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M. M. Sotirov, Philippe Deuffic, I. Zivojinovic, G. Lidestav, D. Feliciano, T. Hujala, A. Lawrence, G. Weiss

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United in diversity? Typology, objectives and socio-economic characteristics of public and private forest owners in Europe

Metodi Sotirov^{1,2}, Phillipe Deuffic³

¹Senior Consultant Forest Policy and Governance, UNIQUE forestry and land use GmbH, Schnewlinstraße 10, Freiburg, Germany, email: metodi.sotirov@unique-landuse.de

²Senior Researcher, Chair of Forest and Environmental Policy, University of Freiburg, Tennenbacher Str. 4, Freiburg, Germany, email: metodi.sotirov@ifp-uni-freiburg.de

³Sociologist IRSTEA, CESTAS Cedex, 50 Avenue de Verdun, 33612 Cestas, France, email: philippe.deuffic@irstea.fr

Introduction

Forests and other wooded lands cover 40% of the total land area of the European Union (EU). Because of their strategic importance, forests have been subject to different land-use strategies to meet increasing competition for multiple forest goods and ecosystem services (ES) under changing environmental, socio-economic and political conditions. For example, while nearly a quarter of the EU's forest area is protected under EU and/or national nature conservation legislation, timber production remains the main forest management strategy.

Over the last two decades, terms like sustainability, multi-functionality, and biodiversity have come into vogue as a result of the proactive mobilisation of researchers and environmental non-governmental organizations (NGOs). At the same time, competitiveness, innovations, and economic globalization have continued to leave their mark in the forest sector. Most of the aforementioned keywords are included in national forest laws and EU forest-related policies, providing a syncretic vision of what roles forestry should play in our societies. In addition, a wide range of EU and national policies and instruments (regulation, incentives, information, and education) have been applied to influence their decisions. Still, academic research finds that forest owners do not always feel concerned by these aims and rules of these policies (Brukas and Sallnäs, 2012; Lawrence and Dandy, 2014; Scardina et al., 2007; Steiner Davis and Fly, 2010). At the same time, a large body of different EU and national forest-relevant policies and laws place inconsistent and for the most part contradictory claims on forest management.

Hence, it is not surprising that decision-makers, forest owners and managers, forest industry interests, environmental groups, scientists and citizens have been confronted with and/or expressed different, and for the most part, competing claims towards forest land-uses. The efforts to balance competing claims have been sources of fierce disputes and societal conflicts across Europe for a long time. The main forest policy issues have been the increased timber use versus forest habitat conservation; material use of wood versus woody biomass use for bio-energy, forestry vs. land use changes (afforestations vs. agriculture and biodiversity protection); as well as forestry versus recreation (Sotirov et al., 2013).

In this context, forest management at the sub-national, regional and local level has arguably become a focusing point of different EU and national forest-relevant policies. It is at the scale of forest landscapes level in the different member states where different EU and national forest-relevant policies meet with forest management strategies and societal coordination mechanisms in the aim of providing a balanced provision of forest ES. Therefore it is the landscape scale where the implications of various policy and socio-economic factors on different forest management strategies, spanning from highly segregative approaches, where single-product forest stands are confined to different zones, to more integrative management approaches where the single stand in itself could be multifunctional, is most relevant to study.

The exploration and understanding of the trajectory the forest landscape follow is likely to depend on both political, socio-economic and environmental factors, as well as on the activities of the managers of the area, the demands of multiple other users and societal actors. Forest management at the landscape level that is presumably driven by decision-making of variety of

owners and stakeholders has not been a central focus of European research so far. For example, research efforts in the domain of social sciences, most notably in political science and policy studies, remain either focused on forest policy-making at the global (Arts and Buizer, 2009), European (Winkel et al., 2009; Edwards and Kleinschmit, 2012; Winkel and Sotirov, 2013) and national (e.g., Veenman et al., 2009; Winkel and Sotirov, 2011) or sub-national (Gossum et al., 2011) levels. Policy research at the landscape level has so far been focused on jurisdictions outside the EU (Bray et al., 2004; Schneeberger et al., 2007). When dealing with Europe, social sciences research has lacked systematic policy and socio-economic analysis at the sub-national levels (Carvalho-Ribeiro et al., 2010; Palacios et al., 2013) emphasizing very often single explanatory factors, for example public evaluation of landscapes (Nijnik et al., 2008). The forest-relevant natural science research typically targets biological processes and their stewardship at landscape level, without explicitly addressing changes in policies, socio-economic developments and their implications on forest management. Bridging multiple disciplines and research paradigms appears to be essential for increasing coherence between forest-related land-use policies and nature resource management (Andersson et al. 2006).

