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Participative forest planning: How to obtain knowledge

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Abstract

Aim of study: To develop a methodology to obtain knowledge in public participation processes.

Area of study: Fonsagrada-Os Ancares (Spain), region located in the northern Iberian Peninsula.

Material and methods: This study proposes a new method for generating questionnaire survey in participative forest plan with four stages. The validation of this method is performed in the context of a tactical sub-regional forest plan.

Main results: The questionnaires based on criteria and indicators proved to be effective in obtaining key information for planning. The method used offers tools to reach the consensus on natural resource management, through the knowledge gained by selecting relevant information (preferences, opinions, and expectations) from past, present, and future forest activity, focusing on solutions to conflicts.

Research highlights: The use of appropriate indicators and criteria in the planning phase allows for obtaining knowledge concerning the preferences and future challenges for forest management.

Additional keywords: public participation; rural area; questionnaire survey; consensus; Fonsagrada-Os Ancares; stakeholders.

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Introduction

The comprehensive management of natural resources exerts a great influence from the scientific, technical, and applied perspectives (Brouwer & Van Ek, 2004; Lee, 2006). Currently, it is accepted that a key prerequisite for the sustainable management of natural resources is the involvement of all the stakeholders in decision-making (Niedzialkowski *et al.*, 2012).

There are different methodologies (normative, substantive, and instrumental) for how to approach public participation (Fiorino, 1990; Stirling, 2006; Niedzialkowski *et al.*, 2012) and different considerations with respect to whether it is to be regarded as a means or an end, such as ethical considerations or its use as a management tool (Buchy & Hoverman, 2000). Based on the involvement of the participants, different level of participation can be defined, ranging from the simple delivery of information to self-organization (Arnstein, 1969; Buchy & Hoverman, 2000; Stenseke, 2009). In all cases, as indicated by Lakicevic *et al.* (2014),

introducing public opinion into decision-making continues to be an important problem.

The different perspectives on and objectives of public participation have generated different methodologies and techniques of public participation (Sheppard & Meitner, 2005; Díaz-Balteiro & Romero, 2008; FAO, 2010; Kangas *et al.*, 2010; Bruña-García & Marey-Pérez, 2014; Uhde *et al.*, 2015). These methodologies have a normative or substantive character and have been used as a means in planning activities. According to Kangas & Kangas (2005), there is no method that is universally better or even applicable to all situations. The selection of method requires a consideration of the needs of each case, and different levels of participation require different techniques (Buchy & Hoverman, 2000). Jansson *et al.* (2014) showed that the process of participation in environmental decisions, actions, and management is more efficient when it begins in primary school.

Stirling (2006) indicated that instrumental perspectives are neglected in scientific circles and scarcely

developed in contemporary practice. As the extent of the public participation process increases, from a substantive-instrumental perspective, problems arise that slow its development (Niedzialkowski *et al.*, 2012). The problems detected can be grouped into the following categories: 1) lack of initiative, 2) lack of perspective, and 3) generation of conflict.

Lack of initiative is common in many territories (Herbert-Kijazi & Kant, 2011; Cantiani, 2012; Rodríguez-Darias *et al.*, 2016). Implementing processes with participative planning becomes complex, and it is easier to mobilize the interest of the population for a specific project, in time and space, than it is to define a global strategy at a larger scale (Stenseke, 2009). The perspective of the process is key. Broad scales are less effective (Stenseke, 2009). When the focus is centered on specific areas and adapted to local characteristics, it is more successful (Cantiani, 2012). The results of the study by Tilt *et al.* (2007) on two small townships in western Washington (USA) showed the importance of taking into account local agents. In terms of the collaborative process, authors such as Collier & Scott (2009) indicate the importance of local preferences when overcoming obstacles to participation. Through semi-structured interviews in ten Danish towns, Frøik & Konijnendik (2014) showed how to integrate public participation in green spaces and how this participation is positive for the management of the spaces.

At times, the reckless application of participation generates conflicts (Stenseke, 2009) creating opposition to the participative management model (Sipilä & Tyrväinen, 2005). The main causes of confrontation are the exaggeration of participant expectations (Sipilä & Tyrväinen, 2005), different perceptions of the situation by the groups involved, and the failure to explain the basis for decision-making, yielding undemocratic results (Rauschmayer *et al.*, 2009). Clear negotiation and working rules are required for participation to be effective (Elsasser, 2007).

