

Introductory article for Special Issue on “Forest land ownership changes in Europe”

Research trends: Forest ownership in multiple perspectives

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Abstract

Research on forest ownership has received growing attention in recent years, particularly in relation to the effects of restitution processes in former socialist countries, emerging new forest owner types, trends towards fragmentation of ownership structures, and questions related to the steady supply of forest industries with raw materials. Literature reviews indicate that despite the profound impact of different ownership categories on the actual forest management and fulfilment of policy goals, the aspect of ownership is rarely included in research on forest management or forest policy. Future research should first develop a more differentiated picture of legal forest ownership categories and owner types, going beyond a simple dichotomy of public and private ownership forms, and beyond simplified typologies such as non-traditional, urban or absentee forest owners. Second, it should tackle the question how the form of ownership relates to forest management and the provision of goods and services, and the extent to which new management approaches are needed for different owner types. Thirdly, it should ask about effective support structures for forest

owners such as advisory services and other policy instruments, including how policy goals could be best achieved in consideration of different ownership forms and how different owner types could be best supported in their needs. In addition to broaden the empirical knowledge base across countries and development trends over time, we state a need for stronger theoretical foundations of and innovative conceptual approaches for forest ownership research that proactively grasp future anticipations.

Why is forest ownership an issue?

At the centre of applied forestry research are two main fields, first, the natural science based forest ecological and silvicultural research, and second, the social science and economics based business administration and forest policy research. Both fields basically assume profit-oriented and timber producing forest holdings – with some variations in how strongly this orientation is followed and how important other forest ecosystem services are among the management goals. Although post-industrial concepts or paradigms such as multi-functional, multipurpose or multiple-use, sustainable or ecosystem-based forest management include multiple values of forests (Buttoud, 2000, Kennedy et al., 2001, Schlaepfer et al., 2002), the legacy of the classical forest management models with the primary goal of a steady supply of forest-based industries with quality timber still underlies the major forest management concepts (Lawrence et al., 2003).

Management approaches are usually studied and discussed without specific reference to different ownership categories of the forest land and forest holdings. We do not hear much about owner-dependent management models – with a few exceptions such as small-scale, community or participatory forestry. Critical assessments of these concepts, however, demonstrate that classical timber-oriented and industry-oriented forestry are dominant frames even in those specific fields (Dressler et al., 2015, Lund, 2015). Alternative forest management approaches experience barriers both in research and in practice (Buttoud et al., 2011; Nybakk et al., 2015; Weiss et al., 2011).

Wouldn't we assume that the goals and preferences of forest owners, as well as the psychological dimensions of ownership (Matilainen et al., this issue) must have a direct influence on the application of forest management approaches? That is a question which could be explored by applying classical ownership categories, including public vs private, large vs small, or the specific forms of participatory or community forestry mentioned above (Weiss et al., this issue). The question, however, goes far beyond formal types of ownership since both public and private owners may decide to manage for profit or for other or multiple goals. We also need to think about how owners in different ownership types manage their forests and thus contribute to policy goals such as timber and biomass production, climate change mitigation and adaptation, biodiversity conservation, recreation, water protection and other ecosystem services (Lawrence, 2018). Simultaneously, we must realize the impact of forest professionals as service providers on the decisions that forest owners make and actions that they take. The interactions between ownership type, actual or appropriate forest management approaches, and policies, are of fundamental importance in understanding and shaping forestry, but represent an often neglected research area. Connections between forest ownership, management, and policy are in fact of growing relevance in the current era of emerging circular bioeconomy shaped by climate action, urbanization, and other societal drivers. Societal changes impact not only on political or market demands on forestry, but also on forest owner goals, their capacities and motivations. Forest owners appear to be much more

part of society than conventionally assumed in policy and research (Huff et al., 2017; Lorenz and Elsasser, 2018).