Previous academic work has hence provided only partial, unfocused or even still missing insight into the policy, socio-economic, management and behavioral determinants of the balanced provision of forest ES at the landscape level, now and in the future. However, given the increased interest in sustainable use and conservation of forest resources facing uncertain futures, it is surprising that so little research has been conducted on the topic, especially in terms of the linkages between policies, socio-economic developments and forest management.

In this paper, we argue that forest landscapes are managed by the decisions of forest owners and managers which are driven by both their own decisions ('agent-based factors') and the influences of external agents from policy, markets and public pressure ('structural factors') while taking account of ecological factors. If we are to better understand and model the development of the forest landscapes we need to know more about the current and future decisions of forest owners and managers, and how changes in policy, economy, and society affects landscape development through managers' decisions. Therefore, we need to develop sound typologies of forest owners as well as concepts to account for how (different groups of) forest owners and managers react on policy, market and social change. What we need to know is what the key drivers from society, economy and policy for forest management decisions are, and how the management decisions change when the external drivers change in the future.

If we want to study and understand how and why forest owners and managers behave as they do, and how and why they (do not) change their management practices at the landscape level in response to external factors, we need sound concepts and categories that are at best bolstered by theoretical approaches of actors' behavior. Such kind of underrating represents the main aim of the present paper.

Methodology

This paper is informed by data collection and analysis carried out within the FP-7 funded project INTEGRAL. This policy and socioeconomic research was carried out in a series of 20 case studies at the regional/landscape level in 10 EU countries (BG, FR, GER, IRL, IT, LT NL, PT, SE, SLK) that mirror the variety of political, socio-economic and ecological circumstances in Europe (Sotirov et al. 2014).

In particular, a policy and stakeholder analysis of 'integrated forest management' was carried out between May 2012 and April 2013. More than 400 in-depth interviews with policymakers, forest owners, forest managers, and various stakeholders (e.g., nature conservationists) were conducted. In addition, hundreds of documents (e.g., statistics, legislation, policy papers, and scientific reports) were analyzed to complement and validate the interviews.

The qualitative interviews and document analysis were based on a common questionnaire and coding framework. The data was analysed to identify different forest owner types in order to understand how forest owners make sense of events, actions, norms, and regulations affecting them. In particular, the data was used to provide more detailed insights into respondents

reasoning covering a wide range of items. They included forest owner's socio-economic profile and property, behavioural logics and micro level factors as individual objectives, expected provision of forest goods and services, and the way in which forests are managed. As such, the main aim was to understand forest owners' profiles, objectives, values, motives, and practices. The main findings from this large scale collaborative research are presented in the next chapters.

A typology of forest owners and forest managers in Europe

Forest owners and forest managers across different ownership categories (public, private; small-medium, large scales) can be classified according to different perceptions of forests, management objectives (e.g. as a reserve or else as a source of income) and how the forest management itself is carried out. For instance, some forest owners are primarily interested in the economic aspects of forestry, preferring a more intense wood processing oriented forest management, while others practice 'close-to-nature' ecological forest management. Furthermore, other forest owners and forest managers emphasize recreational aspects. Overall, distinct types of forest owners and forest managers with different objectives and socioeconomic characteristics could be identified across Europe (see table 1). These forest owners' profiles can be described as follows:

The "optimizers": economy-oriented forest owners (T1)

This first ideal type of forest owner is clearly economy and profit-oriented. In empirical research, they are qualified as "*forest businessmen*", "*forest entrepreneurs*", "*forest investors or economist*", "*large-scale forest owners*", "*new strong investors*" or "*paper pulp industrialists*". This ideal type is often composed of large-scale private forest owners and of forest cooperatives' representatives with properties of more than a hundred hectares. Most of them are full-time forest managers and forestry is their main source of income. Some of them may not live near their forest and engage companies managers to earn larger net revenue. These forest owners are members and even leaders of the management board of important forest owners' organizations. Involved in different steering committees (regional banks, forest cooperatives, and forest owners' unions), they participate in local, regional and sometimes national forest policy arenas. Their involvement in dense and large forestry networks gives them a dominant position and more freedom to negotiate and argue about general orientations. As they participate in rules definition, they are also less prone to take for granted constraining norms that are imposed by external sources of authority (EU, international conventions, etc.).

