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Forest biomass for energy in multi-functional forest management: Insight into the perceptions of forest-related professionals

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ABSTRACT

The purpose of this study is to gain insight into the views of forest-related professionals in Slovenia regarding the policy instruments and external factors driving the production and use of forest biomass for energy as part of sustainable and multi-functional forest management. Semi-structured interviews were conducted among forest-related professionals, followed by an in-depth qualitative analysis. The results show the importance of managing forests for several forest functions simultaneously within one area, indicating the suitability of the integrative approach. Moreover, it was affirmed that forest biomass for energy should not be the main goal of forest management, but rather a by-product of other goals. Its use is driven by a set of policy instruments interrelated with external factors, the most important of which are economic instruments and the market, respectively. From this perspective, interviewees recognised the role of government as essential in the development of the bioenergy sector in Slovenia. Value chains in combination with educational activities offer a suitable answer for coordinating various wood uses. The results of this study can facilitate political decisions that take into account stakeholder interests and environmental threats in the context of the contemporary forest management paradigm.

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1. Introduction

How forests are managed in order to provide an even distribution of ecological, social and productive benefits is of crucial importance for the sustainable production and use of forest resources. The share of forests in the European Union (EU) exceeds 40% (COM(2013) 659, 2013), hence these ecosystems represent an important fragmented oasis with a multitude of values and benefits for society, such as the provision of recreational services, hunting, non-wood forest products and biodiversity. Establishing appropriate forest management given the myriad of various stakeholder interests and particular local conditions is a special challenge for many countries, often implying the need for multi-functional forest management.

Bioenergy production is an important component of forest management which may significantly influence the provision of other forest functions (Aguilar, 2014). Particularly in terms of the development of the EU bioeconomy sector, bioenergy has promising potential to contribute to sustainable economic growth, spur innovation, reduce fossil fuel consumption and improve the related knowledge base (COM(2012) 60, 2012; Ollikainen, 2014; Pülzl et al., 2014). Furthermore, the importance of forest biomass production and use was emphasised prior to the bioeconomy action plan when shaping the EU Directive on the promotion of the use of energy from renewable sources (RED). RED aims

at developing a single framework for encouraging the use of renewable energy sources (RES) by setting legally binding targets for RES production and use (Directive, 2009/28/EC, 2009; Mantau et al., 2010).

The production of bioenergy from forests must be managed in a manner that promotes sustainability (Aguilar, 2014). The most common procurement of forest biomass is therefore through removal of logging by-products, followed by small-diameter tree removal to meet silvicultural objectives. Even more important is the notion that multi-functionality is compatible with the principle of sustainability. In this view, the Slovenian forestry doctrine comprises multi-functional (also multi-objective or multi-purpose) forest management, which is embodied in the Forest Act (FA) and encouraged by the Resolution on the National Forest Programme (RNFP). Simultaneously ensuring the sustainable supply of forest biomass and ecological and social objectives is, at least on a normative level, the main objective of Slovenian forest management. Considering that forests cover more than half of the country's area, forest biomass is even more relevant here. Indeed, wood biomass for heat production is used in almost 40% of Slovenian households (SURS, 2014).

According to the Slovenian FA, forest functions are divided into three categories: ecological (e.g. hydrological, climatic, biodiversity), social (e.g. recreation, tourist, educational) and productive (e.g. timber production, non-wood forest products). In Central Europe the concept of forest functions is commonly used to denote priority areas in certain forest ecosystems, but also the potential of forests to secure benefits to society (Simončič et al., 2013). As such, forest functions are tightly

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connected with forest management goals, which must be designed in a participatory process (e.g. in forest management planning). In summary, various forest functions and services are currently gaining importance, and their integration is generally considered when shaping forest management decisions (Olschewski and Benítez, 2010).

Basically, there are two approaches to multi-functional forest management: integrative and segregative. The main idea behind the latter is the separation of areas for single, but different uses, and it is mainly practised in countries with low population densities and large and continuous forest areas. On the other hand, the integrative approach promotes multiple management goals within one area and has mainly been applied in countries with high population densities with a high level of public interest (Simončič et al., 2013). The distinction between the two approaches is important for achieving the established forest management goals and comprises different forest management strategies. For example, within the scope of integrative forest management the production of forest biomass for energy might be incompatible with the recreation function if the former is given higher priority. Forest management works would need to be elaborated in order to fulfil both biomass for energy production and recreational goals by harvesting logging residues and building appropriate infrastructure for recreational users, respectively.

In general, renewable energy policy in the EU targets heating and electricity production and use of RES by applying various demand- and supply-orientated policy instruments. For forest biomass, economic instruments, such as fixed prices, tax incentives, investment subsidies, (forest) management incentives, green certificates and low-interest loans, are often cited in the literature as being the dominant instruments. Moreover, policies shaping the allocation of natural resources (e.g. environmental or agricultural policy) affect bioenergy prices by stimulating technological development and innovation. However, the effectiveness of some economic instruments has been questioned in previous studies. In summary, the optimal policy instrument mix should adhere to local conditions, designated policy targets and the timing of instrument enactment (Aguilar, 2014; Thornley and Cooper, 2008).

