



## Analysis of governance systems applied in multifunctional forest management in selected European mountain regions

### Analýza systémov governancie využívaných pri multifunkčnom manažmente lesov vo vybraných európskych horských oblastiach

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#### Abstract

The objective of this study is to map and analyse governance systems relevant for the implementation of multifunctional mountain forest management in selected European countries. This paper is based on the FP7 research project Advanced multifunctional forest management in European mountain ranges (ARANGE). Current governance systems relevant for the implementation of multifunctional forest management are analysed in seven case study areas: the Iberian Mountains (Spain), Western Alps (France), Eastern Alps (Austria), Dinaric Mountains (Slovenia), Scandinavian Mountains (Sweden), Western Carpathians (Slovakia) and Western Rhodopes (Bulgaria). Qualitative social research methods were applied for data collection. Semi-structured questionnaire was focused on the following elements of governance: participation and stakeholders interactions and inter-sectorial coordination. The results indicate that forest managers share a general perception of multifunctional forest management being focused on preserving or strengthening several forest functions and services including timber production. They believe that current governance systems basically support multifunctional management of mountain forests. The participatory and inter-sectoral processes are playing an important role in multifunctional forest management in selected European mountain regions.

**Keywords:** ecosystem services; inter-sectoral cooperation; forest management planning; environmental policy

#### Abstrakt

Cielom štúdie je zmapovať a analyzovať systémy governancie relevantné pre multifunkčné lesné hospodárstvo vo vybraných horských regiónoch Európy. Tento príspevok vznikol v rámci projektu 7. rámcového programu Zdokonalený multifunkčný manažment lesov v horských regiónoch Európy (ARANGE). Súčasný systémy governancie uplatňované v multifunkčnom obhospodarovaní lesov sme analyzovali v siedmich prípadových štúdiách: Iberské pohorie (Španielsko), Západné Alpy (Francúzsko), Východné Alpy (Rakúsko), Dináre (Slovinsko), Škandinávské vrchy, (Švédsko), Západné Karpaty (Slovensko) a Západné Rodopy (Bulharsko). Použili sme metódy sociologického výskumu. 27 expertov z prípadových štúdií (väčšinou obhospodarovateľov lesov) odpovedalo na 21 pološtruktúrovaných otázok zahŕňajúcich nasledovné prvky governancie: participácia, koordinácia, rozodovanie, zodpovednosť a využitie odborných znalostí. Výsledky poukazujú na skutočnosť, že obhospodarovatelia lesa vo všeobecnosti zdieľajú názor, že multifunkčné obhospodarovanie lesov je zamerané na zachovanie alebo posilnenie viacerých funkcií lesa, vrátane drevoprodukčnej. Uplatňované systémy governancie v zásade podporujú multifunkčné obhospodarovanie horských lesov, ale samotné multifunkčné obhospodarovanie je v jednotlivých prípadoch rozdielne. Tieto rozdiely vychádzajú viac zo špecifických podmienok jednotlivých prípadov, ako z uplatňovaných systémov governancie. Získané výsledky vytvárajú možný základ pre formuláciu a prijatie efektívnych a adekvátnych politických odporúčaní pre multifunkčné obhospodarovanie horských lesov v Európe.

**Kľúčové slová:** ekosystémové služby; inter-sektorová kooperácia; lesníctvo; obhospodarovanie; plánovanie; environmentálna politika

## 1. Introduction

Governance is a multi-faceted concept frequently used in high-level policy discourse (e.g. OECD, World Bank, UNFF, Agenda 21, FLEG), but this approach has been also used in different forest related topics e.g. policy formulation (Hogel et al. 2004; Krott 2008; Giessen & Bocher 2009; Secco et al. 2011), forest certification schemes (Overdevest & Ricken-

bach 2006; Marx & Cuypers 2010), regional social-ecological systems (Lebel et al. 2006), utilization of forest management rights (Ostrom 2005; Agrawal et al. 2008; Bouriaud et al. 2013) or marketing of forest products and services (Robertson, 2004; Mavsar et al. 2008; Ernstson et al. 2010).

More specifically, the concept of adaptive governance systems has been addressed and described in relation to

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practicable multifunctional and sustainable forest management, (e.g. Schmithüsen 2000; Wolf et al. 2006; Cubbage et al. 2007; Mander et al. 2007; Carvalho-Ribeiro et al. 2010; Secco et al. 2013). Adaptive governance becomes specifically complex in mountain regions where beyond the typical long planning horizons and existing risks of natural hazards (avalanches, storms, insects) specific environmental (nature protection) and social characteristics of that area are to be taken into account (e.g. changes in the settlement structure and livelihood patterns, traditional customs in land use).