This category of forest owners rarely calls for radical shifts in policy orientations and orders of priority. Most of them strongly support the post-WWII industrial forestry model based on wood economy that is notably convergent with their own objectives. They assess their performance based on economic criteria and maximization of profit, since marketable timber represents a large portion of their income. They assume strong connections with the forest industrialists and service providers with whom they regularly sign wood supply contracts. They also share the same language and rhetoric arguments, such as the notions of "*profitability*", "*productivity gains*", "*costs rationalization*", etc. This type of forest owners also pays attention to new markets including wood energy biomass, but in the form of transformed and marketable products (pellets, chips, densified wood logs). Non-forest wood products such as mushroom picking, alternative tourism, or hunting are sometimes marketed, although they do not generate the greatest amount of revenue. More innovative than other forest owners, they use the latest technological innovations such as genetically-selected plants, fertilization, GIS, and mechanized harvesting.

While this profile of forest owners cannot ignore environmental issues, they have mixed feelings about environmental regulations. They have their own environmental ethos and are not always only pure maximalists. However, these forest owners also consider that environmental considerations must not hamper economic profitability. This is one fundamental way in which they are different from all others types of owner.

A sub-profile should also be mentioned: the “subsidies-oriented forest owner”. At first sight, this kind of forest owner is not really interested in high-quality timber production, since planting trees for them is simply a means of earning more money than with farming. However, while their current behaviour is logical with short-term objectives, the potential lack of long-term income is a continual source of worry – some of them stated that they are afraid of “*losing [their] future pension*”. It is therefore difficult to definitively label this sub-group as “subsidy hunters”, because they may change their attitudes towards forestry in the future.

The “satisfiers”: tradition-oriented forest owners (T2)

These forest owners are labelled as “*traditionalist forest owner*”, “*household forest owner*”, or “*family forest owner*”. In many cases, they have inherited small or medium scale forest property (10 to 100 ha). As part-time forest owners, their main source of income does not come from forest products, but from other unrelated professions. As with the previous type, they are members of forest organizations, but do not assume any elective responsibilities.

Their main objective is to produce timber not to maximize profit but to cover household needs and extra expenses. A bit far from a pure logic of maximization, they rarely take time to calculate the return on investments, and profits are therefore lower in this group, with some forest owners and managers probably recording losses. Since profitability is rarely their main concern, they are not overly interested in marketing their wood. They simply wish to sell wood at a fair price, to cover household needs or to build up a “nest egg”. This mentality explains why some of them keep their trees well beyond the point at which they reach optimum value.

Despite a formal membership, forest owners belonging to a sub-type T2a still rely more on personal communication to make their decision. The limited influence of formal advisory networks is partly due to their wishing to remain independent. They are more geared towards local or family networks within which they develop informal agreements. We can see the strength of social norms that partly dictate their attitude through their sensitivity to the opinions of their peers and neighbours. Most of them also claim to maintain the “trusted” traditional and technical know-how they acquired from their predecessors (parents and grandparents). The structural influence of primary socialization often has a significant effect on this group, as it strongly frames their interpretation of present forest management practices. Their trust in the traditional system of beliefs is reinforced by routines, codified rules, norms, customary rights, and also reciprocal surveillance. All of these considerations lead this profile of forest owners to avoid management activities recognisable by non-forest social groups as damaging the forest (i.e. large clear-cutting).

The sub-type T2b can be distinguished by a weaker participation in social forestry networks. The oldest could have been active members in the past but there are now overwhelmed by new generations. The youngest can also be isolated, as they lack personal contact with other members, especially highly centralized organisations such as forest cooperatives or forest owners’ associations. The more the wood purchaser acts as an exclusive adviser, the more the T2b forest owners are influenced. If this personal relationship is particularly advantageous to the buyer in question, it may isolate this kind of forest owner from the rest of the community.