This special issue aims to contribute to a better understanding of the role of forest owners in forest management, not only through forest owner typology studies. It builds on work from 30 European countries, coordinated through the European COST Action FP1201 FOREST LAND OWNERSHIP CHANGES IN EUROPE: SIGNIFICANCE FOR MANAGEMENT AND POLICY (FACESMAP), 2012-2016, as well as the scientific conference on “Forest ownership changes in Europe: trends, issues and needs for action”, 7-8 September, 2016, in Vienna, the final conference of the Action. Drawing on literature analyses, an evidence review across the 30 participating countries, a survey in the whole ECE region, and a series of stakeholder workshops, the COST Action described the manifold dimensions of changing ownership, both in their local contexts and spatially across Europe, and provides an analysis of the relationships between such ownership changes, forest management approaches, and effectiveness of policy support¹. The papers in this Special Issue are a selection from the outputs of the COST Action and the final conference. They take a multidisciplinary approach, including sociological, economics and political science perspectives. The articles are based on both data jointly collected in the frame of the COST Action and on additional data collected by the authors of the articles. Some of the articles give broad and comprehensive overviews of status and developments across Europe, others take a comparative view of cases from selected countries, and some present a single case study with broader conceptual or practical implications. A special focus lies on literature reviews of forest ownership studies and conceptual work for the analysis of forest ownership change and specific ownership forms (Ficko et al. this issue; Weiss et al. this issue). The common work in the COST Action was supported by a series of stakeholder workshops on European and local levels (so-called Travellab, Feliciano et al., this issue), with the aim to understand European level stakeholder perspectives as well as local contexts across Europe. In this way, the Action aimed to connect to forest management on the ground as well as to relevant policy processes and stakeholders. The Action results and this Special Issue come timely since ownership issues are crucial for the sustainable use and management of forests as aimed for, among others, in the Sustainable Development Goals of the United Nations (SDG 15, see United Nations, 2016) and in relation to the contribution of forests to mitigate climate change via an optimized utilization of renewable materials in a bio-economy (Winkel, 2017; Martinez de Arano et al., 2018).

Our ambition in this Special Issue was to give an update on forest ownership studies, and also to assess the significance that forest ownership has in all aspects of forest management and policy. Interestingly, while literature reviews reveal that forest ownership studies do often think about forest management implications (e.g., Ficko et al, this issue), conversely the literature on forest management approaches lacks a focus on ownership (Nybakk et al., 2015; Weiss et al., this issue). It thus seems the knowledge on forest ownership has not yet reached forest management in the form of distinct management models for different owner categories. Forest ownership studies and typologies prominently speak about different forest owner goals and motivations – for instance, economic and environmental goals – and their behaviour – such as their wood harvests, openness

¹ The work of the COST Action is documented on the website www.facesmap.boku.ac.at and in the Country Reports (Zivojinovic et al., 2015) and a Policy Paper (Weiss et al., 2017). The upcoming forest ownership study which was conducted jointly with UNECE/FAO will present a comprehensive overview of the state and developments of forest ownership in the ECE region (website: <http://www.unece.org/forests/areas-of-work/forest-resources/methods-and-processes/forest-ownership.html>).

towards wood mobilisation or their organisation in forest owners' associations. Even when looking at forest policy studies, the role of ownership is often recognized as one crucial factor in policy processes, but its specific role is rarely scrutinized in detail. This is confirmed by recent review studies on the EU nature conservation policy Natura 2000 (Sotirov, 2017) as well as on bio-economy (Winkel, 2017), which point to the central significance of forest ownership for any forestry and forest management issue, whether related to the fulfilment of owner goals or of public policy goals. But this knowledge has rarely been translated into policies for the full range of forest owner categories.

In the following, we give a short overview of theoretical and methodological approaches, discuss the question of ownership, including: forest owner typologies, gender aspects, structural changes of ownership in Europe, restitution and privatization, increasing fragmentation of forest ownership, community forestry, forest owner organisations, advisory services and policy implications.