Currently, public participation should promote the creation of synergies between stakeholders and managers, achieving better integration between the environment, the economy, and society (Diez *et al.*, 2016). The goals should be as follows: 1) generating new information, 2) incorporating all interested parties, and 3) contributing to a public agreement (Primmer & Kyllönen, 2006). To gather the opinions, interests, and expectations of the participants, indicators are used because they help to reduce the complexity of information, maintain scientific standards, and improve communication (Doody *et al.*, 2009). Recently, the joining of criteria and indicators in public participation processes has been developed in the forest sector (Jalilova & Vacik, 2012). In processes with many participants who are distant from each other and with limited time, it is common to use paper

questionnaire survey (Nordström *et al.*, 2010; Herbert-Kijazi & Kant, 2011) or virtual questionnaire survey (Brown & Weber, 2011).

This study proposes a methodology aligned with the objectives proposed by Primmer & Killonen (2006) and is framed within the substantive and instrumental perspective described by Fiorino (1990). Questionnaire survey was generated through the selection of basic indicators for the future management that will be the object of evaluation by the local population in an understandable language and adapted to each stakeholder. The validation of the method was performed in the context of a tactical sub-regional forest plan.

Material and methods

Area of study

The region of Fonsagrada-Os Ancares (Fig. 1) is located in the eastern region of Galicia (in the northwestern region of the Iberian Peninsula). It has a surface area of 1,728 km². This area is characterized by the presence of small forest landowners (Marey-Pérez & Rodríguez-Vicente, 2008; Rodríguez-Vicente & Marey-Pérez 2010), agricultural enterprises (Álvarez-López *et al.*, 2008; Riveiro-Valiño *et al.*, 2009), and a mosaic of towns, cultivated land, and forests (Díaz-Varela *et al.*, 2009). Starting in the year 2004, environmental protection measures have been implemented; currently, they cover 40.3% of the land surface (Fig. 2), with an expected increase in coverage in the coming years (Marey-Pérez *et al.*, 2012).

The main environmental and forest problem in the region is forest fires (Fuentes-Santos *et al.*, 2013). Between 1991 and 2008, 4,764 forest fires were recorded in the region, affecting a total land surface of 19,776 ha. The majority of the recorded fires were caused by human activities, and most were determined to be intentional fires (87%), burning a total of 15,398 ha (Fuentes-Santos *et al.*, 2013).

In summary, there are three problems indicated in the introduction for the development of participative processes: (i) there is a lack of initiative due to the dispersion and mean age of the population; (ii) there is a lack of perspective as a result of the experience of applying policies that are removed from the local reality; (iii) there are conflicts due to the implementation of natural protection measures and the history of fires.

Methods

Figure 3 shows the general outline of the process. Initially, the present situation was conceptualized through technical and informational documents. Future