As described previously, T2 forest owners aim to earn a minimum benefit but from different products. The T2a sub-group focuses on timber production which remains the most important source of direct incomes. They are involved in the timber market, as they provide wood from time to time. The sub-type T2b also produces timber but they are mainly interested in non-wood forest products (NWFP) for personal use, or sometimes to diversify their sources of income and to spread their financial risks. In some study case areas, NWFP like hunting and picking are a significant source of income. Other additional sources of diversification come from recreational activities and traditional firewood marketing. Some owners in this group even consider their forest as a ‘*fuelwood factory*’. The use of the word “*factory*” would tend to indicate owner managing their forests consciously and sustainably with the aim of making a living from firewood - supplying their neighbours, family members, members of rural communities, and

very local markets. While some figures exist, it is still difficult to assess the financial benefit of NWFP as it might occur in the context of a grey economy.

For this type of ownership, nature protection is seen as state or EU interference (e.g. Natura 2000) not often relevant on their own property. Suspicious of environmentalists' discourse, they make a distinction between "remarkable biodiversity" (seen as a major concern for environmental NGOs but not for forest owners) and "ordinary biodiversity", which they believe is maintained thanks to their daily forest management practices. Most of these forest owners do not understand why coercive environmental policies are imposed, as they consider themselves the main defenders of forest biodiversity. Despite this wariness, they cooperate with environmental NGO and try to increase biodiversity (deadwood conservation, diversification of tree species) on some dedicated and often less fertile places (river banks, peat bogs, rocky areas, etc.).

The "passives": forest owner outsiders (T3)

This group of forest owner profiles includes "passive owners or outsiders", "ad hoc owners", and "disinterested forest owners". They generally own very small-scale property, and often consist of older members of the forest community. While these forest owners have more spare time due to being retired, they do not have sufficient financial and physical capacities to intensively manage their forest. They are not members of any professional forestry network and have little or no contact with specific public bodies competent in forestry. Due to this isolation, they often ignore innovations or are dubious about them. Smaller forest owners also indicated that they often use their own (somewhat outdated) forest machinery. Some of them may have inheritance problems (jointly-held property with no designated beneficiary) that hamper daily management practices and the profitability of forestry operations.

Among this type of ownership, some forest owners are qualified as "ad hoc owners" since they acquired small woodlots by chance (inherited) or as a result of the restitution process engaged in former eastern-bloc countries since 1989. While they do not care much about their woodlots, not all of them are totally "forest illiterate". They only carry out some activities on an ad hoc basis (to provide firewood for household needs, to avoid further losses of value due to pest damage, etc.). Some of them also consider forests to be a "burdensome heritage" as they do not know what to do with the forest they inherited and how to sell it at a fair price. Another form of status quo is linked to afforestation schemes: farmers hire a forestry consultant for afforestation and the establishment of the plantation. Although limited maintenance and thinnings are required 20 years later, some farmers admit "to closing the gate" once the forest is established and never stepping inside.

T3 forest owners are often more interested in non-wood products (game, mushroom, scenery, wood fuel, medicinal herbs) than high quality timber. They do not strive for technical excellence, nor do they aim to achieve maximum profit. In some case study areas, the main aim of these small-scale forest owners is to provide enough fuel wood for their households, but not to develop commercial exchange. They often ignore forestry issues and environmental concerns, and admit letting natural afforestation invade forest areas referring to these areas as "wasteland" or "wild boar refuges". Finally this forest owners' type are not really upset by the final outcomes of forest management, or by the social rules laid down by the local forest community. While they are rarely engaged in communicative actions, they finally make their decision by default.

The "environmentalists": close-to-nature oriented forest owners (T4)

These "forest environmentalists", "forest lovers", "nature oriented forest owner", "biodiversity maintainer", and "alternative green values forest owners" structure their practices and beliefs around the notion of close-to-nature forestry.

The sub profile T4a is active forest owners who act both in logic of cognition and practice. While they pay lot of attention to advances in ecological sciences, they confront these results

with their own experiences in the field, refusing to take for granted every kind of technological advances. As their forestry model seems to be misaligned with standards, they tend to be reluctant to others group of forest owners and, often prefer to sympathize with alternative forestry networks such as Pro Silva and environmental NGOs. In fact, some of them are even leaders or creators of these organisations. They wish to earn their living from forestry as the “economy-oriented forest owners”, while remaining in harmony with biological cycles and adopting technologies with lesser impacts on the environment. True to their principles of ‘close-to-nature forestry’, the members of this group optimize their production by maintaining a natural balance between all parts of the forest ecosystem. To reinforce the economic dimension which is seen as a key factor for the credibility of close-to-nature forestry models, T4a forest owners suggest diversifying tree species and limiting the most expensive forest operations such as ploughing, artificial regeneration, and pruning. Regarding biodiversity, they consider it an ally, and a mean to make their forest more resilient, productive, and profitable. For them, searching for a natural balance between forest components could in the long term save more money than trying to artificially control every emerging pest. In several case studies, these forest owners adopt continuous cover forestry, mixing trees in the forest stands, and stimulating biodiversity in the ecosystem. They believe that the concentration and minimization of natural spaces in small reserves is insufficient to preserve ecosystem functioning. Despite a biocentric approach, they refuse the “doing nothing” attitude, as they consider it leads to lower biodiversity.