Issues in forest ownership research

As awareness grows that European forest ownership is changing, in particular the growing number of private forest owners (PFO) with different socio-economic status, the quest for finding common attributes for categorization has arisen. To this end, different methods for typology making have been developed and applied (for earlier overview studies see Dayer et al., 2014; Emtage et al., 2007; Ní Dhubháin et al., 2007; Selter et al 2009). Typically, a positivistic quantitative market segmentation approach has been applied, based on structured questionnaire data. Different aspects of farming (system, style, occupation), livelihood strategies, wealth ranking, anthropological/demographical and attitudinal aspects have, for varying degrees, been considered in creating the typologies. A review of PFO typologies published from 1985 to 2015 shows that the general objective was to provide a better understanding of forest ownership (Ficko et al, this issue). Other more specific objectives were related to roundwood mobilization, delivery of public goods, and forest management approaches, and were able to provide explanations based on dissimilar types of owners. However, the possibilities for wider generalizations are limited. One reason is that, apart from a monitoring example from Finland (Karppinen and Hänninen 2006), they have so far been snapshots, usually based on ad hoc survey data, with little potential to assess trends in management behavior of different owner types. Another reason is poor access to data that allows confirmatory approaches, e.g. to establish the relationship between expressed attitudes and management behaviour. Last but not least, generalization is also limited because of the frequent use of atheoretical or heuristic approaches. New frameworks and alternative theories are needed for better understanding the linkages between values, attitudes, and behavior, for instance, the behavioral factors affecting discrepancies.

More broadly, forest ownership types may be conceptualized in quite different perspectives, including the legal or customary form of forest ownership, the institutional or social characteristics of the owners, socio-economic characteristics of the forest holdings, or the owners' goals, attitudes and behaviour in forest management (Weiss et al., this issue). The legal forms of ownership are much more complex than the common division of public and private, with various intermediary forms such as common or community forest ownership (see below).

Another observation is that gender aspects have been much ignored in previous research. Gender research provides multiple ways (theories and methods) to consider the basic fact that forest

owners are men and women. Until recently this has, with few exceptions, been overlooked in the context of family forestry (FAO, 2006). Studies reporting on the gender balance has been carried out in Norway, Sweden, Finland, Latvia and Lithuania. For Norway and Sweden, gender theories have been used to increase understanding of the meaning of forest ownership (Follo, 2008; Lidestav, 2010), and in Finland gender order has been studied in forest owners' voluntary conservation activity (Vainio and Paloniemi, 2013). On the basis of this previous work, FACESMAP participants introduced the gender perspective across three different research frameworks: gender as an empirical variable, as a structuralizing category, and as meaning category. By compiling current data and publications on European forest ownership, and the collective meta-analysis of those by a team of researchers, a deeper and more nuanced understanding of both "new" and "traditional" forest owners is presented (Follo, et al 2017). In this issue, Umaerus et al. add to the – still modest – pile of gender-oriented forest owner studies by investigating whether female forest owners act "greener" than male forest owners, concluding for their Swedish case study that female owners, while having the same interest in timber production, are more open towards non-traditional business opportunities connected with their forests such as tourism or health-oriented activities.

Increasing private ownership – and increasing diversity of owners and forest management

The share of private forests has been growing in the last decades in Europe. Overall, private forest area increased by 18% in Europe since 1990 (Forest Europe, 2015), partly due to an increase in forest land through afforestation (more pronouncedly in Ireland, Iceland or Poland), partly due a shift from public to private ownership (Zivojinovic et al., 2015; Weiss et al., 2017). In some Western European countries, forests have been transferred from public to private ownership in the course of more neoliberal policies (Hodge and Adams, 2013; 2014) and land grabbing has become a European concern (van der Ploeg et al., 2015). The majority of this shift, however, has taken place through the political changes in Eastern Europe during the 1990s which increased private ownership through restitution and sometimes additional privatisation (e.g., in the Baltics). The legacy of socialist regimes is still visible in weakly developed institutional frameworks such as immature forest owner associations (Glück et al., 2010; Sarvasova et al., 2015) and a low level of property rights (Nichiforel et al., 2018).