In this study the governance is understood as an effective way how the multifunctional mountain forest management in case study regions is implemented.

This study is a part of a FP7 research project “Advanced multifunctional forest management in European mountain ranges” (ARANGE, 2012). The ARANGE project builds on seven case study regions in major mountain ranges throughout Europe covering a wide range of forest types, socio-economic conditions and cultural contexts. It seeks to develop and evaluate strategies for their multifunctional management considering risks and uncertainty due to changing climatic and socio-economic conditions (ARANGE, 2012).

In the ARANGE project, the analysis of governance systems serves as a supporting task focusing on the implementation of multifunctional mountain forest management in Europe. Clearly, this paper cannot represent the whole complexity of forest governance. Nevertheless, it offers an insight on the governance approaches in European mountain forests based on the selected case study areas and it can deliver basic information on various elements of governance.

The research hypothesis of this paper is that sustainable multifunctional forest management in European mountain ranges is based on case specific governance systems. Our research is topically related to works addressing governance systems for sustaining the ecosystem services and multifunctional mountain forest management (Glück & Weber 1998; Buttoud et al. 1998, 2002; Glück 2000, 2002; Hogl et al. 2004, 2008) and governance assessment approaches proposed by UNDP (2006, 2009).

The aim of this paper is to present the key elements of current governance systems in selected European mountain ranges using seven case study areas defined in the ARANGE project. Applying a qualitative research approach, it specifically investigates the participation and stakeholder interactions, inter-sectorial coordination, multi-level coordination, decision structures and processes, responsibilities, and the use of expert knowledge.

Specific objectives of the paper are to:

- identify how the stakeholders understand multifunctional forest management;
- identify the importance of different ecosystem services;
- identify the most important sectors involved in governance of multifunctional forests management;
- identify governance instruments used/applied in case study areas;

The paper aim is to identify specific elements of multifunctional mountain forest governance in the selected case study areas.

**Table 1.** Case study areas description (based on ARANGE 2012).

Mountain range	Iberian mountains	Western Alps	Eastern Alps	Dinaric mountains	Scandinavian mountains	Western Carpathians	Western Rhodopes
Country	Spain	France	Austria	Slovenia	Sweden	Slovakia	Bulgaria
Case study name	Montes Valsain	Vercors	Montafon	Sneznik	Vilhelmina	Kozie chrby	Shiroka laka
Total Area [km <sup>2</sup> ]	100	500	75	50	8500	132	92
Forest area [%]	90%	55%	90%	97%	62%	90%	97%
Ownership	public, private	public, private	commons, private	state owned	public, private, church, municipality	church	public, non-industrial, private owner, cooperative
Altitudinal range [m]	1200–1900	560–2270	600–2000	250–1700	300–650	600–1800	700–2000
Main tree species	<i>Pinus sylvestris</i> , <i>Quercus pyrenaica</i>	<i>Picea abies</i> , <i>Abies alba</i> , <i>Fagus sylvatica</i>	<i>Fagus sylvatica</i> , <i>Acer sp.</i> , <i>Abies alba</i> , <i>Picea abies</i>	<i>Fagus sylvatica</i> , <i>Abies alba</i> , <i>Picea abies</i>	<i>Pinus sylvestris</i> L., <i>Picea abies</i> , <i>Betula sp.</i>	<i>Picea abies</i> , <i>Abies alba</i> , <i>Fagus sylvatica</i>	<i>Pinus sylvestris</i> , <i>Pinus nigra</i> , <i>Abies alba</i> , <i>Fagus sylvatica</i> , <i>Picea abies</i>
Ecosystem Services*	TP, CS, NC, REC	TP, BMFE, PF(rockfall), NC	TP, PF (rockfall, avalanches, flooding, erosion), NC, GM	TP, GM, NC, PF(erosion, water retention)	TP, CS, NC, reindeer herding, GM	TP, NC, REC, PF(erosion, water resources)	TP, BMFE, CS, NC, REC, PF(flooding/erosion)

\*TP – timber production, CS – carbon sequestration, NC – nature conservation, REC – recreation, BMFE – biomass for energy, PF – protective function, GM – game management

## 2. Material and Methods

The method applied in this study is a comparative analysis of case study areas (CSAs). The CSAs are representing the mountain ranges in seven European countries: the Iberian Mountains in Spain (Montes Valsain), Western Alps in France (Vercors), Eastern Alps in Austria (Montafon), Dinaric Mountains in Slovenia (Sneznik), Scandinavian Mountains in Sweden (Vilhelmina), Western Carpathians in Slovakia (Kozie chrby) and Western Rhodopes in Bulgaria (Shiroka laka). The selection of CSAs was made so as to represent the most important types of mountain forest ecosystems and the diversity of the environmental management patterns and societal specifics within the EU, including forest ownership, rural development and people's demands on forests. The CSAs are concisely described in this paper, focusing on the aspects relevant to the purposes of the paper, i.e. characteristics related to provisioning of ecosystem services and ownership structure (Table 1).