Conversely, sub profile T4b is more passive. They tend their forest and sometimes collect wood for domestic heating. They do not search for economic benefits (in opposition with the type T4a). They are “*hedonists*” and “*hobby forest owners*” who do not want to counteract nature but simply let it take its course. While they develop strong intangible values associated to the “conservation” of forest *sensu lato*, they do not participate actively in nature conservation programmes (IT).

The “multi-functionalists”: multi-objective-oriented public forest owners and managers (T5)

This group T5 comprises the “state forest managers” in particular in the countries where the forests are mainly public or semi-public, the “municipalities’ forest managers”, and the representatives of collective organisations owning forests. They are also called “*multi-objectives owner*” or “*multifunctional forest owner*”.

As full time workers in state forest enterprises and municipalities, forest managers are often well trained and integrated in professional networks at local or regional level. Their sources of information are very diverse, mostly formal and official. As representatives of a public authority, State forest managers promote and implement forest policies decided at a regional or national level. During interviews, they delivered the official message of their organisation and systematically referred to multifunctionality and sustainable forest management as guidelines of their daily practices. However, they also noticed their belonging to a driven-market society and emphasized the importance of timber as a “key resource” from the budget balance of their organizations. Beyond official messages, decision making for public forest managers is often complicated as they are under the scrutiny of a vast range of forest stakeholders who feel legitimate to express their opinion on public properties. Pragmatically, they have to balance and combine various and opposite injunctions (short term profitability and long-term sustainability, respect of environmental standards, satisfaction of social demands, etc.).

While the T1 forest owners’ decision making is mainly oriented by the vitality of the market and wood prices, public forest owners often quote ecological factors and “state of the forest” as the important factors to orientate forest management. For this reason, some State forest managers are not convinced by new economic orientations and intensive models introduced by recent forest policies reforms and share the same feeling of schizophrenia when they face contradictory slogans (“to produce more and to protect better”). They sometimes complains about contradictory and detrimental requirements and about the financial pressure coming from public authorities which sometimes consider public forest as a tool to “pay the state budget”

and to make up the deficit. Although they belong to the system, some state forest managers mention bureaucracy as a main problem.

State forest managers are sometimes described as more inflexible in their opinion, as they develop a strong professional ideology and rather rigid code of conduct within the hierarchical system of state administration. This creates a strong common perception of what is “appropriate” in terms on forest management. But since two decades, they also are more perceptive to forest policies changes: less “command and control” and mandatory rules, more voluntary agreement as certification, more public debate, etc. This paradigmatic change is not obvious for the oldest foresters who sometimes deplore the softening of binding force of forest management plans as well as the participation of the lay public to forest management.

Table 1 is showing a summary of the different types of forest owners as found in our research.

Table 1: Types of forest owners and forest managers in Europe (Sotirov et al. 2014)