The restitution of formerly nationalized forest land took place in most former socialist countries (except Poland), but to different extents and in different ways in each country. It was often a slow and difficult process and is still not finished in many countries (Zivojinovic et al., 2015). These processes led to the (re-) establishment of small scale forest ownership, and emergence of new ownership categories including environmental associations and foundations (Schmithüsen and Hirsch, 2010). These "new" private forest owners often lack the knowledge, skills and capacity for efficient and sustainable forest management, and forest policy lacks the strength to provide them with sufficient extension services and financial incentives which could help and incentivize them (Krott, 2008). In order to span this policy gap, forest owners' associations and co-operations have been created to address the specific problems related to the restitution processes (Sarvasova et al., 2015). Scriban et al. (this issue) give detailed insights into restitution processes, the challenges connected with the resulting change of the ownership structure and political responses, using the example of Romania.

The increased fragmentation of private ownership and increased share of non-traditional or urban forest owners is concern for many European policy makers who see the active management of private forests as important for achieving their development agenda (Stern et al., 2010). But while policy-makers often believe many forest owners to have a low level of interest and management activity, forest owners themselves mostly claim to actively manage their woodlands, on their own terms (e.g., Feliciano et al., 2017; Ficko and Boncina, 2015; Lawrence and Dandy, 2014; Matilainen et al., this issue). With the growing share of non-traditional owners, the goals behind forest ownership become more diversified: urban owners are more open towards biodiversity conservation or other non-traditional uses of forest land (Hogl et al., 2005; Schraml and Memmler, 2005; Lorenz and Elsasser, 2018). With that, an increased diversification of forest ownership may be an asset in view of the multiple policy goals for forests – including timber and biomass production as well as recreation or biodiversity conservation.

We observe that policy-makers aim to engage forest owners in active management in order to support policy goals related to urban and industry development. Advisory services predominantly aim at timber production, thus failing to reach a considerable portion of forest owners (Stern et al., 2010; Huff et al., 2017). Several articles in this Special Issue investigate the question of what can trigger active management and what can improve forest owners' contribution to policy objectives. This depends on many influencing factors and is the result of complex decision processes which make it difficult to influence their behaviour by policy means. A basic but often overlooked aspect is that forest owners' relation to their forests is strongly connected to cultural and social factors such as regional institutional backgrounds or family heritage, an observation which is, in this Special Issue, confirmed also for new, non-traditional forest owners (Matilainen et al., this issue). In a similar way, Stoettner and Ní Dhubháin (this issue) observe that, in Ireland, harvesting activity is associated with the level of the forest owners' participation in social networks. The direction of that relationship can not however be easily determined; more research is needed. For the same country, Upton et al. (this issue) found that harvesting demonstrations were effective interventions by the extension service, but also found that the forest management decisions are primarily influenced by the age of the forests, since the majority of the private estates are still in first rotation. Mostegl et al. (this issue) show that most forest owners in Austria are aware of climate change and its consequences but adaptation measures such as management change are not undertaken – this result is in line with Laakkonen et al. (2018) who report that Finnish forest owners lack guidelines for climate-responsive forestry on their own forest. These authors challenge decision-makers to recognize that small-scale private forest owners require tailored information about climate change adaptation in order to become re-active in forest management. Scriban et al. (this issue) demonstrate that, in Romania, anthropogenic disturbances have impacted heavily on private forests despite the existence of tight regulations to preserve the traditional forest management. Umaerus et al. (this issue) determine that in Sweden, female and male forest owners manage their forest differently, with female forest owners more interested in ecological, recreational or social values of forests than men. Górriz-Mifsud et al. (this issue) list the challenges for joint forest management, which is considered an important approach to activate forest owners and to improve environmental sustainability in Spain. Finally, from their literature review, Ficko et al. (this issue) also warn that the link between forest owners' typologies, widely assumed by policy makers, and forest owners' management behaviour is still not well established. All those studies call for a much more differentiated conception of owner-management relations.