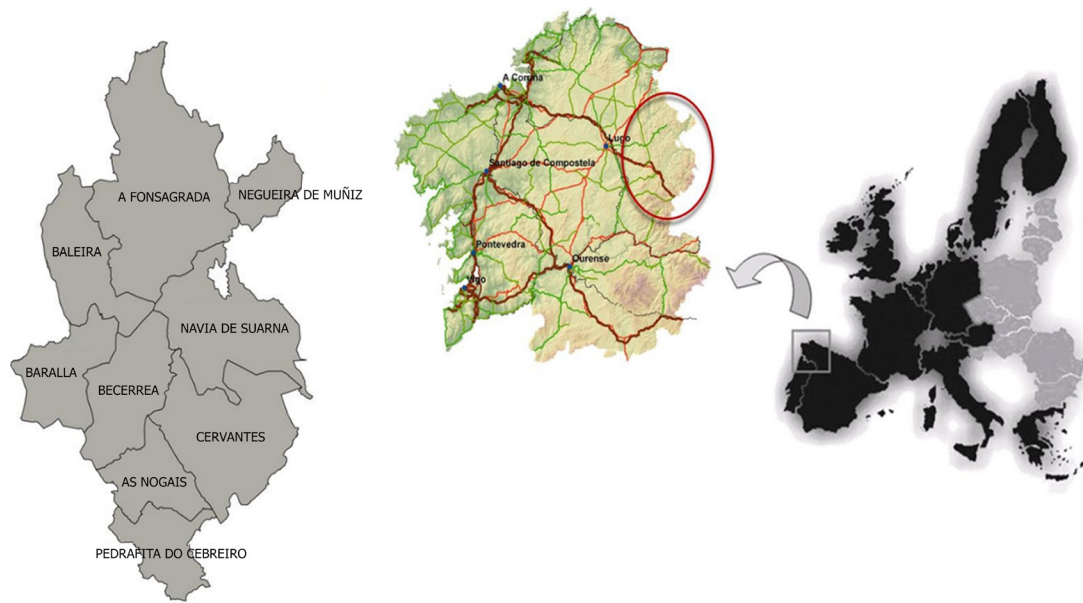


Figure 1. Situation of the Fonsagrada-Ancres forest district.

transformation needs to be discussed and defined by the stakeholders, and the mechanism that makes this process work is formed by the criteria and indicators that bring together the present, public participation, and the future.

The planning of natural resources has a subjective component in terms of the demands of society (Mendoza & Martins, 2006; Ananda & Herath, 2009). The objectifying process required for the development of management plans requires a process to interpret these demands. In the case of public participation, the first phase is the appropriate selection of representative individuals and groups (Elsasser, 2007; Nordström *et al.*, 2010; Bruña-García & Marey-Pérez, 2014; Lakicevic *et al.*, 2014). In the second phase, fundamental items are selected for management organization, on which local community must reach a consensus (Booth & Halseth, 2011). One of the greatest difficulties of this process lies in achieving the necessary communication to go from the subjective to the objective, with a standard method being a method that reduces complexity and improves communication by maintaining scientific objectivity and using indicators (Doody *et al.*, 2009). Finally, it is necessary to gather all the diversity of options, given the necessity of process flexibility.

Nordström *et al.* (2010) noted that questionnaire survey is a method used to gather information. Herbert-Kijazi & Kant (2011) considered it valid for obtaining the preferences of stakeholders, especially in relation to substantive and instrumental work (Fiorino, 1990). It becomes necessary to adapt the questionnaire survey to obtain information that applies to political and

technical decisions (Doody *et al.*, 2009). As successful examples, Jalilova *et al.* (2012), using questionnaire survey administered to a local population, validated a set of criteria and indicators developed with public participation. Doody *et al.* (2009) used the Q-method for indicator selection. Coulibaly-Lingani *et al.* (2011) started with a series of indicators and, through questionnaire survey, obtained information on the preferences, opinions, and expectations of a considerable number of participants.

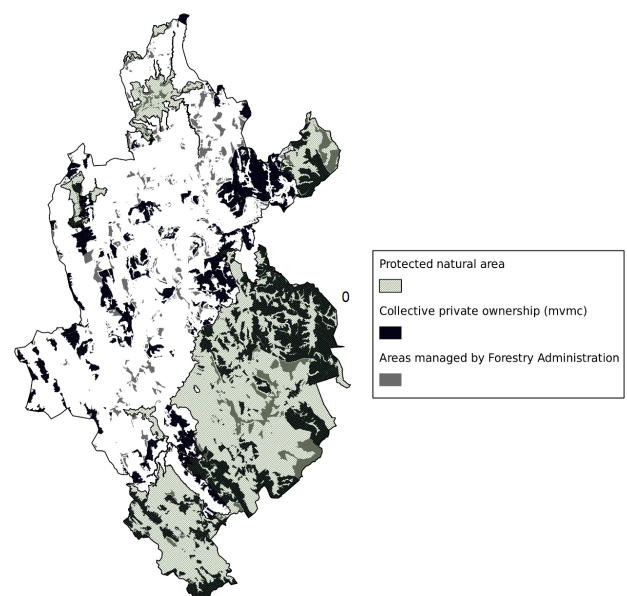


Figure 2. Distribution of protected spaces and forest properties.