Methods applied for data collection in the task dealing with governance systems are questionnaires and/or interviews (methodology of qualitative social research). The standardized interview (fill in the online questionnaire) was aiming at describing the local situation and identifying the local specifics of forestry governance in the respective CSAs. The survey respondents (1–8 per CSA) were representatives of local actors including forester owners and/or managers and relevant local forestry administrations (Table 2). To ensure the appropriate formulation of questions and adequate explanation of technical terms, the first version was initially tested as an face to face interview in the Slovakian CSA – Western Carpathians case study (Kozie Chrby) and then commented by the national experts in all CSAs. Most of the questions were close-ended. However, a minor part of the interview consisted of open-ended questions to permit respondents to express their views without constraining them to particular response dimensions. Some closed-ended questions contained additional clarifying sub-items and/or text boxes where complementary information could be provided. There was also the possibility to add any comment at the end of the questionnaire if needed.

**Table 2.** Number of respondents by category.

CSA	Montes Valsain	Vercors	Montafon	Sneznik	Vilhelmina	Kozie chrby	Shiroka laka	Totally
Authority	1	1	0	1	1	0	1	5
Manager	2	1	1	0	4	4	1	13
Owner	1	0	0	0	3	1	2	8
Other expert	0	1	0	0	0	0	0	1
Totally	5	3	1	1	8	5	4	27

This study does not have an ambition to deal with all different governance structures in different socio-cultural backgrounds that might enhance or restrict multifunctional forest management in mountain regions.

In total 21 questions were structured into three parts:

- I. Introduction (specification of the mountain forest types in the focused area, perception or understanding of multi-purpose forest management, objectives, and forest goods, functions and services provided by the particular mountain forests).
- II. Governance systems, in which the following elements of governance were targeted: responsibilities, intersectoral coordination, participation and stakeholders interactions.
- III. Governance instruments – divided into management plans, subsidy mechanisms, tax benefits, penalties, methodological guidance, education and research.

Moreover, the introductory part of the questionnaire covered the fundamental identification items, including the attribution of the respondents to the CSA and identification of the stakeholder group, which they represent.

The empirical material was gathered during the spring 2013. The national experts were requested to ensure the responses from their CSA by communicating with local stakeholders using the *ARANGE Stakeholder interaction platform*, which is a panel of selected actors created in advance in each CSA (ARANGE 2013c). There was a single common version of the questions prepared for all CSAs (in English language), and afterwards it was translated to the native language of respective CSA if necessary.

The respondents had the opportunity to consult their views with other local actors. As a face-to-face interviews with some of the responding stakeholders were conducted in case when interpretation of some technical terms in the national context was needed or when formal and informal decision structures and processes specific to respective CSA needed to be exemplified. The semi-structured questionnaire was prepared and implemented with the help of the Adobe Forms Central application (Adobe Forms Central, 2013). To fill up the online questionnaire took about 20 to 30 minutes. The respondents were encouraged to consult the glossary of terms attached to the questionnaire prior to filling in the questionnaire. All definitions in the glossary originated from a literature review and were generally focused on a common understanding of terminology used in the questionnaire.

The number of acquired responses varied, depending on the local circumstances and ownership structure, ranging from eight replies to a single reply from the respective CSAs. Based on the interviews 27 filled questionnaires in total were gathered from all CSAs (Table 2). Most commonly, the respondents identified themselves as forest managers (50%), there was about 30% of land and/or forest owners, who were often involved in practicing forest management. About 20% of the respondents were representatives of forest authorities or other type of stakeholders.

Data collected in the course of this survey allow using qualitative methods (generalization, comparison and storytelling) for context analysis and interpretation. Comparative cross-tables and Adobe visualization tools to synthesize the research findings were used. Evaluation of the aggregated data enabled reporting and interpretation of the main findings across the CSAs and the main ecosystem services.