Common action – in forest ownership, management and interest representation

There is a long and rich tradition of communities owning, managing and using forests in Europe, and work in FACESMAP showed the enormous potential to understand this diversity of arrangements as a forest governance laboratory (Lawrence et al., 2016a). Case studies include medieval and earlier models, and their survival or loss (Gatto and Bogataj, 2015); the effects of socialism and post-socialism (Bogataj and Krč, 2014; Gatto and Bogataj, 2015; Premrl et al., 2015); community forestry as social innovation following land reform (Ambrose-Oji et al., 2015; Hoffman, 2013) as well as social and environmental impacts (Carlsson, 1999; Lawrence and Ambrose-Oji, 2015; Lidestav et al., 2013; Sandstrom et al., 2016). This fertile domain needs more attention; a recent review of 40 years of community forestry around the world noted only in passing that Europe has been little studied (Gilmour, 2016).

One particularly European contribution to the understanding of forest commons and community forestry, is the wide range of models and motivations for forest owners to form associations. Some of those associations may function as commons, when management decisions are taken jointly and planning is applied to the combined forest properties as a whole (Holmgren et al., 2010), and Ostrom's theories of common property management are often applied to understanding such associations and collective actions (Ostrom, 1990; Sarvašová et al., 2015). Likewise Ostrom's theories are used in a study of owner associations in Navarra (Gorriz-Mifsud et al., this issue), demonstrating in detail the challenges for small scale owners to work together in joint management. In contrast another paper in this special issue highlights how restitution has undermined a sense of community, by fragmenting property and straining relationships in Romanian villages (Scriban et al., this issue). These two papers illustrate not only the diversity of this situation in Europe, but also the dynamics. Not only forest ownership, but also governance arrangements for forest owners to engage socially, cooperate and take joint decisions, are changing and presenting owners and advisors with new challenges.

Joint action or organisation of forest owners has long been proposed as a remedy to the hindrances related to fragmented or small-scale forest ownership. Forest owners' associations are a heterogeneous type of organisation, but have various common objectives, including increased forest owners political power (Mattila and Roos, 2014; Sarvasova et al., 2015), improved market position (Häyrinen et al. 2017; Kronholm 2016; Posavec et al., 2011), development of business activities (Glück et al. 2010; Pollumäe et al. 2016; Rauch, 2007; Schraml, 2005; Weiss et al., 2012), support for cooperation among forest owners and forest authorities (Aurenhammer et al. 2018; Nonic et al. 2011), and obtaining financial incentives (Jársky et al., 2014; Mendes et al., 2011; Živojinović et al., 2015).

In this special issue, several new views and cases which discuss forest owners' associations are presented. The role of forest owners associations in the restitution process is discussed by Scriban et al. (this issue). The papers by Bowditch et al. (this issue) and Gorriz-Mifsud et al. (this issue) demonstrate the importance of forest owners' partnerships for the stewardship of their properties and particularly for environmental goals, while Stoettner and Ní Dhubháin (this issue) stress their role in reaching economic objectives. We learn that common action in forestry is related to multiple uses, including joint ownership, management and interest representation, with many aspects still deserving detailed investigation.

