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Analysis

Divergence in stakeholders' preferences: Evidence from a choice experiment on forest landscapes preferences in Sweden

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ABSTRACT

A great deal of biodiversity can be found in private forests, and protecting it requires taking into consideration the preferences of key stakeholders. In this study, we examine divergence in stakeholders' preferences for forest attributes across the general public, private non-industrial forest owners and public and private forest officials in Sweden by conducting a discrete choice experiment. Our results indicate that citizens have a positive valuation of biodiversity protection. Moreover, their valuation is statistically significantly higher than those of forest owners. Interestingly, our results suggest that both forest owners and forest officials have a strong orientation towards production, with higher valuation than the general public of the common management practice of even aged stands and clear felling. Even though the Swedish Forestry Act regards production and environmental goals as equally important, we find that forest officials prefer management practices that promote production rather than biodiversity protection.

1. Introduction

Biodiversity plays a key role in sustaining the functioning of ecosystems and thus in the provision of ecosystem services. To protect biodiversity one can follow different strategies, as for instance, a land-sparing approach where biodiversity protection is geographically concentrated and separated from productive land activities, and a land-sharing approach where biodiversity protection is geographically spread and integrated with productive land activities (e.g., Edwards et al., 2014 and Fischer et al., 2014). Reconciling timber production with biodiversity protection in private forest is, however, often challenging as the supply of biodiversity usually goes unrewarded by markets, and protection of biodiversity comes at an opportunity cost to forest owners. This makes it unlikely to achieve biodiversity protection in the absence of further incentives to compensate forest owners for the potential productivity losses.

In addition, biodiversity protection on private forest land is a complex policy area where several legitimate competing interests and actors influence the outcome (Gritten et al., 2013). Two key stakeholders are the general public and forest owners, and these two groups often have different interests and values concerning the importance attached to production on the one hand and biodiversity and recreational opportunities on the other. In order to design effective policies for protection of forest biodiversity and ecosystem services, a better understanding of the preferences of forest owners and the public is needed.

Moreover, forest policies in many countries are largely implemented through communication and personal contacts between forest owners and forest officials, implying that it is likely that over time an understanding between the two groups is developed. If forest officials' preferences for the protection of biodiversity in private forests were to be similar to those of the general public, the gap in preferences between forest owners and the public might narrow down (Kindstrand et al., 2008). Nevertheless, forest officials are a heterogeneous group consisting of both those working for the governmental agencies (hereinafter referred to as public officials) and those working for private forest companies (hereinafter referred to as private officials). In Sweden, for instance, forest owners generally have less contact with public forest officials today than a few years ago, and instead more contact with private officials at the forest owners' associations or in the forest industry (i.e., the timber buyers) (Jönsson and Gerger Swartling, 2014). Furthermore, even if public forest officials have contact with forest owners, it is not clear that their preferences are in line with the desires of the general public. For instance, as described by Carlsson et al. (2011), there is evidence that the decisions of those

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who work in the public sector are based on their private norms regarding environmental values.

In this study, we examine forest values among different forest stakeholders in Sweden by conducting a discrete choice experiment (DCE) involving citizens, non-industrial private forest owners, and forest officials working for the government, forest companies, and forest owners' associations. Respondents were asked to choose among a set of productive forests shaped by alternative forest management practices, and thereby make trade-offs between management outcomes, biodiversity indicators, and costs. The specific research questions we aim to answer are: (i) Do different stakeholders have similar preferences for alternative forest management practices that lead to different biodiversity outcomes? (ii) Which dimensions of biodiversity (e.g., number of total or rare forest bird species) are valued the most? (iii) Are these dimensions valued similarly the same across different stakeholder groups?

Some previous studies have also examined forest values and beliefs among forest owners, the general public and forest officials in Sweden (see, e.g., Kindstrand et al., 2008; Nordlund and Westin, 2011; Eriksson, 2012; Eriksson et al., 2013; Hemström et al., 2014). These studies indicate that the interest groups have very heterogeneous preferences regarding biodiversity protection vs. production. For instance, in contrast to men/old people, women/young people value nature preservation higher than production (Nordlund and Westin, 2011; Eriksson et al., 2012). Also type of forest ownership and familiarity with the environmental goods affects preferences for biodiversity (see, e.g., Lidestav and Nordfjell, 2005; Eriksson, 2012; Eriksson et al., 2013).

A limitation of these studies is that they analyze values by means of rating and ranking tasks, which neither allows for a comparable measure of preferences (in a quantitative way) nor enables estimation of the willingness to pay (WTP) for various aspects of biodiversity protection. A DCE provides a suitable framework for valuing and comparing preferences between stakeholders and has been used previously on environmental issues by Carlsson et al. (2011) and Rogers (2013) to compare citizens and EPA administrators in Sweden (marine reserves and clean air) and Australia (marine reserves), respectively, and by Carlsson et al. (2012) to compare risk reduction preferences of citizens and public administrators.