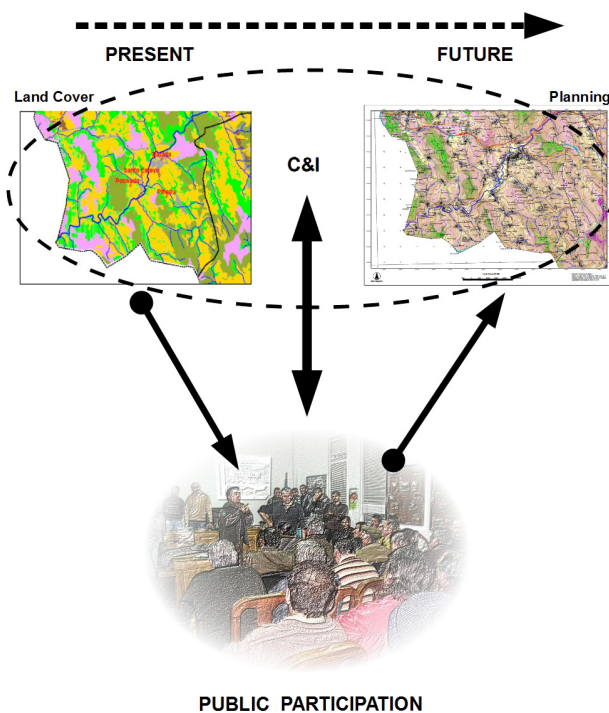


Figure 3. Process of participative planning using criteria and indicators.

The methodology used in this study had four stages. In the first stage (A), the criteria and indicators to be used were selected. It was important that they were internationally recognized (Castañeda *et al.*, 2001), allowing comparison of results with other places and periods (Hickey *et al.*, 2007). In the second stage (B), indicators were selected for which the opinion of the population was indispensable (Sheppard & Meitner, 2005) and that allowed following up on sustainable forest management (Hickey *et al.*, 2007). The translation of indicators into questions that are understandable by all participants (Doody *et al.*, 2009) was performed in the third stage (C), adapting the questionnaire based on the factors that influence the participation of the local population (Coulbaly-Lingani *et al.*, 2011). Finally, in the last stage (D), the specific questions were adapted to each stakeholder (Nordström *et al.*, 2010; Cantiani, 2012).

Results and discussion

Validation process

A total of 134 valid participants were able to complete the participation process. In the first stage (A), the drafting team, in conjunction with the Regional Forest Administration, selected the pan-European criteria and indicators for sustainable forest management (MCPFE, 2007). In stage (B), 12 of the 27 quantitative and 101 initial descriptive indicators were selected; they were considered essential for obtaining information through public par-

ticipation. In stage (C) a total of 34 questions were written to provide a response to the selected indicators. Table 1 shows the results of these two stages.

Finally, in stage (D), a total of nine questionnaire models were designed as a function of the present stakeholders (forest owners, community members, beekeepers, hunters, livestock owners, ecologist groups, forest businesses, people from the administration, and other collective groups with links to the forest sector). Figure 4 shows the general outline of the questionnaire, which was composed of 125 questions and structured into four blocks: profile, opinion, specific problems, and characteristics of their activity. The opinion and specific problem blocks were common for all the models.

The cost of the process was 250 h of technical personnel. This total corresponds to the preparation of the questionnaire survey (80 h), their implementation (50 h), and 120 h for the analysis of the answers. In terms of surface percentages, the cost corresponds to 0.14 h/km² of technical personnel and 1.85 h of technical personnel for each individual who completed the questionnaire. Taking into account the contribution of Sipilä & Tyrväinen (2005), planned participation requires a greater initial investment but improves the quality of the process and may lead to lower costs in the plan execution phase.

Results of administering the questionnaire survey on forest planning

Figure 5 shows the distribution by stakeholders and territories of the participants in the process. It is evident that the main stakeholders were present in all the townships. With respect to the age of the participants, age varied from 22 to 82 years, with a predominance of participants being older than 65 years old. Regarding

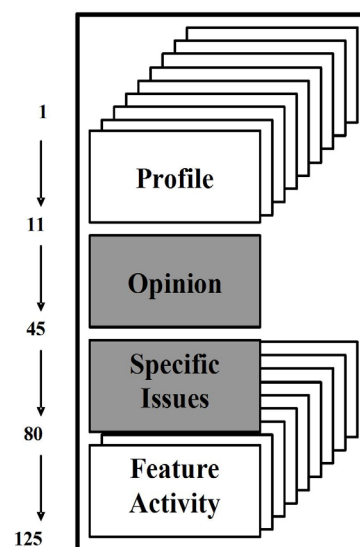


Figure 4. Outline of the questionnaire models.