Policy and practice – a case of multiple relations

With all of these geodemographic and socio-spatial changes in forest ownership, combined with political-economic changes among forest owners and society, the relationship between policy and practice has become an arena of diversity, innovation, tensions, and some gaps. Traditionally in most countries, communication in non-industrial private forestry has been channelled through government extension officers, who have advised and instructed forest owners. Classical top-down extension is no longer the norm; in most countries government agents are in a minority alongside a varying mix of actors from state, private, and NGO sectors. In countries with centrally controlled, highly regulated forest management, extension officers focus on ensuring compliance; but where forest owners have more freedom to choose how to manage their forest the private advisory sector is flourishing. Across Europe we find increased flexibility, openness and participation of owners as sources of information; increasing reliance on information and persuasion rather than enforced compliance; a shift of attention from timber to a wider range of ecosystem services such as biodiversity and recreation; a shift of funding and providers from public to private sector; and emergence of new virtual communication tools (Lawrence et al., 2016b).

In this context many of the papers in this issue acknowledge the need for advisory services to adapt to owners' realities (e.g. Mostegl et al., this issue). Several highlight ways in which the organisation and methods of extension are changing. In Navarra, the growing interest in forest owners' associations is related to the decline of traditional extension (Górriz-Mifsud et al., this issue).

Two papers from Ireland in this special issue add particularly to the policy and extension literature, as this is a country with strong government investment in rapid afforestation with exotic conifer species, supported by extension services. In this context it is interesting that members of forest owner groups who have harvested had the largest and the most diverse social networks (Stoettner and Ní Dhubháin, this issue). The Irish context also provides unusually ideal conditions for testing the impact of extension services, and Upton et al. (this issue) provide evidence of success in thinning demonstration both in terms of self-reported learning and actual management outcomes. At the same time their paper highlights the challenges of the Irish policy and environmental context, and reminds us that extension services must be tailored to circumstances.

As a critical view of the performance of policy instruments addressed from the European level to private forest owners via national legislation, Sarvašová et al. (this issue) reveal that Natura 2000 compensation payments from rural development policy instruments (EFARD) do not achieve their goals related to the European biodiversity targets, because the measures are not well aligned to forest owners' needs and preferences. Similarly, Quiroga et al. (this issue) critically assess the forest owners' affinity for subsidies. By using survey data from several European countries, they find that forest owners with a utilitarian view of forest management, bigger forest holdings, farm forest owners, and forest owners from East Europe are more likely to take up subsidies. Overall, there is not a very high subsidy affinity across forest owners since market instruments are not capturing the main attention from forest owners when managing the forest. Their results point towards a need to design alternative policy incentives, because subsidies may not be attractive or effective in future, given the anticipated further fragmentation and diversification of forest ownership in Europe. As policies become more effective when tailored to owners' decision-making environment, also businesses and practices call for customer orientation. Kajanus et al. (this issue) demonstrate with

examples from eight European countries how the changing operational environment can be taken into account in creating new or modifying existing business models for private forestry.

Some of the articles in this special issue contribute to implications of changing forest ownership in the form of policy advice. For example, Górriz-Mifsud et al. (this issue) review the effects of different policy instruments aiming to bolster joint forest management, Bowditch et al. (this issue) discuss how the governance of knowledge, innovations, and partnerships may contribute to forest resilience, and Laakkonen et al. (this issue) address policy-business collaborations by assessing the value networks of potential forest leasing services. All three studies point to the need for new governance approaches and new roles for policy-makers within horizontal partnership structures or platforms for building capacity for local actors (Górriz-Mifsud et al.; Bowditch et al.) or to create trust among open value networks (Laakkonen et al.). These and other papers in this issue hand over the observed challenge to the mix of policy makers, who must include not only political decision-makers but also local practitioners, researchers, service providers and forest owners' representatives.

Conclusions and research needs

We conclude that there are several profound knowledge gaps around various issues related to forest ownership in Europe (see also Weiss et al., 2017). The work in the COST Action FACESMAP contributed to narrowing some of the gaps, particularly by reviewing and documenting the state-of-art (Weiss et al., this issue; Ficko et al., this issue), by supporting comparative studies (Feliciano et al., 2017; Follo et al., 2017; Nichiforel et al., 2018; Sarvasova et al., 2018; and studies in this Special Issue), and through a survey of forest ownership structures in the UNECE region together with UNECE/FAO (United Nations, forthcoming).