Forest Owner Types Categories	Type 1: Economic	Type 2: Traditional	Type 3: Passive	Type 4: Close-to-nature	Type 5: Multi-objective
General description	Forest owners and managers who use the forest primarily for monetary rewards (e.g. maximises net present value) according to a well-defined forest management plan. Main benefits from timber production, including fuel-wood, but some benefits also from non-wood products (e.g., hunting picking, recreation)	Forest owners and managers who apply traditional knowledge and routines of forest management without a well-defined forest management plan. Main objectives is to produce timber not for maximizing profit but for household needs (fuel-wood) and local commercial use, and extra expenses; Forest seen as a saving bank, standing capital to be used sporadically only when needed	Forest owners and managers who do not invest in the forest and who explore the forest only occasionally. They only carry out some activities on an ad hoc basis (households needs or to avoid further losses of value due to pest damages), forest as a burdensome heritage. No or few contact with specific public bodies competent in forestry	Forest owners and managers who seek to enhance non-wood and non-economic objectives provided by forest ecosystems. They are interested in ecological objectives such as protection and enhancement of forest naturalness, biodiversity, resilience, climate regulation. They “garden” their forest. Some not want to interact with nature and let natural processes continue without intervention; Others want to earn their living from forestry but in respect with biological cycles	Forest owners and managers who maximise the provision of the whole set of forest ecosystem goods and services (timber, recreation, biodiversity etc.) They are more prone to change management direction over time than other forest owners groups. Well integrated in professional network and institutions
Country examples / regional labels	“Businessman (LT)”, a “Forest entrepreneur” (FR, SE); a “Large-scale forest owner” (GER), “Forest farmer” (GER, IRL)	“Traditionalist forest owner” (FR), “Family forest owner” (LT, SE), “multi-objectives owners” (IT)	“Hedonist”, “Hobby forest owners”, “Urban forest owners” (GER); “Passive outsider” (FR), “Ad hoc owner” (LT), “Neglecting famers (IRL), “Disinterested forest owner” (IT)	“Forest environmentalist” (FR), “A forest lover” (LT), “No management forest owner” (GER)	“State forest managers”, “Public forest managers”

Forest Owner Types Categories	Type 1: Economic	Type 2: Traditional	Type 3: Passive	Type 4: Close-to-nature	Type 5: Multi-objective
Property characteristics (trends) and social background	Mainly private owner but also some public forest managers Large scale property	Small or medium scale property Integrated in local community (neighbours, family, local forest group)	Mainly private forest owners with urban lifestyle Small scale property (issues of fragmented ownership)	Small to medium-scale property Public owners, private owners and environmental groups as forest owners	Large-scale forest managers, state property or municipalities property

4. Distribution of forest owner types in Europe

Figure 1 and 2 are showing the share of forest owner types across and within each of the 20 case studies in 10 countries in Europe.

These results point to the fact that the most prevalent categories are the 'Economic' and the 'Multi-objective' types of forest owners and forest managers. On the one hand, these findings confirm the importance of economic objectives (e.g., timber production and supply of wood products) as drivers of forest management. On the other hand, the importance of the widespread motivation of forest owners who seek to balance timber production and related forest ecosystem services (biodiversity, recreation, etc.) in multiple objective management planning contexts and approaches is also obvious. The third most pervasive ownership category is the 'close-to-nature' forest owners, which was found to be active rather than passive. Both, the categories of 'passive' and 'traditional' forest owners were found in about half of the case studies.

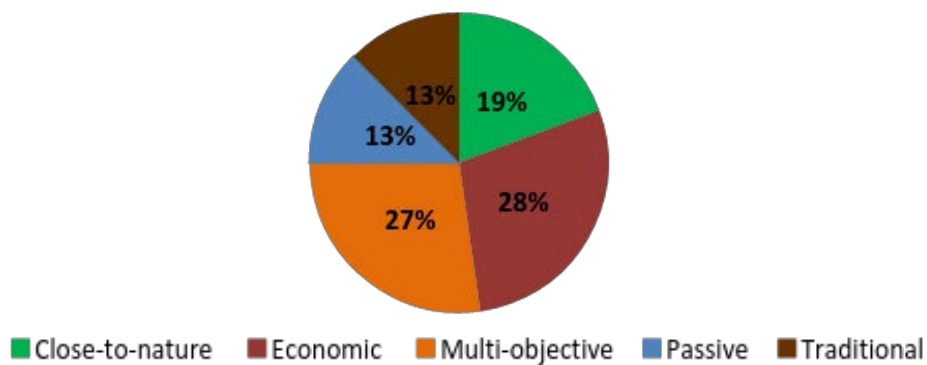


Figure 1: Share of forest owner types across 20 case studies in 10 countries in Europe (own figure based on Sotirov et al. 2014)