Table 1. Conversion of criteria and indicators selected in questions

Criterion	Indicator	Question No.	Question
1	11	111	Do you believe that the existing forest land area is adequate?
		12	121 Can re-population campaigns be expanded with rapid growth species? 122 Can re-population campaigns be expanded with slow growth species?
	13	131	Is it necessary to diversify forest structure?
		132	One of the main problems is fragmentation of the forestland surface; evaluate all possible solutions.
2	24	241	Evaluate the following causes of deterioration of your wooded area.
		242	When your wooded area suffers significant damage from snow, what do you do?
		243	When your wooded area suffers significant damage from wind, what do you do?
		244	When your wooded area suffers significant damage from drought, what do you do?
		245	When your wooded area suffers significant damage from lightning, what do you do?
		246	When your wooded area suffers significant damage due to fauna, what do you do?
		247	When your wooded area suffers significant damage from fire, what do you do?
		248	When your wooded area suffers significant damage from freezing temperatures, what do you do?
		249	When your wooded area suffers significant damage from plagues/disease, what do you do?
		2410	Does your investment in the forest depend on the risk of fire?
		2411	To more effectively battle fires, the following is needed...
3	35	351	Did you consider planned forest management important?
		352	Did you consider that the forest should be managed by the Administration?
		353	You consider that the forest should be managed by the Administration because...
		354	You consider that the forest should NOT be managed by the Administration because...
4	41	411	How do you evaluate the mixing of species in plantations?
		42	421 Evaluate the main causes of failure in re-population campaigns.
		43	431 How do you consider that the following tree formations should or should not be linked/grouped with the Administration?
		49	491 Evaluate the Declaration of Natural Space/Protected areas.
		492	You think that the Declaration of Natural Space/Protection area is negative, and the causes are . .
6	64	493	You think that the Declaration of Natural Space/Protection area is positive, and the causes are . .
		641	Did you request subsidies for your activities in the last 10 years?
		642	Evaluate the help allocated to your activities by the Administration.
		643	List in order of importance the possible problems of requesting help.
		644	List in order the reasons for not requesting help.
		645	List in order the following actions to manage the forests.
		646	Looking to the future, evaluate the following aspects in which the Administration should invest in the forests.
	65	651	Working in the forest in comparison to other work
	610	6101	From the landscape point of view, evaluate the vegetation formations present in the area

Shadowed: questions referring to indicators detailed in the results

gender, it stands out that 94% were men. As is the case in other territories (Atmiş *et al.*, 2007), cultural issues explain the low female representation. Regarding educational level, 24% of participants had university degrees, while 23% had a high school education and 53% have a primary education.

As a sample of the applied methodology, we selected an answer for each of the criteria, which also appear shaded in Table 1.

— *Do you believe that the existing forest surface is adequate?* (111). A total of 68% of the participants

state that they slightly agree, agree, or strongly agree (Fig. 6). The answer indicated that there was no interest in expanding the forested land surface. This fact is juxtaposed against forest planning as it has traditionally been conducted to date (Marey-Pérez & Rodríguez-Vicente, 2008), in which the main interest of the Forest Administration has been to increase the forest surface by repopulating pastures or scrubs against the wishes of the local community, generating conflicts (Gómez-Vázquez *et al.*, 2009; Marey-Pérez *et al.*, 2010). Authors such as

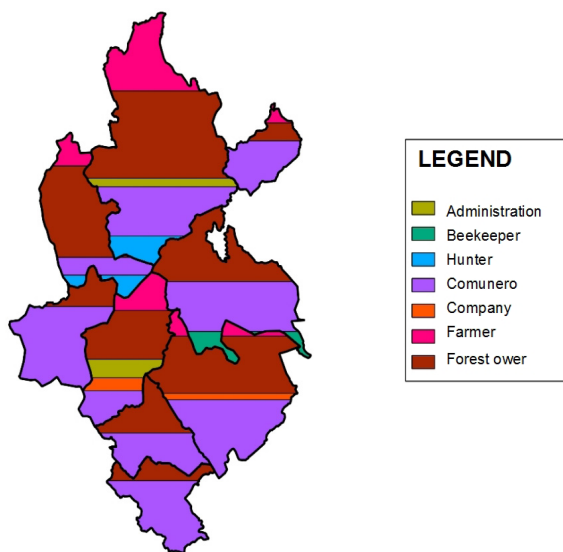


Figure 5. Regional and sectorial representation of those surveyed. Comunero=communal owner.

