruments, such processes have been introduced as a way to correct the inability of state

regulation to realize policy objectives in management on-the-ground, and also supporting the integration of various sustainability goals [61]. Recent years has witnessed a rise in research papers addressing such, or comparable, policy processes in several European countries, including, for instance, Germany [19,62], Finland [9•,42,63], Sweden [18], the Czech Republic [64], Bulgaria [62] and Estonia [65]. However, previous research has found that European NFPs do not always promote collaboration on equal terms, reconcile conflicting perspectives and priorities, or trigger forest policy change on-the-ground [9•,19,42,62–64].

In Sweden, the world's 3rd largest exporter of pulp, paper and sawn timber, and one of Europe's most extensively forested nations, the government only recently decided to initiate a formal process to adopt an NFP as part of efforts to meet National Environmental Quality Objectives [18]. This is an especially intriguing case since Sweden has been a highly significant exception to the general European adoption of NFPs [61]. Drawing on contemporary research [10•,18,66,67], it can be argued that Swedish forest policy is guided by management-by-objectives and a policy instrument mix, with a focus on voluntary, non-coercive, and incentive based instruments such as market-driven forest certification schemes, information and advice. Yet, insights from recent research has shown that Swedish forest policy suffers from an increasing gap between governance and management on-the-ground [7••,10•]. Numerous evaluations by responsible authorities have shown that current environmental initiatives are not sufficient, meaning that several environmental objectives set by the Parliament are not expected to be attained with current regulatory frameworks [68,69]. There may be several reasons for this shortage, including (inter alia) conflicting objectives, mismatches between objectives and measures, methodological problems in monitoring relevant ecological outcomes, and a lack of financial compensation to forest owners [7••,18]. Perhaps most importantly, many of the policy documents guiding land use provide little indication of exactly how, and to what extent, different objectives should be achieved [7••]. The government has therefore suggested improved coordination and monitoring as well as extended collaboration and dialogue between a broad range of stakeholders (environmental NGOs, the forestry sector and civil society) and public agencies [7••]. The most prominent example of this development is the last year's attempts to launch a broad stakeholder process in the form of an NFP [18].

As one of the leading countries contributing to the EU renewable targets, Sweden is considered a vital player in providing forest residues to the European bioenergy market [70]. By taking on the European ambition towards a low-carbon society, the Swedish government has embraced bioeconomy as a key growth paradigm offering opportunities for sustainable growth, rural development

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[1] A weak or strong approach to sustainability can be described in different ways. When described as two extremes, advocates of a weak sustainability approach assume wide substitution possibilities between produced and natural capital, while a strong approach to sustainability assumes hardly any such possibilities [see [60] for a review of the concepts].

and a pathway to a fossil fuel-free welfare state [18]. Forests cover more than 60% of the country's land area, and it is often argued that the use of forest products by industry and society play crucial roles in the national carbon balance [22]. In line with current EU energy and climate targets, the Swedish NFP process is intended to generate effective and legitimate suggestions for how to use the forests in the bioeconomy shift [18], supported by the country's recently adopted climate goal of net zero emissions of greenhouse gases by 2045 ([71], see [18] for a review of the NFP process). Such state-initiated processes may be said to signal a return of the state in a decentralized policy area, although one may argue that the state is never truly absent [72].

From policy to outcomes on-the-ground
In light of various forms of collaborative efforts it should be mentioned that several interventions in recent years have affected forest management on-the-ground, not only in northern Europe, but also globally. Although there is a rather fierce debate between conservationists and the forest sector concerning the actual impacts of large-scale forestry in the boreal biome (e.g. [29,9,45,73]) some positive trends can be observed. In particular, the introduction of green-tree retention at clear-felling has been driven especially by the breakthrough of market-driven forest certification schemes, such as the Forest Stewardship Council (FSC), at the end of the 1990s. Green-tree retention is intended to integrate the conservation of biodiversity with timber production and to maintain the provision of other ecosystem services by retaining or voluntary setting aside important forest qualities, habitats and structures [74]. Whereas the actual outcomes of certification schemes remain a challenge to measure [66], recent research has suggested that forest owners' voluntary set-asides are an important complement to traditional forms of nature conservation regarding size and structural factors important to biodiversity [74,75].

Conclusions, future directions and policy recommendations
This paper has reviewed the current trend to rely increasingly on collaborative efforts to improve sustainability, paying particular attention to National Forest Programmes (NFPs) and focusing in particular on northern Europe. It has considered research on collaborative processes as well as research on policy design as there is a need for reviews as well as studies drawing on both these fields of research to identify vital research gaps and policy problems. This last part of the paper elaborates on a set of future research directions and policy recommendations that are critical to achieve intended outcomes in forest governance systems characterized by state-initiated collaborative processes as well as various forms of voluntary initiatives.