Still, knowledge on forest owners' goals and behaviour is mostly limited to timber utilisation, to national situations and to broad categories of owners, e.g. large vs. small-scale owners, or institutional vs. private owners. Relatively few studies have focused on new or non-traditional forest owners. Furthermore, neither traditional nor non-traditional owners are homogeneous, and knowledge gaps relate to both of them. It would help to understand the owners of the future, by understanding young adults whose parents own forest, investors who considering diversifying their property portfolio, or city families who plan to buy a second home in the countryside. Gender aspects have been neglected in forest ownership research. In addition, European level analyses and comparative studies are rare, a fact which can partly be explained by the fact that national statistics related to owners categories differ between countries and make comparative analyses across countries difficult.

Overall, more information is needed on the one hand on the linkages between owner's lifestyles, perceived identities, and behaviour, and on the other hand on owners' goals relating to the variety of private and public goods and on the effects of their forest management on the provision of ecosystem services and fulfilment of policy goals. Knowing about the great heterogeneity of forest owners with regard to their diverse goals and motives of ownership and forest management, we must assume a heterogeneous picture of the effectiveness of different forest-related policies and applied policy instruments. With the exception of wood mobilisation issues, little work has been done on how the different owner types respond to policy instruments and how owners can be

reached effectively. This includes a lack of systematic knowledge on forest owners' associations, advisory services and similar support structures for forest owners.

More knowledge on forest owners' behavioural response e.g. to carbon trading, payments of ecosystem services schemes, and non-wood forest products triggering efforts are needed. Research could respond to this challenge by initiating more practice-oriented but conceptually grounded experimentation studies which investigate not only the perceived appeal of certain novel policy suggestions but the arguments that owners provide to their attitudinal and behavioural responses. We also need more information on forest owners' communication and interaction on online platforms and social media. Since the literature on that topic is scant, we know little about who of owners are active online, how they act, what they produce, share, ask, and respond. Research stream following these questions could make use of mix of qualitative and quantitative methods, automatic internet data gathering and clustering tools as well as neural networks and other machine learning approaches. From the described state-of-art, a number of challenges can be highlighted for closing our knowledge gaps (Weiss et al., 2017; Lawrence et al., 2016c). In policy discourse, and - since much of the research on forest ownership is directly connected with policy needs – also in scientific discourses, the diversity of ownership types is usually presented as a problem when owners do not fit the assumed ideal type of a wood-producing forest owner. A more positive way of seeing the diversity of owners may help in finding new solutions for both policy goals and forest owners. Such an approach would not aim to reconcile the whole set of diverse policy goals at the same time and on the same areas and for all owners, but to find those owners who are best inclined to follow certain goals. At the same time, this would take land owners more seriously, and would offer them a palette of options and solutions – including new management approaches. We currently often operate with a oversimplified dichotomy of traditional and non-traditional owners, farm and urban owners, residential and non-residential owners and the like. The concepts of “non-traditional”, “non-farm”, “non-residential” or “urban” owners suggest falsely that those groups are homogeneous in themselves and that we know the other, the normal or standard type of owners very well. The growing diversity of owners implies new management goals, attitudes, skills and capacities and with that, a need for new management approaches. The new ways of management may include silvicultural or harvesting techniques, organisational solutions of the forest planning and work and new business models with new products, services, production or marketing. To this end, researching the constellations and actions of private-public-people partnerships, connecting forest owners, policy implementation, and business services in novel ways could bring fresh avenues into how effective use of forest resource data, online advisory and operational services, and owner-driven communication may interact.

This review presented in this article shows that the diversity of owner types has profound impact on forest management and on the fulfilment of policy goals, a fact which is not sufficiently included in research so far. Any research connected to forest management and its relation to society and policy would therefore need to include the aspect of ownership. In the following, we sketch specific research needs to answer to the above summarised knowledge gaps and challenges.