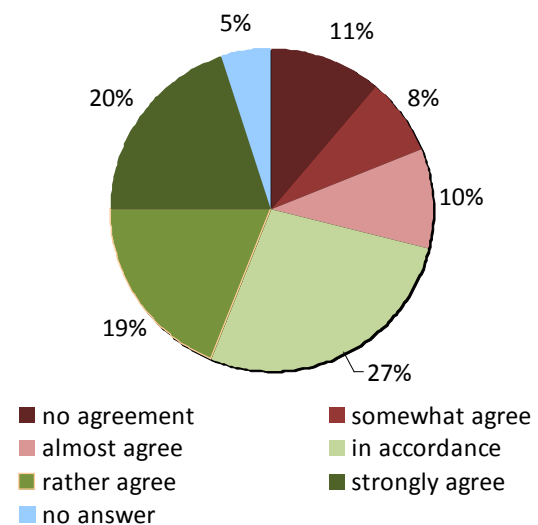


Figure 6. Percentage of answers to question 111

Gundersen & Frivold (2008) obtained similar results in Nordic societies by using questionnaire survey.

— *What is required to battle fires more effectively?* (2411). The measure with the highest score is that of information, education, and citizen awareness (see Fig. 7). This result is juxtaposed against the actions that have been undertaken to prevent fires to date, which have centered on creating infrastructure and providing fire extinguishing equipment (Xunta de Galicia, 2016). As indicated, the greatest environmental problem in the study region is intentional forest fires. Marey-Pérez *et al.* (2010) stated that the causes of such fires can be found in property conflicts and land management issues. Other authors (Díaz-Varela *et al.*, 2009; Moreira *et al.*, 2011) noted conflicts caused by frequent changes in land use. The participants are knowledgeable on the cause

of the problem and indicate that the solution is based on education and awareness in the local population (Cantiani, 2012), the search for new methods to solve the problem with technology (Borchers, 2005) or land management (McCaffrey *et al.*, 2011), and in education and the behavior of the population in the face of fire risks (Brenkert-Smith *et al.*, 2012) more than greater financial investments in fire extinguishing measures.

— *Do you consider planned forest management important?* (351). A total of 89% of participants were in favor of the planned management of forest resources (Fig. 8). In Spain, there is no tradition regarding the application of multiobjective forest plans (Marey-Pérez & Rodríguez-Vicente, 2008), although there have been plans developed with a single objective, such as battling fires (Galiana *et al.*, 2013), in which no public participation

