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Income losses due to the implementation of the Habitats Directive in forests — Conclusions from a case study in Germany

Lydia Rosenkranz [a,*], Björn Seintsch [a], Bernd Wippel [b], Matthias Dieter [a]

[a] Thünen-Institute of International Forestry and Forest Economics, Hamburg, Germany
[b] UNIQUE forestry and land use GmbH Freiburg, Germany

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ABSTRACT

In the context of implementing the Habitats Directive (92/43/EEC) approximately 17% of the German forest area was designated in "Special Areas of Conservation (SAC)". Amongst these there are many beech forests which were not subject to a special protection status before.
Management plans, containing measures for the protection of SACs, are just being developed. These measures may cause restrictions to forest management leading to losses of income. Our study aimed to analyse natural and economic impacts of the implementation of the Habitats Directive which could, e.g. be used as a basis for designing compensation schemes.
In discussion with operational managers it became clear that the measures most restrictive to forest enterprises were small-area land set-aside, restrictions in choice of tree-species and maintenance of a sufficient share of mature stands.
The impact of those nature protection measures on case-study forest enterprises was evaluated using an excel-based simulation model which enabled the calculation of, e.g., income losses based on enterprise individual data for a given simulation-period.
The main factors influencing income losses were age-class distributions, management practices and objectives of forest enterprises. Annual income losses for the enterprises averaged 31 to 39 €/ha.

1. Introduction

The Fauna–Flora-Habitats Directive (92/43/EEC, FFH- or Habitats Directive) aims "to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest" (Habitats Directive 92/43/EEC, Art. 2). It was introduced in the EU in 1992 as part of the European Natura 2000 nature conservation network.

The responsibility for implementing the Habitats Directive lies with the EU Member States. Each State is obliged to designate "Special Areas of Conservation (SACs)" for the protection of natural habitat types and species listed in the annexes of the Directive and to ensure the required conservation measures (COM, 2003). The Habitats Directive mainly focuses on protection objectives and hardly any direct requirements for forest management can be withdrawn (Winkel et al., 2009). It is the task of the EU Member States to concretise the abstract conservation objectives and measures (here called FFH-measures) for each of the respective SACs in terms of so-called "management" or "maintenance and development" plans (Habitats Directive 92/43/EEC, Art.6).

The Habitats Directive was included in the German Federal Nature Conservation Act in 1998. The authority for the concretisation and implementation of the FFH-measures lies, in a federalist state like Germany, mainly with the Bundeslaender. In consequence, the concepts, the methods and the status of implementation within the Laender are diverse. There are, for example, varying threshold values as well as practices for surveying the conservation status of SACs, on the basis of which FFH-measures are formulated. For this reason the FFH-measures in the Laender can be different for the same object of protection (Rosenkranz et al., 2012).

Natura 2000 areas today cover about 24% of the German woodland (Polley, 2009). Approximately 1.8 Mio ha (17%) of the total German forest area is located within SACs. There are 18 different forest habitat types in Germany (BfN, 2012). Amongst them there are about 0.55 Mio ha of beech forests which have not been subject to a special protection status before (Sippel, 2007). These forests are not only of great importance for nature conservation goals but also for forest management and the German policy objectives in the fields of economics, energy, and climate protection.

There are yet hardly any research results about the impacts of the implementation of the Habitats Directive on forestry. With the ongoing process of concretising the abstract conservation objectives in management plans the impacts on forest management have now become

* Corresponding author at: Thünen Institute of International Forestry and Forest Economics Leuschnerstraße 91, D-21031 Hamburg, Germany.
E-mail address: lydia.rosenkranz@ti.bund.de (L. Rosenkranz).

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assessable. Requirements like the conservation of habitat trees, dead wood and mature forests as well as the protection of habitat-specific natural species composition (cf. BfN, 2006) are likely to have impacts on forest management. Reductions of the amount of harvested timber and of the income of forest enterprises are to be expected.

Also, the forest enterprise characteristics, which especially influence impacts of FFH-measures, need to be determined. Generally it is to be expected, that FFH-measures in single forest enterprises can have a different degree of impact, depending on the respective forest enterprise's objectives, and the currently exercised or planned forest management.

Some Bundeslaender already apply compensation instruments such as nature conservation contracts (e.g. Bavaria and Hesse) or lump sum payments (e.g. North Rhine Westphalia and Baden–Württemberg). Others are just now developing compensation instruments. Thus, knowledge of the natural and economic impacts of FFH-measures and of factors enhancing the loss of income could prove to be helpful in this development process.

2. Research objectives

Against this backdrop, the joint research project "Impacts of nature protection requirements on forestry and the forest sector (FFH-Impact)" with its two sub-projects was carried out by BBW-Consultancy, Freiburg, the Forest Research Institute of Baden–Württemberg (FVA), Freiburg, the Thünen-Institute of International Forestry and Forest Economics (TI-WF), Hamburg, the Department of Forest Economics and Forest Management of the Georg-August University of Göttingen (Uni GÖ), the Faculty of Law of the University of Hamburg (Uni HH) and the Institute for Landscape Ecology and Nature Conservation (ILN), Bühl.