### 3. Results

#### 3.1. Conceptualization of multifunctional forest management

A concise understanding of governance and multifunctional forest management in a CSA requires an adequate comprehension of the key terms associated with multifunctional forest management. Multifunctional forest management as understood by the most questionnaire respondents is a management of forests focused on preserving or strengthening several forest functions and services. The respondents also understand that multifunctional forest management supports, besides timber production, also other specific forest functions. However, timber production should not be suppressed in favor of other forest functions, unless some forest functions are concurrent or not compatible with timber production (26 from 27 responders). However, there were differences (among the CSAs as well as within them) in the understanding how multifunctional forest management is being implemented in practice distinguishing functional aggregation and segregation approaches.

In the aggregation approach (functionally integrated forest management), ecosystem services are considered as equal. This perception was accepted by less than a half of the respondents, while it was explicitly disapproved by one third of the respondents. One supportive response from Montes Valsain stated: *“The management of the forest tries to make compatible forest harvesting, cattle grazing with the proper practicing of traditional activities along with the preservation and improvement of the habitat of plants and animals, as well as the needs of the human population.”* However, another respondent from the same region expressed a need to prioritize some ecosystem services, stating *“...multifunctional forest management focuses on developing several forest functions and services, but with some functions or services being of more interest than others. A prioritization of functions is always needed, although difficult to establish at the different management levels”*. However, a response from Vilhelmina illustrates the discrepancy between the theoretical concept of multifunctionality and the implementation: *“Forest functions should perhaps be compatible and definition of functionally integrated forest management sounds fine but is far away from how forestry is working today due to the fact that timber production is very important as a main goal in forestry”*. This last statement alters the understanding of multifunctional forest management towards the segregation approach. The segregation approach (functionally differentiated forest management), which matches the understanding of two thirds of the respondents, results in a *“multifunctional forest management that prioritizes a function, but maintains and strengthens all those functions that are compatible”*.

Other respondents noted difficulties in adopting the definition of multifunctionality identically across different spatial units; evidently, spatial scale determines the applicable management decisions and strategy. This refers to Simoncic & Boncina (2013) who promote the concept of *Priority areas* to provide multiple forest ecosystem services that can help to differentiate priorities, objectives and measures within large forest areas. Also, there were notes of particular respond-

ents about having inherently different priorities in multifunctional forest management. Moreover, a representative of forest authority from France noted a discrepancy between the formal support of multifunctionality and practical behavior: *“As an owner the department is rather a protectionist, but as a subsidy manager, it is production-oriented”*. However, despite some differences in the perception of multifunctionality within a CSA, the perceptions clearly differed among the CSAs than among the respondents from the same region when more than one answer were obtained. These results confirm that functionally differentiated forest management is applicable at a local level (forest management unit or smaller areas), while functional aggregation is the issue of forest management at a higher level (mountain range, forest land). This approach towards ecosystem services is also promoted in land-use planning and management (Fürst et al. 2013a, 2013b).

#### 3.2. Practices of multifunctional forest management

All study regions recognized manifold goods and services being provided by forest ecosystems through active, targeted forest management. With the exception of one respondent from Montes Valsain, timber production was always reported as the main ecosystem service (Fig. 1 and Table 3). Soil/water protection and biodiversity protection were the two next most vital ecosystem services, perceived by the most of respondents across all CSAs. Hunting, recreation and firewood/biomass production were evaluated as secondary or main services in all CSAs. Production of other wood products and non-timber products were labeled mostly as ecosystem services of secondary importance (with the exception of two respondents from Shiroka Laka and one from Vilhelmina). Carbon sink was mostly considered to be of secondary importance and simultaneously as commented by a respondent from Vilhelmina, this service is provided *“indirectly through tree production, but not actively considered”*. Similarly, another respondent from Montes Valsain warned that *“we could tell that we are managing for carbon sequestration but that’s not really true”*. Other important ecosystem services in mountain areas include protection against gravitational and other natural hazards, fishing (angling), and grazing (cattle in Montes Valsain and reindeer husbandry in Vilhelmina).