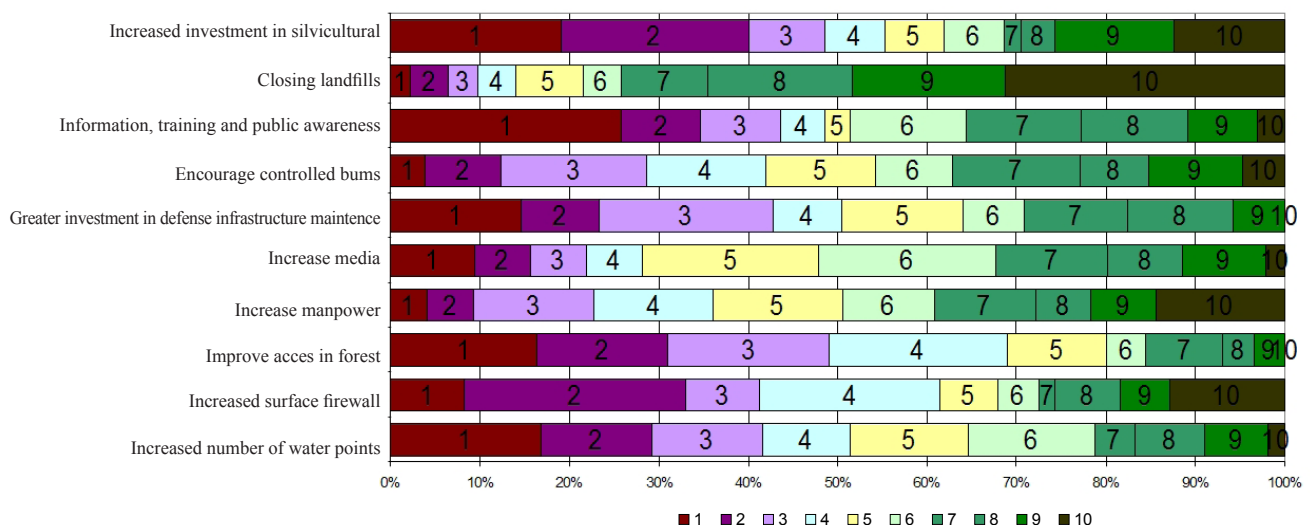


Figure 7. Percentage of answers to question 2411 (1 more effective, 10 less effective)

has been included. The results show that, despite the lack of tradition, stakeholders want to participate in forest planning because they hold that their participation can improve the quality of the results of the plan (Booth & Halseth, 2011) and contribute to improving the quality of life and future of a more empowered rural society (Sipilä & Tyrväinen, 2005).

— *How do you evaluate the declaration of a Natural Space/Protection Area?* (491). A total of 61% of participants gave a negative evaluation of declaring their lands as natural protection areas (Figs. 3 and 9). The declaration of protected areas leads to conflicts with the local population (Jones *et al.*, 2012). The conservation of biodiversity in Europe was defined in Directive 92/43/CEE, which establishes the creation of an ecological network of protected areas: the Natura European Network 2000. The participation of local actors has been positive (Young *et al.*, 2013), but there have also been failures (Apostolopoulou *et al.*, 2012). The reasons for the failures have been the lack of understanding and benefits received through the management plans of these areas (Hirschnitz-Garbers & Stoll-Kleemann, 2011), mainly in regions where the traditional use of the land coexists with different types of property and management (Lockwood, 2010).

The main threat to the areas in the Natura Network 2000 in Spain is forest fires (Velázquez *et al.*, 2010) due to the lack of connection between biodiversity conservation and management based on objectives centered on economic activities (Hoyos *et al.*, 2012). Some parts of the study area were declared protected areas in 2004, without a participation process or an explanation of the consequences for the local population. The property and management of the land have been causes of conflicts that were not previously resolved, provoking an increase in the number of forest fires (Booth & Halseth, 2011).

— *How do you evaluate the most important landscape formations?* (6101). Participants shared similar wishes with respect to having a diversified forest landscape (Fig. 10). This result runs counter to the repopulation activities with monospecific pine planting campaigns incentivized by the Forest Administration (Xunta de Galicia, 2001; Marey-Pérez *et al.*, 2009), in which the landscape resulting from the process was not been considered initially as a decision criterion (Jaraiz-Cabanillas *et al.*, 2013). The result confirms the public's preference for forest landscapes that differ to a large degree from the practices of forest organization (Nielsen *et al.*, 2007). Again, the planning expected by the inhabitants did not coincide with the planning being implemented (Castro *et al.*, 2011), exhibiting a great heterogeneity of responses in terms of what landscape is preferred (Álvarez Martínez *et*

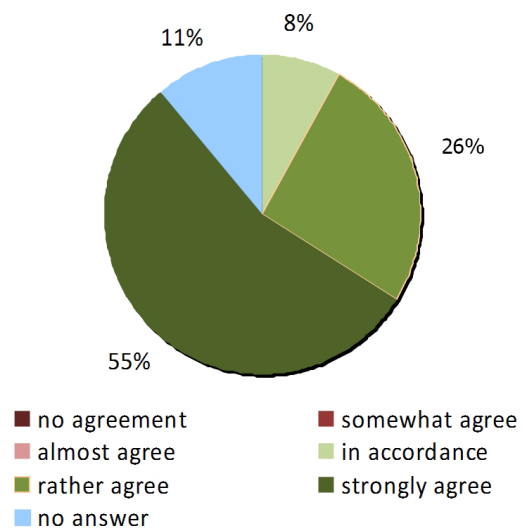


Figure 8. Percentage of answers to question 351.