Key issues for future research concern the merits and limitations of collaboration as well as how to design optimal policy mixes that support sustainable outcomes in the emerging bio-based economy. Despite the fact that there is a growing focus on collaboration in European forest strategies, there is a deficiency of studies providing analyses of their feasibility and outcomes [59**,18,7**]. Not the least, NFPs, or related forest strategies, are widely advocated as collaborative processes that improve legitimacy and enhance forest policy formulation and implementation, but there are few studies on their effectiveness and optimal organization. To study the actual merits and limitations of collaboration, it is important to incorporate the policy design literature with its growing focus on outcomes of a particular design choice [47,50]. For one, recent research highlights that existing NFPs must be further elaborated to align general forest policy with management actions on-the-ground, and to allow increased productivity to be reached without compromising forests' ecological and social values [9,18]. This point may be considered particularly pertinent to unusually inclusive collaborative processes, such as the Swedish NFP process [18]. Research should also devote more time to *how* the outcomes of collaboration can be measured, such as how appropriate indicators can be constructed regarding for instance forests' productivity as well as social and environmental objectives. Related to this, few studies analyze the policy design per se — such as the choice of target goals and indicators — and how it may, or may not, create incentives for land owners to implement multiple, and contradictory, objectives of national and international policies [7**,59**]. Another important theme is how to foster meaningful collaboration in light of anthropogenic climate change and scientific uncertainty [29]. Given the forests' large spatial coverage, long-term planning horizons and presence of many ecosystem services, there is a strong need for interdisciplinary research considering social and natural systems alike [7**,8,66,76,77].

This review has suggested policy design recommendations for forest governance systems relying heavily on collaborative efforts. In general, it is of central concern that such processes generate broad legitimacy from a large constituency of concerned stakeholders, and at the same time avoids usual pitfalls in policy design [Table 1]. These recommendations are based on contributions from recent research on collaborative processes [6,18,9,34**,37,39] as well as the growing body of literature on policy design in the field of resource management [11,47–52]. These recommendations include (inter alia): clear rules of the game, a professional process management, the explicit motivation of political choices and trade-offs, integration with existing policy objectives and other related policy processes, policy instruments that are compatible with the objectives, the need to foster iteration and learning at all scale levels, and a need to capture expectations and

Table 1
Policy recommendations, collaborative forest governance
Define rules of the game, goals and mandates of the process as early as possible
Pay attention to the importance of a professional process management
Motivate political choices and trade-offs, especially decisions characterized by scientific uncertainty and/or stakeholder controversy
Enable integration with existing policy objectives and other related processes and avoid *layering*
Strive to ensure that current and proposed policy instruments are compatible with the objectives and avoid *drift* and *conversion*, which lead to implementation deficits
Create conditions for an iterative process, integration with various sectors, adaptation and learning
Capture expectations and dedication among forest owners and other stakeholders at the stage of implementation

dedication among forest owners and other stakeholders at the stage of implementation. Finally, this review underlines the importance of fostering awareness among stakeholders about how and when a collaborative process may lead to the formulation and implementation of new forest policies. Wherever a collaborative process is established, it is vital to clarify its purpose, principles for participation and rules of the game as early as possible in the process.

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•• This book provides a review of the challenges of long-term planning in forest management, incorporating lessons from the past and future outcomes in present-day decision-making. The authors show how trade-offs can be assessed to take account of the additional ecosystem services and social interests provided by forests. They present a synthesis of novel interdisciplinary ways to assess and conduct natural resource management, thereby putting forestry into a broader natural, social and cultural context.

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The development of appropriate, novel forest management and restoration approaches that adequately consider uncertainty and adaptability are hampered by a continuing focus on production of a few goods or objectives, strong control of forest structure and composition, and most importantly the absence of a global scientific framework and long-term vision. Ecosystem-based approaches represent a step in the right direction, but are limited in their ability to deal with the rapid pace of social, climatic, and environmental changes. This paper argues that viewing forest ecosystems as complex adaptive system provides a better alternative for both production-oriented and conservation-oriented forests and forestry. It proposes a set of broad principles and changes to increase the adaptive capacity of forests in the face of future uncertainties. These span from expanding the sustained-yield, single-good paradigm to developing policy incentives and interventions that promote self-organization and integrated social-ecological adaptation.

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