**Table 3.** The importance of ecosystem services in the case study areas.

Main ES	Main-secondary	Secondary	Case-Specific
Timber production	Hunting and fishing	Other wood products	Animal grazing
Protection ES (soil and water protection, including protection against gravitational and other natural hazards)	Recreation services	Non-wood products	
Protection of biodiversity	Carbon sink		
	Firewood, chips and other energy biomass		

The prioritized ecosystem services (Fig. 1, right) are dominantly, but not always actively supported by forest management. In almost all CSAs, the production of timber,

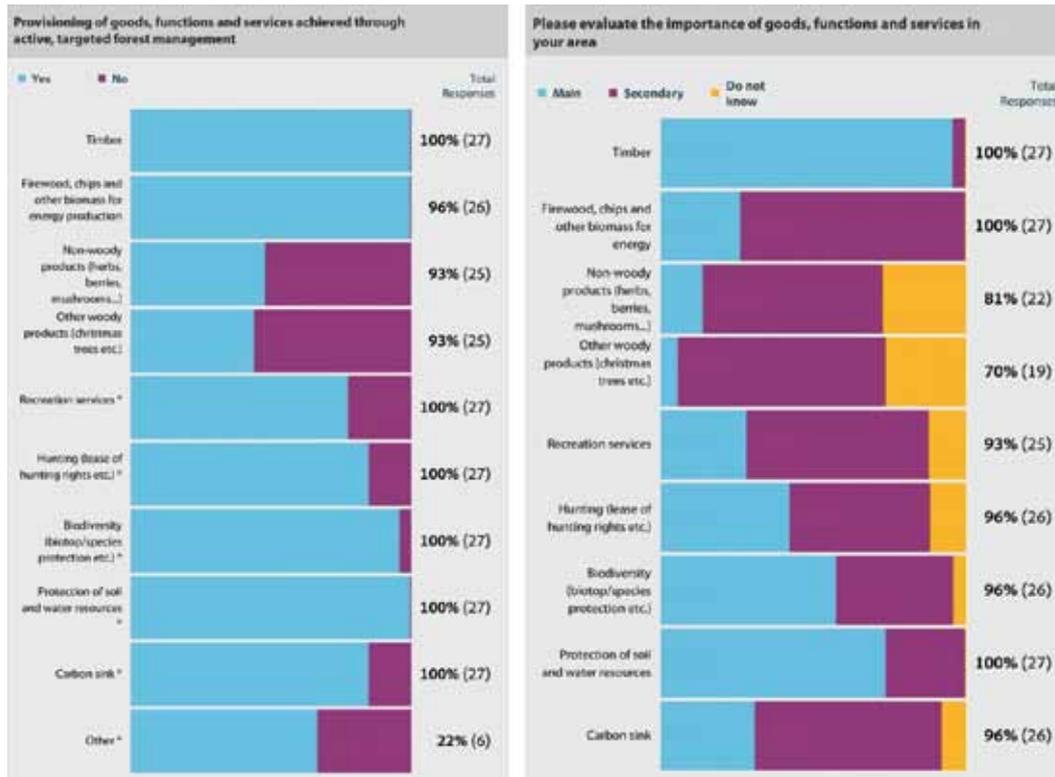


Fig. 1. The provisioning (left) and the perceived importance (right) of goods, functions and services in the case study areas.

biodiversity protection, and the protection of soil and water resources were reported to be sustained through an active forest management (Fig. 1, left).

Hunting and recreation services are also actively supported in all CSAs; however, active measures concerning these services are being explicitly taken only in some CSAs. Moreover, the perception of active/passive measures differed among the respondents from Vilhelmina, Kozie Chrby and Shiroka Laka. Similarly, active measures targeted at the production of other non-wood products range from no support in Montafon and Kozie Chrby to explicit support in Montes Valsain and Sneznik. Active management supporting the animal grazing was reported for Montes Valsain and Vilhelmina.

### 3.3. Governance systems supporting multifunctional forest management

Taking into account the multifunctional value of forests and sustainable management in mountain ranges, we have focused on describing examples of governance systems in the CSAs. Similarly to Høgl et al. (2004), we have found that participatory and inter-sectoral processes are playing an important role in multifunctional forest management.

Generally, the most important sectors involved in governance of multifunctional forest management are forestry sector and nature protection – or similarly defined – environmental sector (Fig. 2). The sectors dealing with water management, regional development, recreation and tourism were reported as somewhat important. According to two thirds of the respondents, the intersectoral cooperation is more or less ensured, although the overlaps between sectors

may occur sometimes. However, all respondents from Kozie Chrby considered the intersectoral cooperation as minimal or not established at all. There is also a persisting presence of conflicting interests (environment vs. forestry, environment vs. agriculture, agriculture vs. forestry etc.) reported from CSAs. Overlaps or conflicts between forestry and nature protection have also been reported for Montes Valsain. Similarly, frequent overlaps between the sectors relevant to forest management were reported from Sweden.

