Incentive based mechanisms

Economic and social implications of incentive based policy mechanisms in biodiversity conservation

Paula Horne, Ville Ovaskainen and Terhi Koskela
Finnish Forest Research Institute, Vantaa Research Centre,
Unioninkatu 40 A, FIN-00170 Helsinki
Finland
paula.horne@metla.fi, ville.ovaskainen@metla.fi, terhi.koskela@metla.fi

Abstract

Ecological, economic and social sustainability should be simultaneously taken into account in modern forestry as well as in forest conservation. To achieve conservation goals in the long run, conservation policies should be socially accepted. Landowners' property rights are in a central role when new tools for implementing nature conservation are introduced. Finland has launched an extensive policy programme for the conservation of biodiversity, focusing on conservation issues in private forests. The METSO programme proposed new policy instruments based on economic incentives and voluntariness of forest owners, such as conservation contracts and nature value trading.

This paper is based on two studies, which aim to understand the factors affecting the social acceptability and economic implications of biodiversity conservation in private forests with a focus on the proposed new mechanisms. Finnish citizens' preferences for the conservation policy and policy instruments, as well as private forest owners' preferences for various attributes of voluntary conservation contracts, were examined using the choice experiment method. Information on preferences was collected by mail surveys to 3000 Finnish citizens in 2002, and to 3000 forest owners in 2003.

The preliminary results suggest that incentive based, voluntary policy mechanisms provide several potential advantages. First, they respect forest owners' property rights and correspond to what citizens seem to consider a fair distribution of the costs of conservation. Second, voluntary mechanisms can improve the cost-effectiveness of conservation policy. Third, incentive based mechanisms can provide social welfare gains over traditional policies. Fourth, voluntariness and participatory procedures improve the social acceptability of forest conservation and reduce the potential for conflicts. As the use of incentive based mechanisms can potentially increase the social acceptability and cost-effectiveness of forest conservation, they appear as promising new tools to complement, even though not to replace, the traditional policies. It remains to be estimated to what extent the new policy mechanisms can eventually help in implementing a realistic conservation programme.

1 Introduction

Forest conservation in Finland is very strongly centered to the northern parts of the country. In Northern Finland 17% of forest area is preserved, while in Southern Finland and in Ostrobothnia only 1.8% of forest area is protected. Forests are the primary habitat for 43% of the threatened species in Finland. Especially broad-leaved forests are important environment for the threatened species. Broad-leaved forests are mostly located in the southern parts of the country, with 93% of this type of forests in Southern Finland or Ostrobothnia. While the network of conservation areas is estimated to be sufficient to those threatened or declined forest species whose natural distribution is centered to the northern boreal forest zone, the present level of conservation is too low to maintain all the threatened or declined forest species with distribution emphasized to southern parts of the country. Thus, the need for conservation is especially strong in Southern Finland (Metsien suojelun... 2000).

In Finland non-industrial private forest owners own 61% of the forest land, while 25% is owned by the state, 9% by companies and 5% by others (municipalities, parishes, and other collective bodies). In Southern Finland the proportion of private ownership is even higher, 75% (Statistical yearbook... 2002). Because of the high proportion of privately owned forests, the private forest owners have an essential role in safeguarding biodiversity especially in the Southern parts of Finland where the need for conservation is especially strong.

Finland's National Forest Programme 2010 (1999) considered the ecological, economic and social dimensions of sustainable forestry. In addition to domestic demands, the programme is designed to meet the demands set by international forest policy norms. In 2002 Finland launched a Forest Biodiversity Programme for Southern Finland (Metso), especially focusing on conservation issues in non-industrial private forests. The Metso programme, supervised by the Ministry of Agriculture and Forestry and the Ministry of Environment, complements the National Forest Programme. The Metso programme is a plan of action to preserve the habitats for threatened species and ensure the maintaining of the nature types needed by these species.