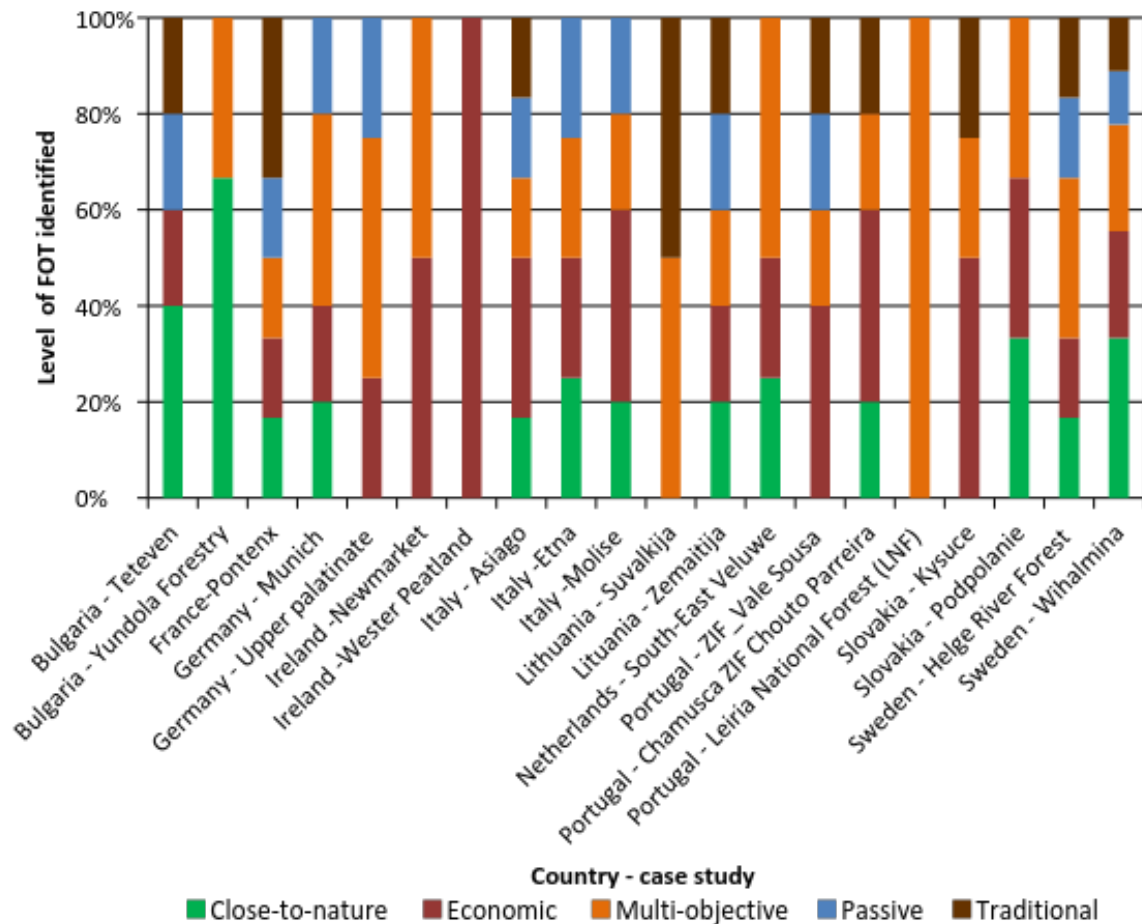


Figure 2: Share of forest owner types in each of the 20 case studies in 10 countries in Europe (Own figure, based on Sotirov et al. 2014)

Discussion

As discussed above, we could derive a set of forest owner types and characterize them along several defining features (e.g., objectives, values/beliefs, socio-economic parameters). Because of the complex nature of owner-forest relationships, typologies can only capture the most salient motivations for ownership. In spite of this irreducible complexity, our explanatory analysis shows that forest owners' population might be structured around five ideal types. However this typology is both stable and changing. To paraphrase Norton (2012), no descriptive disciplinary model or expert system can embody all of the variables and data necessary to understand, predict, and control the functioning of the dynamic system within which forest owners struggle with complex problems.

On one hand, forest owners' types are stable because their attitudes towards structural factors strongly frame, determine, and orientate their daily practices. While forest owners could theoretically act only out of self-interest, they often behave in tune with pre-existing knowledge, by respect for a system of values, beliefs and norms defined inside the networks they belong to. This respect of the pre-defined common rules partly explains why forest owners could be suspicious of other systems of beliefs put forward by external producers of knowledge and norms (environmentalists, scientists, and governmental agencies). Their trust in traditional systems of beliefs is reinforced by routines, codified rules, norms and customary rights. These tacit rules and deeply-anchored knowledge change only gradually and are much more impervious to deliberate policies (North, 1990). While the internalization of these social norms and of appropriate behaviours makes easier forest owners' choices, it also tends to keep the less educated and passive forest owners in their place and under the internal policing of others members and forest professional advisors.