First, improved knowledge is (still) needed about forest owner types and the development of the owner structure over time, in both theoretical-conceptual and empirical regards, and from past to present and from present to future. A better understanding of the diversity of legal forest ownership forms would be valuable, with attention to special forms such as municipal as part of public ownership, old and new forms of common or community ownership, social ownership forms such as

charity or other non-profit organisations, and special commercial forms such as investment funds. Research into social and demographic characteristics of forest owners, such as age and gender structure, should not only include their specific preferences and behaviour but also their support needs in decision-making, management and stewardship of their forests, including commercial and non-commercial goals. This not only calls for broadening the datasets (e.g., across time and across countries), it implies a need to look at specific phenomena such as special ownership forms, and to ask new kinds of questions by putting, for instance, owners' needs in the centre of research instead of industry needs or defined policy goals. Acquiring a thorough understanding of owners' own genuine needs will probably require adapting pure social sciences such as anthropology and ethnographic methods instead of simplistic market segmentation surveys. It also calls for a stronger use of theoretical frameworks when in the past the typologies were often merely problem-related and a-theoretical, or for broader conceptual approaches that look at owners as part of society instead of a separate group. Through this, societal factors that influence owner decisions may be better analysed – a few examples are demonstrated in this special issue with psychological ownership, network analysis or value co-creation approaches.

A second important research focus would be on forest owners' behaviour and its implications for forest management and policy goals. Little is known how ownership forms impact on them, because this may be perceived too sensitive because power relations are on stake. The neglect of this question, however, seems to inhibit also more focused research on practical forest management methods. We do see a need for conceptualizing new forest management approaches for different forest owner types within cultural, personal and structural property-related contexts beyond the previous important work on industrial vs small scale forest management. Innovative management approaches could include new forest products or uses, new organisational forms of forest stewardship or novel business models for special forest ownership forms and new forest owner types.

A third important field of research is on new models for associations, cooperations, advisory systems and other support structures and forest owner policies. Little is known on the historical development and variety of advisory systems and support structures, including public organisations, forest owners' interest groups, associations, cooperatives and other forms of cooperation, higher education extension services, R&D institutions, education and training organisations, etc. Research would include the conceptualisation and mapping of types and forms of advisory systems on European scale, including public and private forms, compulsory and voluntary membership types, one-for-all organisations or specific advisory services for different ownership forms or owner types, for instance, urban and female owners. With regard to the consolidation of fragmented ownership patterns, the mapping of forms and models of forest owner cooperation on European scale would be purposeful, from loose forms of information exchange, to shared machinery ownership and forest management, to contractual and legal forms of joint management or land ownership. An evaluation of policy initiatives for mobilizing inactive forest owners and/or consolidation of fragmented ownership patterns, and to mobilize forest land markets through novel online platforms, for example, would be highly interesting.

Forest management and more specifically sustainable forest management is a complex problem which requires multiple theoretical and methodological approaches. For developing more integrated insights and conclusions, however, not only a plurality of conceptual approaches is recommended, but also stronger integration across natural and social science disciplines and between science and

practice. Transdisciplinary methods such as the Travellab (Feliciano et al., this issue) designed and experimented in the COST Action FACESMAP ensure that stakeholders are involved since the beginning of the research process, that reflexion and reformulation of research questions occur, and that the acquired knowledge is exchanged with stakeholders at several stages of the research process. Co-production action research could enhance understanding of owners' genuine goals and foster innovation uptake and promises to contribute to the design of effective policy interventions. Participatory research could support the trend towards more participatory, more inclusive and co-creative policy design and adaptive refinement, based not only on natural-scientific evidence but also on social-scientific knowledge on what motivates people, how they communicate, engage to goals and service providers, make decisions and take action.

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