The most important non-governmental organizations and associations contributing to forest governance in CSAs are the professional associations and, to less extent, also the interest associations (Fig. 3). Local action groups are important only in some case CSAs. Among the important

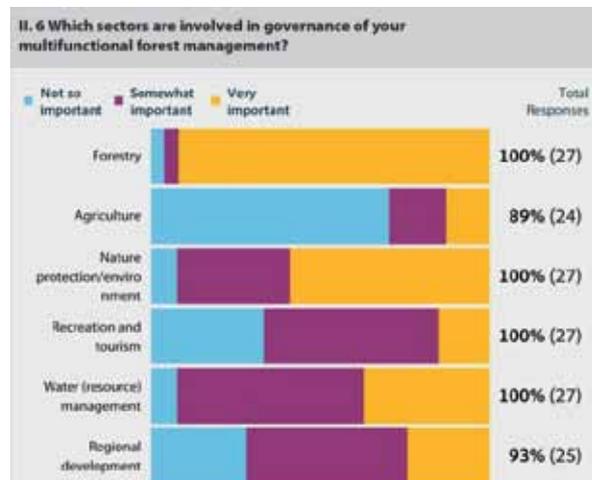


Fig. 2. Sectors involved in forest governance in the case study areas.

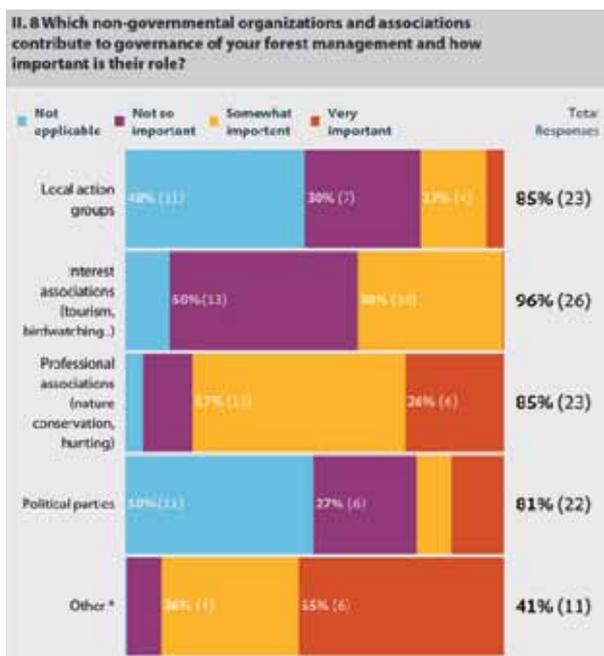


Fig. 3. The assessed contribution of NGOs and associations to governance of forest management in the case study areas.

non-governmental institutions, interest or professional associations, the following examples were provided by the respondents: district (Regional Park) forestry commission in Vercors, forestry chamber in Kozie Chrbty and reindeer husbandry districts and international research organizations in Vilhelmina.

Supervision of multifunctional forest management is ensured mainly by governmental but also by other (yet unspecified) regional, district or local organizations, and in some cases also by non-governmental organizations. Supervision that is relatively important is represented by certification bodies during their audits or inspections. Forest certification standards were agreed to support multifunctional forest management. Most of the forests within the CSAs are certified by either PEFC or FSC. Some non-certified forests within CSAs were reported from Shiroka Laka (90%), Montes Valsain (20%) and Vilhelmina (10%). There was not reported an absence of supervision in CSAs.

State supervision of forests is being undertaken mainly by governmental institutions from forestry sector or by the combination of agriculture and forestry sectors. Two respondents from Montes Valsain reported a governmental supervision by environmental sector.

Relevance of local public opinion for supervising forest management varies in CSAs. Almost two thirds of respondents considered public opinion as relevant: public opinion in Vercors lead to preference of selective cutting instead of clear-cutting, it increased the involvement of public in forest management planning in Montes Valsain and Sneznik and strengthened public interests in management of municipal forests in Montes Valsain. Public opinion is also influenced through the local associations and clubs, e.g. snowmobile clubs, hunters, anglers as well as through the comments of reindeer keepers and neighboring owners on harvesting plans in Vilhelmina.

Most of the reported indicators of multifunctional forestry that are controlled by the supervising bodies can be described as sustainable forest management indicators. They include planned harvest volume, state of endangered species, forest regeneration, water source quality, tree species composition, erosion, deadwood amount. Respondents also highlighted some national indicators such as the size of the clear-cuts, vehicle damage to soils, number of hunting permits and trophies, the extent of cattle grazing, the share of exotic tree species plantations, age of forest, and state of habitats.

Monitoring of social forest functions such as support for local inhabitants, environmental education, support of tourism, regional employment, health and safety etc. is less common and reported only for some of the CSAs. However, due to a high variability in the responses among CSAs as well as within them, the level of monitoring of social functions could not be evaluated accurately.