In addition, the use of different bioenergy fuels is affected by different cultural, economic, environmental and social aspects (Qu et al., 2012). The development of the production and use of forest biomass is influenced by a set of external factors, among which researchers highlight the role of education and awareness (Aguilar et al., 2013; Gruchy et al., 2012; Qu et al., 2010), market influences (Joshi and Mehmood, 2011; Schwarzbauer and Stern, 2010), rural economic development (Ollikainen, 2014; Stidham and Simon-Brown, 2011), competing energy prices (Aguilar, 2014), and forest owner willingness to provide forest biomass (Wilnhammer et al., 2012). Basically, it is possible to conclude that the external factors driving bioenergy development comprise ecological, social and economic aspects of local, national and global importance. For example, market dynamics usually applies to the global scale, while education and awareness are often related to national or local conditions and cultural and historical characteristics.

The task of managing different forest uses simultaneously is challenging and demands a high degree of participation among forest-related professionals as well as other policy actors (e.g. forest owners, non-governmental organisations). Historically, forest management was mainly shaped by the decisions of forest professionals who failed to include social aspects into forest planning (Pülzl et al., 2014; Simončič et al., 2013). Nowadays, forest management participation involves various stakeholders, including civil society. In general, experts from forest-related institutions are vital participants in defining management objectives and designing priority areas. Moreover, forest-related professionals play a particularly important role in the development of the bioenergy sector by actively sharing information and knowledge among all stakeholders (Qu et al., 2012). They provide decision makers with knowledge, provide information to the general public, help form public opinion and ensure sustainable natural resource management (Aguilar, 2014; Dwivedi and Alavalapati, 2009; Qu et al., 2010).

Given the outlined framework, we assume that understanding professional perceptions is one of the first steps towards a comprehensive study of the implementation of multi-functionality and sustainability principles.

To our knowledge, no qualitative studies involving various professional perceptions regarding forest biomass in relation to forest functions have been conducted (see also Aguilar, 2014). Several studies, however, have indicated that some differences might arise among stakeholders concerning the importance of different forest functions (e.g. Kindstrand et al., 2008; Stidham and Simon-Brown, 2011). Thus, this exploratory study was conducted to identify forest-related professional perceptions about the importance of forest biomass in terms of forest functions, policy instruments and external factors. We were particularly interested in analysing perceptions of three significant expert groups: research and educational institutions, governmental officers and environmentalists. With this in mind, the central questions to be examined in this paper are twofold:

- What are professionals' perceptions regarding the importance of forest functions in terms of the production of forest biomass for energy?
- What importance is given to the political instruments and external factors driving the production and use of forest biomass for energy by each expert group?

The paper is organised as follows: after briefly outlining the conceptual framework, Section 2 describes the methods and data collecting process. Section 3 provides the results of the qualitative analysis of the interviews, while Section 4 discusses the results in connection with those of other studies. The paper concludes with a summary of the main findings in Section 5.

2. Methods and data

In this paper the research method and analysis were qualitative. Qualitative methods are used for capturing views regarding a certain phenomenon (in our case: forest biomass production and use for energy) which cannot be captured by applying quantitative methods or hypothesis testing (Ní Dhubbáin et al., 2009). Moreover, the utility of the qualitative interview method is even more relevant within the currently unstable market situation, with a lack of statistical data and manifold stakeholder attitudes which might not be easy to quantify (Mattila et al., 2013).

In order to obtain qualitative empirical data, we conducted semi-structured face-to-face interviews with expert representatives of various institutions related to forestry and the biomass energy sector. Since we anticipated different positions, we a priori defined three expert groups: a) policy (representatives of government institutions, ministries, bodies and agencies that shape and affect forest policy decisions directly); b) ecology (representatives of non-governmental organisations, public institutes and bodies that shape forest policy indirectly); and c) research and educational (representatives of research and educational organisations that provide decision makers with knowledge).

We identified and selected professionals using purposive sampling where information-rich cases are chosen because "they have particular features or characteristics which will enable detailed exploration and understanding of the central themes and puzzles which the researcher wishes to study" (Ritchie and Lewis, 2003). This approach aims to ensure that all key participants are taken into account and that some diversity is included in order to explore the inter-group characteristics. In addition, snowball sampling was adopted in order to validate the sample and to identify other professionals (see e.g. Rantala and Primmer, 2003). After we conducted the interviews with these initial interviewees, they were asked to identify additional relevant professionals. In total, thirteen forest-related professionals were interviewed. The interviews

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