The Metso programme proposed new policy instruments based on economic incentives and voluntariness on the part of forest owners (Valtioneuvoston periaatepäätös... 2002). While biodiversity preservation is acknowledged to be a crucial part of ecologically sustainable forest management and forest conservation policy, securing the social sustainability of the policy measures and regulations applied is vital for obtaining the objectives of preservation in the long run. Strict nature reserves provide a secure core for conservation networks and present a low risk level in the stability of conservation status. Considering only ecological values, the acquisition of forest land to the state for strict biodiversity conservation purposes would seem like an attractive option. However, the optimal choice of conservation policy and implementation mechanism is a complex game of trade-offs between ecological values and socio-economic considerations. Tailoring the policy mechanisms to suit the ecological requirements in a cost-effective and socially acceptable manner is a challenging task for the policy makers.

Nature value trading is one of the policy instruments introduced in the Metso programme. In nature value trading a forest owner gives a commitment to maintain or enhance the natural values of the site by a fixed-term contract for ten years and receives compensation for this. The forest owner offers nature sites to the transaction and forestry authorities in co-ordination with environmental authorities choose the most suitable ones. All the sites to be traded must meet the conservation biological criteria defined in the Metso programme (Metso Leaflet 2003). The pilot project of nature value trading has been started in South-West Finland Forestry Centre in Satakunta province in summer 2003 (Luonnontilan hallinnan talous 2002).

Bidding game (also called competitive tendering) is a search procedure whereby the state asks landowners for offers and price bids for specified types of nature resorts to be acquired for conservation purposes. The primary target in the bidding game is permanent conservation through the establishment of private conservation areas (retaining land ownership) or acquisition of the land to the state, but fixed-term contracts for a 20-year period are also possible. An experimental bidding game is starting under the Metso programme in 2004.

Under a **nature management plan,** the forest is managed in a way that maintains and enhances natural values. The landowner and local environmental and forestry authorities compose a nature management plan that can be established only by the application of the landowner. The plan defines the actions to protect nature values as well as the silvicultural activities in the area. Silviculture is not forbidden, but all forestry activities have to be done without endangering the nature values of the area. The plan includes estimates of the economic losses caused by the restrictions on forest use and the costs of the actions needed to preserve the nature values. There are no obligations for the landowner about the use of land after the term of the contract (Valtioneuvoston periaatepäätös... 2002).

This paper is based on the preliminary results of two studies that seek to provide an overview of Finnish citizens' as well as private forest owners' preferences for biodiversity conservation in private forests. With a focus on the proposed new policy instruments, the studies aim at understanding which factors are the most important for the acceptability of biodiversity conservation in private forests. The main objective is to consider, in the light of empirical evidence based on stated preferences, whether the incentive based, voluntary policy mechanisms introduced in the Metso programme are likely to fulfill the expectations related to the social acceptance and cost-effectiveness of conservation policy.

2 Methods and data

The choice experiment method was applied in order to examine the preferences of forest owners and citizens for the inevitable trade-offs between desirable outcomes of forest use and conservation policy. The choice experiment is a stated preference valuation method, where the respondents are given different scenarios and asked directly which one they prefer. The method is especially appropriate in situations where the scenarios are hypothetical, or when information is needed of trade-offs between different aspects of the good or service that is being valued. Louviere et al. (2000) provide an overview of the choice experiment approach, and Horne and Ovaskainen (2001) and Horne and Petäjistö (2003) give examples of earlier applications in Finland.

In the method, respondents are presented with a number of choice sets. Each choice set consists of three alternatives from which the respondents are instructed to choose their preferred one. One of the alternatives presents the current situation, while the other two alternatives are described by a set of attributes. The levels of attributes differ between the alternatives thus describing different future scenarios. Attributes can be quantitative or qualitative in nature, and the ability to combine these two types of data is one of the main benefits of the choice experiment approach.

Two studies were conducted to examine the social implications of the change in conservation policy. The first study examined the level of acceptance by Finnish citizens of forest conservation in private forest land. The level of biodiversity conservation was placed abreast with implementation policy and its socio-economic costs, including employment losses. The purpose of the study was to determine whether the use of incentive based policy mechanisms would increase the level of acceptance of nature conservation in Southern Finland and how the welfare of different segments of society would be affected by the policy change. The second study considered preferences of forest owners for implementation of conservation policy. The focus of the study was on incentive based policy mechanisms, especially on the terms of conservation contracts.