Forestry was generally considered as a sector strongly influenced by conventional practices and with relatively low implementation of innovations (Rametsteiner et al. 2005). The importance of collective decision-making processes in forestry is highlighted by Ramcilovic-Suominen and Epstein (2012), but they also stressed other factors like individual motivation, property regime, international market and forest culture that may affect decisions. Decision making in CSAs is mostly influenced by professional knowledge and experience (Fig. 4). Actual and expected financial profit as well as legal requirements, standards, and plans also have important influence on decision-making. Transfer of knowledge among colleagues, traditional custom practice and current trends in forest management are less important; less than one third of the respondents considered these sources of knowledge as very important for decision making. A respondent from Slovenia drew attention to the unprivileged private actors in decision-making: “forest owners have only little influence on decisions about the system of multifunctional forest management. Every measure in the forest has to be allowed by public forest service”.

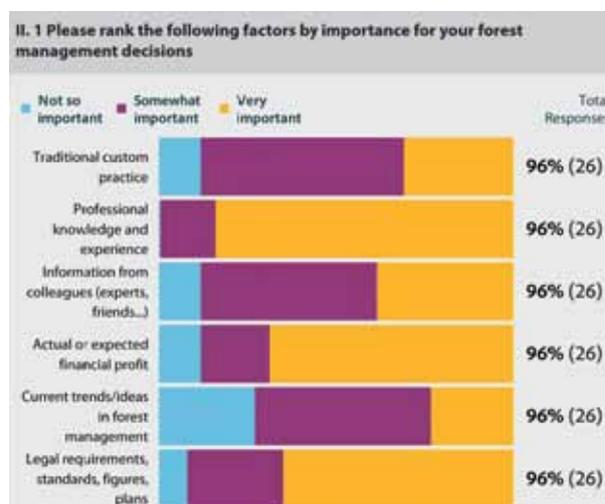


Fig. 4. Importance of factors affecting forest management decisions.

Professional methodical guidance for multifunctional forest management is predominantly a responsibility of public and regional professional organizations (e.g. local and regional forest owners associations in Vilhelmina). Non-governmental organizations also participate in defining methodical guidance in some cases. Among other organizations, universities and certification bodies were most frequently mentioned. Our results confirmed that both above mentioned facts on forestry in mountain areas - conservative approaches (driven by law and professional standards) and individual motivations (knowledge and profit) are the key factors in the decision-making process.

### 3.4. Governance instruments

Governance in the CSAs is triggered and supported through various forestry-specific instruments. Forest management plans are the common tool for implementation of forestry related legislative and strategic documents at the operational level (i.e. forest stand level or forest management unit level). Their role in forest governance can nonetheless be different (ARANGE 2013b). Although the management planning is not obligatory in Austria, forest management plans are implemented in Montafon on a voluntary basis, which may partly be motivated by adopted certification scheme. A similar situation applies for Vilhelmina: forest management plans are not obligatory in Sweden, but required if the forest is to be certified. Even though forest management plans may be provided, they do not guarantee sustainability and multifunctionality of forest management in practice, since *“the profitability of management is non-existing and public resources are diminishing due the economic crisis, what poses major threat to management”* (forest authority, Montes Valsain).

Within most CSAs, forest management plans contain prescriptions directly related to the multifunctional forest management. The exception is Swedish Vilhelmina, where environmental values are considered as a rule without explicit declaration. Only for some stands of special nature values and other special circumstances (i.e. installations for reindeer herding, cultural heritage, special tourist facilities, etc.) there are comments and descriptions also in the forest management plan. To identify relevant economic instruments that are covered by legislative and policy documents in each CSA (ARANGE 2013b), the survey also included those economic instruments that could be relevant for assessing the performance of the local governance mechanisms.

Subsidies supporting multifunctional forest management have been applied in all CSA in the last 5 years. However, their sources (e.g. regional, national, EU) and the subject of support (e.g. forestry, nature and water protection, recreation) vary. Most frequently, an explicit support for forest management and nature protection is reported, with governmental support being slightly more frequent than the regional one or that of EU. Subsidies supporting recreation and water resource protection were reported by only three respondents. In addition to the four main ecosystem services, subsidies for employment in forestry, culture heritage preservation, bio energy, and forestry in a changed climate were reported from Vilhelmina.