By using a DCE approach, our study on forestry allows us to estimate the preferences of different stakeholders, contributing to the literature investigating whether the preferences of the general public regarding biodiversity protection differ from the preferences of those engaged in forest management. However, our study can also guide the design of biodiversity policy in private forests by eliciting preferences for different components of biological biodiversity (e.g., total number of species, number of rare species, and geographical spread of biodiversity).[1] As pointed out by Nunes and van den Bergh (2001), most studies on biodiversity valuation fail to apply economic valuation to the entire range of biodiversity benefits, providing a very incomplete perspective on the value of biodiversity protection. In contrast, our study considers a broad range of biodiversity components and also provides empirical evidence on the tradeoffs/synergies between the delivery of ecosystem services (e.g., biomass production) and biodiversity protection. Better insights regarding the relations between the perceived values of biodiversity and ecosystem services will help with designing strategies and policy tools that maximize opportunities for conservation of multiple ecosystem services and biodiversity and thereby contribute to resource efficiency.

To tackle the issue of preference heterogeneity we use two approaches. First, we estimate a random parameter logic model that allows us to analyze the observable component of heterogeneity within each of the three types of stakeholders in our study (e.g., general public, forest owners and forest officials). Second, we estimate a latent class model that allows us to cluster and determine the classes endogenously.

The remainder of the paper is organized as follows. Section 2 describes the forest management in Sweden today. Section 3 describes the design of our choice experiment and Section 4 presents the theoretical framework and model specification. Sections 5 and 6 describe the data and the results, respectively, and finally Section 7 summarizes the paper and discusses some implications.

2. Forest Management in Sweden

In Swedish society, timber and pulpwood production is an important source of income with a total production value in 2011 of 23 billion EUR. The value added accounted for 2.2% of GDP in the same year (Swedish Forest Agency, 2014). The focus on economic profitability and timber supply was manifested not only in the first national Forest Act, adopted in 1903, but also in the creation of governmental authorities responsible for implementing it (Lämås and Fries, 1995). In the first half of the 20th century, continuous cover forestry was tried in Sweden according to German practice, yet regeneration was less successful in Sweden than in Germany (due to climate and soil conditions) and the method was subsequently named "Green Lies." Instead clear felling and planting were identified as the best way forward in Sweden (Ekelund and Hamilton, 2001).[2]

In addition, during the same period, private landowners formed forest owners' associations aiming to balance the financial power of large industrial companies. Acting as producer cooperatives, the associations became important players in timber price negotiations and also primary forest management advisors for their members and key promoters of the "high-production" paradigm (Brukas and Sallnäs, 2012).

However, during the last part of the 20th century, concern about the loss of biodiversity resulted in a general increase in the demand for forest conservation in order to prevent local extinction of species and degradation of species composition. For instance, the Swedish Forest Act from 1993 (currently in effect) establishes that production targets and environmental objectives should be of equal importance. As stated in the first paragraph of the Forest Act of 1993, "The forest is a national and renewable resource. It shall be managed in such a way as to provide a valuable yield and at the same time preserve biodiversity." This is to say that preservation of natural and environmental values should be prioritized to the same extent as forest production values.

The ecosystem services provided by the forest landscapes depend on the composition of tree species (monoculture or mixed forests), the management, and the logging practices. For instance, forests managed to maximize productivity of biomass (timber, pulpwood, and bioenergy) are often monocultures of Norway spruce or Scots pine, with the common management practice of even aged stands and clear felling.[3] However, such monocultures have low biodiversity. An alternative would be to have a more heterogeneous forest landscape, with a

[1] The design of biodiversity policy should also be based on a solid understanding of ecological processes and interaction among species. For instance, birds can influence the risk of insect outbreaks by acting as predators, and by quantifying this effect we may get an economic incentive to promote bird-friendly forest management, e.g., a forest with several tree species, and a mixture of size and age classes.

[2] The clear cutting method (resulting on an even-aged forest) is very dominant in Swedish forestry and has traditionally been in the last few decades considered economically more profitable than selective cutting forestry (leading to a different-aged forest). Clear cutting has been said to have resulted in a substantial increase in the Swedish forest volume during the 20th century. For instance, the total standing volume has increased from about 1600 million forest cubic meters in 1920 to about 3400 in 2012. Furthermore, the total harvest has increased by about 80% from about 50 million forest cubic meters in 1956 to about 90 in 2011 (SLU, 2015).
Studies indicate that the volume produced under selective cutting forestry is in the order of 70–100% of the volume produced under clear cutting. The costs are, however, lower under clear cutting. Moreover, the cost to convert a forest that has been managed with clear cuts to a continuous forest can be high (see Swedish Forestry Agency, 2008). Regarding species diversity, the consensus is that selective cutting forestry leads to higher timber quality, lower regeneration cost and slightly higher species diversity than clear cutting.

[3] Even though Norway spruce and Scots pine are the most commonly planted tree species (Scots pine is also commonly regenerated by seed), other species are planted if the main purpose is to produce bioenergy—although the tops and branches of spruce and pine are also frequently harvested to produce bioenergy.