Data of the citizen survey was collected by mail in the early summer of 2002. Simple random sample of 3000 was selected by Population Register Centre to represent 15–74 year old Finnish citizens. The response rate was 45%. The survey questionnaire consisted of the choice experiment as well as attitude and background questions. In the choice experiment setting each respondent faced six choice tasks, each with three alternatives. One of the alternatives was the status quo; no additional conservation areas and no changes in socio-economic attributes. In the other two alternatives the conservation level in Southern Finland was always higher than the present level. The alternatives consisted of six attributes (Table 1). Two of the attributes presented the percentages of protected area in Southern and Northern Finland. The number of threatened species was

Table 1. The effects of programme attributes on the acceptability of a conservation option: Qualitative results of the multinomial logit model for Finnish citizens.

Variable	Effect (+ positive, – negative) Timber production oriented	Multiple values oriented
Constant (status quo)	+	–
Percentage of protected forest area in Southern Finland Present (1.8%) to 4 x present (7.2%)	–	+
Percentage of protected forest area in Northern Finland Present (17%) to 2 x present (34%)	–	–
Employment 5000 jobs lost 2000 jobs lost No change 1000 jobs more	+	+
Annual cost to households over a 10-year period 0 to 350 euros	–	–
Policy instrument		
Land acquisition	–	0
Conservation contracts	+	0
Information based	0	0

calculated on the basis of percentage levels of conservation in Southern and Northern Finland [1]. Socio-economic attributes included the impacts of employment and the annual cost to households through income taxes over a 10–year period. Three policy instruments were given as attribute options. Land acquisition was explained to present lowest risk in achieving conservation targets but with least sovereignty of forest owners. Information based instruments like extension by forest owner organizations were given as a high risk, high sovereignty option, while thirdly, the conservation contracts based on voluntariness of forest owners were presented as a middle course instrument.

The data of the forest owner study was collected by a mail survey to 3000 Finnish private forest owners in spring 2003. The response rate was 42%. The questionnaire contained six choice sets, each with the status quo and two alternatives consisting of five attributes. The attributes described alternative contract terms for conservation in private lands. The attributes included the initiator in the conservation contract, the restrictions imposed on forest use, the amount of compensation per hectare per year, the duration of the contract, and the cancellation policy of the contract (Table 2).

Table 2. The effects of contract attributes on the acceptability of a conservation option: Qualitative results of the multinomial logit model for Finnish forest owners.

Variable (effects coded)	Effect (+ positive, – negative)
Constant (status quo)	+
Compensation to landowner (euros/ha/year) 0 to 350 euros	+
Initiator of conservation contract	
Forest owner	+
Forestry organisation	0
Environmental authorities	–
Forest conservation trust (base case)	–
Restrictions on forest use	
Small patches preserved	+
Nature management plan	+
No harvesting/silviculture allowed	(–)
Strict nature reserve (base case)	–
Duration of contract	
5 years	+
10 years	+
30 years	0
100 years (base case)	–
Cancellation policy	
Forest owner can cancel	+
New owner can cancel	0
Binds also new owner (base case)	–

3 Results

For some empirical evidence on the implications and potential advantages of using incentive based, voluntary policy mechanisms in biodiversity conservation, we consider four aspects that are important to decision making: Property rights and fairness, cost-effectiveness, effects on social welfare, and social acceptability of conservation.

First, nearly two thirds of respondents in our survey of Finnish citizens preferred the use of mechanisms based on voluntariness (Fig.1). This can be taken to reflect the public's preference for incentive based mechanisms in that such instruments duly acknowledge forest owners' property rights. The use of incentive based mechanisms also seems to be in line with citizens' perceptions about the fair allocation of the costs of conservation.