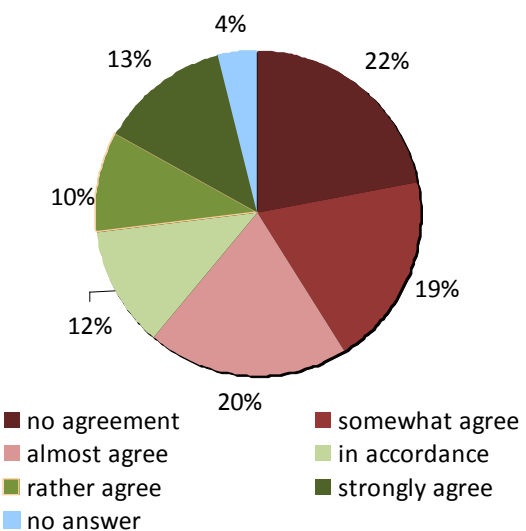


Figure 9. Percentage of answers to question 491.

al., 2011) but with a tendency to place more value on landscapes that bring to mind traditional landscapes (Díaz-Varela *et al.*, 2009) or that combine natural spaces with agricultural activities (Gómez-Limón & Lucio-Fernández, 1999). Social interest insists on diversifying not only the structure but also the composition of species, which is a key element in the design of future forest management planning in the region.

Booth & Halseth (2011) considered a challenge to seek consensus on natural resource management, and Lakicevic *et al.* (2014) noted the difficulty in achieving it. Our methodology offers tools to reach this objective through the knowledge gained by selecting relevant information (preferences, opinions, and expectations) from past, present, and future forest activity, focusing on solutions to conflicts.

It is necessary to have the knowledge of local actors because they are the agents who implement forest

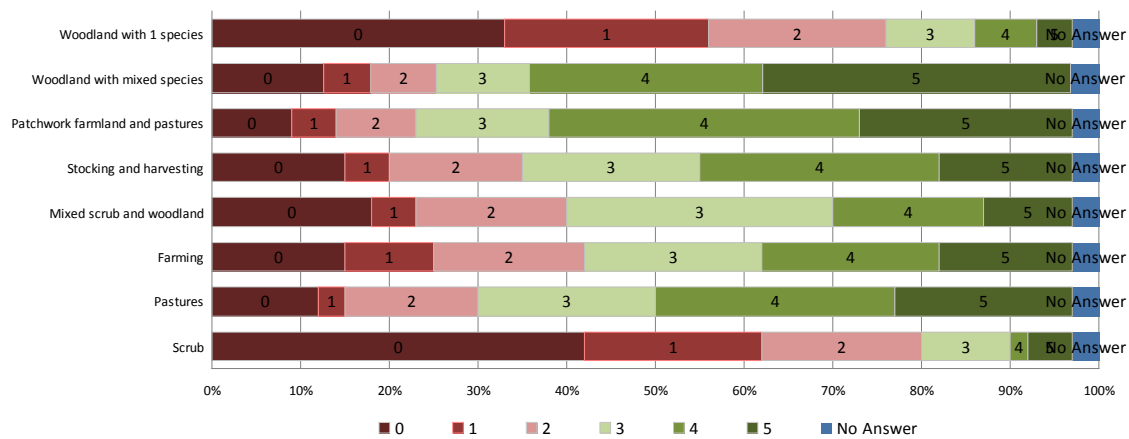


Figure 10. Percentage of answers to question 6101 (0 lower value, 5 higher value).

activity in the territory. Our validation demonstrates that the forest management performed to date did not coincide with the expectations of the local population. Now that this finding is clear, we propose that the technical and political instruments to formulate future management plans must coincide with the preferences of local stakeholders.

The questionnaire survey based on criteria and indicators proved to be effective in obtaining key information for planning. Similarly, the methodology presented and used to generate the questionnaire survey was useful when applying them in rural areas. With a relatively small effort (0.14 h/km² technical personnel), representative results of the area at the regional and sectorial levels and sector were obtained, avoiding greater costs associated with executing the plan. The methodology can be translated to other territories and other societies, always taking into account the local characteristics that will play a role in both selecting the indicators and formulating the questionnaire survey to obtain them.

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