In the sub-project "Economic analyses for implementing the Habitats Directive in forests", conducted by BBW, TI-WF, Uni GÖ and Uni HH, we aimed to identify and evaluate natural and economic impacts of FFH-measures on concrete forest enterprises.

In our study we focused solely on business economic impacts. A comprehensive economic analysis in terms of welfare gains and losses would also require a valuation of the benefits of the public goods arising from implementing the Habitats Directive. However, the information necessary for allowing evaluation on, e.g., the changes in species composition or the success of conserving threatened species, will not be available for a couple of years yet. Until now no public good is defined. So far the Habitats Directive only regulates processes, which results in a lack of quantity for economic valuations. Thus a comprehensive economic analysis could not be accomplished at the time of our project.

The following issues were covered in our study:

1 The determination of FFH-measures with an impact on forest management
2 The plausibility and further development of a new simulation model to assess impacts of FFH-measures over time
3 The long-term consideration of (natural and) economic impacts of FFH-measures on current and future management practices, especially the time and intensity of the occurring effects
4 The cause and effects of the impact of FFH-measures

The following chapters provide findings from the research project. Further, more detailed information on the following chapters can be found in Rosenkranz et al. (2012), Seintsch et al. (2012), and Wippel et al. (2012). Yet, as not all management plans for forest areas in the Laender are completed and–for economical reasons–only a limited amount of case studies could be evaluated, this study does not claim to be representative for all forest enterprises in Germany. It is rather to be regarded as a snapshot of the current implementation process.

3. Literature review

In regard to our research objective there are basically two approaches for evaluating the effects of nature protection measures: the assessment of benefits and the assessment of costs. An important means for assessing the benefits of nature protection measures is, for example, the Contingent Valuation Method (CVM) to determine the Willingness to Pay (WTP) for the conservation of habitats and species. This method was, amongst others, used to evaluate the WTP for the protection of Natura 2000 sites in Scotland (Gibson et al., 2004), and for an increase of protection areas in Finland (Li et al., 2004; Pouta et al., 2000). Studies evaluating the costs and benefits of forest conservation and/or Natura 2000 using the CVM were conducted amongst others by Kniivilä et al. (2002) in Finland and Amigues et al. (2002) in France. Further studies determining the effects of nature protection as well as recreation measures are named in Elsasser et al. (2009).

The assessment of costs of nature conservation measures can be conducted by using forest growth models to simulate changes on stand level (for Central European conditions e.g. Silva (Pretzsch et al., 2002), Waldplaner (Hansen, 2012) and BWINPro (Döbbeler et al., 2011)) or by means of economic models.

A straightforward calculation of the expenses of forest enterprises derived from protection and recreational functions of forests has been carried out by Küppers and Dieter (2008). Expenditure for protection and recreational functions were analysed based on data of the forest accountancy network of the German Federal Ministry for Nutrition, Agriculture and Consumer Protection. Reductions of earnings for forest land set-aside areas were calculated by extrapolating data from the Integrated Environmental and Economic accounts of Forests for Germany. The study aimed to give an overview of the situation of forest enterprises in Germany. It did not aim to differentiate the effects of individual protection measures or of different types of protected areas on forest enterprise level.

Expenses for forest land set-aside were also calculated by Leppänen et al. (2005) and Posavec et al. (2011). The aim of the study by Leppänen et al. (2005) was the analysis of the effects of strict forest conservation on forest enterprises and the timber market. Amongst others, the net present value of normal forest stands with an even age-class distribution and mature stands was calculated using statistical data. Posavec et al. (2011) calculated the net present value of forest stands as well as the present and future cutting values for tree species, using assortment tables, average forest product prices and data on tree species out of forest management plans. Thus, they calculated one-time compensation fees on stand level for forest enterprises experiencing a land set-aside due to the implementation of the Habitats Directive. In both studies enterprise individual data was not included.

Another economic approach was chosen by Wagner and Jönsson (2001). They conducted calculations to determine the average reductions of contribution margin and additional costs per hectare, comparing the FFH-measures to a normal forest. As a data basis yield tables as well as average costs and revenues were used. The impacts of forest land set-aside as well as important FFH-measures for habitat types in Natura 2000 areas were calculated. Yet, this study, too, did not aim to use enterprise-individual data or to take individual forest structures into account.

A practical evaluation tool for forest management restrictions due to nature protection measures was developed by Möhring and Rüping (2006). With their "annuity model" they provided a useful tool to evaluate economic effects of changes in forest management. Based on yield tables, average wood revenues, felling and planting costs the reductions of earnings as a result of changes in forest management practices can be assessed (Möhring and Rüping, 2006:2). The model is suitable to calculate the effects of long-term changes, i.e. changes of rotation length and change of tree species. Yet, no forest enterprise individual data is used. Also, data tables range only up to the end of rotation periods.

For the calculation of compensation for the designation of habitat trees that can be used, for example, for negotiating nature protection contracts, Möhring et al. (2010) developed a practical excel-based evaluation tool. The evaluation is based on enterprise individual data such