On the other hand, forest owners' types are changing. In this sense, individuals should not be regarded as definitely anchored in a category or a type. While traditional forest owners appreciate stability, security, and conformity; their beliefs, practices, and collective norms can still change, sometimes in a very radical fashion. In times of crisis (due to natural hazards as storms or forest fires, or radical change in public policies), forest owners – even the more traditionalist ones – can become self-conscious and critical of current rules. In this context, values hierarchy that underlies norms legitimating may be discussed and reorganized as 'environmentalist' forest owners do by adopting logic of very active communication through social networks. Additionally, time and path of life also transform individual's logic. Being very active in his youth, an "optimizer" could become more traditionalist and entrenched in his certainty, and sometimes "passive" in the latter years. On the opposite, new forest owner, originally passive, may become more active as soon as he/she inherits. Other transition also happens after a critical event or a period of reflexivity: some "optimizers" convert to close-to-nature forestry when they realize that a silvicultural model could also be profitable and socially more acceptable.

Our results also show that logics underpinning the behaviours of forest owners and forest managers are not exclusive. Although some individuals are more inclined to act according to logic of utility, our survey suggests that forest owners' behaviour is not solely based on the highest expected utility, nor is it confined to collective rational argumentation. They consider both the consequences and appropriateness of an intended course of action, while remaining subject to a number of rules, norms and collective beliefs (Arts, 2012). As members of formal or informal social networks, they can never totally ignore social rules and act as free-riders in the long-term without being socially or economically penalized. In the same way, forest owners rarely behave with any economic consideration. Even if they are totally out of the economic competition such as passive forest owners, it is difficult for forest owners to be critical towards the economic imperative that prevails in many forest management models. The predominance of economic growth discourse therefore exerts a powerful influence on forest owners' visions of forest management paradigms (Longo and Baker, 2014). This profit oriented discourse also frames environmental problems. As suggested by Longo, ecological modernization framing has become more prevalent than the binary opposition of economy versus environment since forest owners may satisfy their economic expectations, conform to environmental rules, based their decision on the latest scientific advances and test them empirically in the field in the same time.

Conclusions

Based on the results from the policy and socio-economic analysis presented above, several key implications and conclusions for policymaking and research can be identified.

First, despite their different political, socio-economic and ecological circumstances, a similar set of five common types of forest owners and forest managers can be found across a variety of EU countries. Although forest owners and forest managers cooperate with environmental authorities and environmental NGOs on some issues, debates and conflicts between forestry and nature protection groups prevail in most of the European countries under study. The crucial challenge is to balance competing land use interests, particular related to the material use of timber on the one hand, and biodiversity conservation, use of wood for bioenergy, and recreation on the other hand. As a rule, the environmental services of forests (e.g., biodiversity conservation, water and soil protection, etc.) are perceived as being more significant and are more widely acknowledged by the general public than the economic importance of forests (e.g., for timber production). Still, the latter is being emphasized by the forest industry and a great share of (economically-oriented) forest owners and forest managers.

Second, regardless of or precisely because of the existence of a complex and fragmented forest-relevant policy framework in Europe, forest owners' attitudes, practices, motives and values relating to forest and forestry are not guided by strict submission and passive obedience to these rules, but are as diverse as their many socio-economic profiles. One important explanation for that is that across the EU, forest ownership varies from many very small and fragmented private-owned to large scale state-owned forests, and from small family owned

holdings to large estates owned by private companies. And all of these different forest ownership types are mirroring different objectives and socio-economic features.

Third, some behavioural changes can still be identified. For example, some forest owners are progressively taking into account social and environmental issues, and even adopting new business models (such as wood energy, tourism activities, marketing non-wood products, etc.). These examples show that forest owners are neither totally insensitive to EU and national forest-relevant policies nor completely driven by these external factors.

These findings are highly relevant for both forest policymaking and research. In order to properly address the challenges in relation to the different objectives of EU and national forest-related policies, researchers and policymakers need to account for the diverse motivations and objectives of forest owners and managers, as well as the social and economic constraints they work with. In other words, in order to achieve a policy integration, or unity, between forestry and other policy domains, as well as within the forest sector, the diversity of forest owners and forest managers has to be acknowledged and taken into account by policymakers, administrations and stakeholder groups. Only when an “unity” of “diversity” seems to be implementable, an effective implementation of the variety of EU and national policy objectives is more likely.

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