Tax benefits for multifunctional forest management are usually not directly applied. However, various indirect support instruments can be applied on the national level. For instance, in Slovakia and Slovenia, property tax exemption is being applied on forest land where protection or other non-production ecosystem services are prioritized and forests are classified as “protection forests” or “special purpose forests”. Similarly, exclusion of taxes as a public economic instrument was also reported for Bulgaria. Tax exemption in forest reserves and NATURA 2000 sites is being applied in Vercors. Penalties for breaching multifunctional forest management are generally imposed implicitly - penalties are resulting from legislation. Their application and effectiveness varies among CSAs as different national laws are applied. Effective penalties were reported from Kozie Chrbty and Montes Valsain. Penalties in place but not fully adequate were reported from Montafon. Inadequate or ineffective penalties were reported by respondents from Shiroka Laka and Sneznik. Respondents from Vilhelmina did not share the same view of effectiveness of penalties.

The respondents also commented local threats to multifunctional forest governance, and proposed future tasks and implementation strategies, for example forest owner from Vilhelmina suggested *“developing different strategies and strengthening the entrepreneurs who work with and from the forest”*. Forest authority from the same site was convinced that *“the keywords to reach multifunctional management are landscape perspective - partnership- sustainability”*. However, as recognized by forest authority representative from Montes Valsain, the practical implementation of multifunctional governance is rather problematic and a long-term activity: *“we are being able to maintain a rather positive and well supported multifunctional forest management in place, but (...) a serious problem is justify the disagreements, like with nature conservation organizations for land uses. (Forest management in the Guadarrama range)... is a clear success of a lot of people (provincial foresters, local majors, private forest owners, hunter, farmers, forest workers and others... under strong pressure of ecologists’ associations”*.

## 4. Discussion

Mountain forests belong to the most preserved ecosystem in Europe, and as such they are subject of nature conservation in many cases. Mountain forests were preserved against deforestation for agricultural purposes, due to mostly slope terrain and/or climatic conditions. In order to understand multifunctionality of mountain forest ecosystems, it is necessary to explore which ecosystem services (MEA 2005) are affected by multifunctional forest management practices in the CSAs.

Results show that timber production and soil and biodiversity protection are considered equally important across the studied regions. This implies that timber production and protection (water, soil, biodiversity, etc.) should not need to be opposing or conflicting in practicing multifunctional forest management. Environmental monitoring is ensured within forest management in all CSAs preventing unbalanced use of ecosystem services.

Conflicts between nature conservation and other sectorial policies regarding management of mountain forests were reported from some regions, which indicate deficiencies in intersectoral cooperation and governance failure. One of the main problems in forest governance in European mountain ranges is also unbalanced involvement of regional structures in decision making (NGOs, interest associations, general public).

Sustainable multifunctional forest management refers to the necessity for new forms of governance (Rametsteiner 2009). There are described three main approaches for European forest governance (Pulzl et al. 2013). First one is legislative approach that follows traditional top-down models (Kokko et al. 2006). The second mixed approach based on cooperation and giving the priority to information sharing (Pulzl & Lazdinis, 2011). The third is based approach on so-called soft modes of governance that are neither top-down nor bottom-up (Kleinschmit 2012). All mentioned approaches are relevant for the CSAs. Besides the trend that mountain areas are more under the pressure of local and regional demands (water supply, protective functions, recreation), the support of multifunctional forest management is more national level of interest. There is a large number of governance instruments aimed at multifunctional forest management already exist at national level. The importance of economic instruments such as subsidies, tax benefits or penalties was stressed due to increasing demands for ecosystem service payments. On the one hand the implementation of multifunctional forest management in mountain regions in the absence of financial support is disputable. On the other hand it would be difficult to expect that the subsidies or incentives solve the problem with multifunctional forest management. In this situation, the most important challenge is to involve the communities, governments, and public organizations at various levels in the decision process and secure the consistency in their objectives.

To consider biases that are typical for such one-time surveys, this analysis can be considered as a tentative qualitative assessment of governance in European mountain regions, while several aspects remain unclear such as evaluation of governance effectiveness and efficiency, aspects influencing participation, transparency, capacity. Such questions would require a more detailed analysis, which, however, was beyond the scope of this study.

## 5. Conclusion

Analysis of cases confirmed that sustainable multifunctional forest management in European mountain ranges is based on case specific governance systems. The governance of mountain forests differs from other forest areas because of their main role in protective functions, nature conservation and recreation. The main finding is that multifunctional mountain forest governance is case specific. Many different sectors and actors have an influence on governance in mountain regions and the coherence and consistence of management goals is not always secured. From the governance systems point of view multifunctional forest management applied in selected European mountain regions request high level of

participation and coordination with different stakeholders beside forest sector.

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