Three out of four citizens considered that the landowners should at least get full compensation for the timber revenue forgone due to conservation (Fig. 2). Many respondents also thought that in addition to the forgone revenue, the compensations should cover any direct costs from measures such as restoration, or even the entire societal value of the resource, including timber as well as biodiversity values of the forest.

Secondly, the results from the survey of forest owners suggest that the extended use of voluntary mechanisms can improve the cost-effectiveness of the conservation policy. The attributes of conservation contracts considered in the choice experiment, with their levels and directional effects, are presented in Table 2. Aside

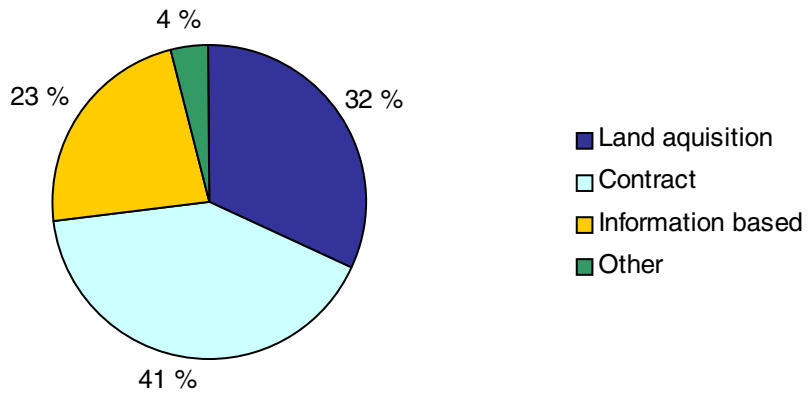

Figure 1. Finnish citizens' preferences for different conservation policy instruments.

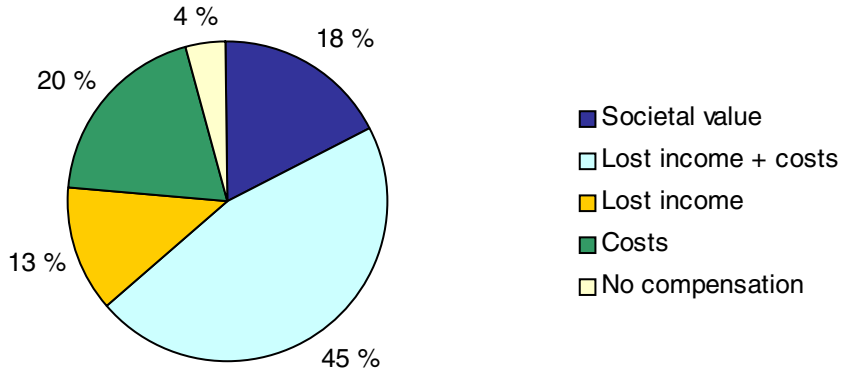

Figure 2. Finnish citizens' preferences for compensation payable to forest owners for conservation.

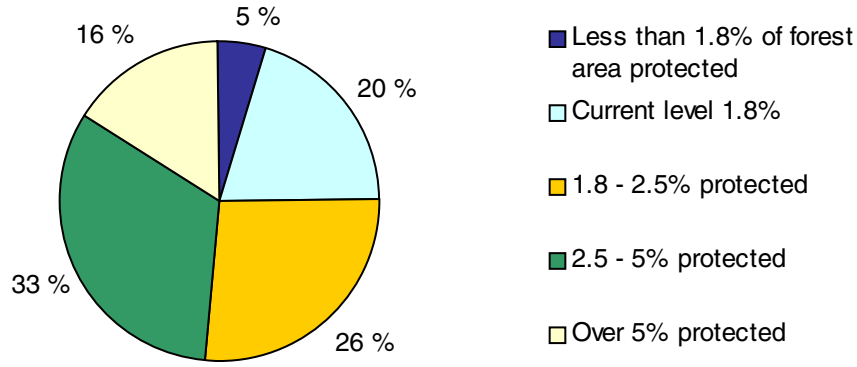

Figure 3. Finnish citizens' opinions about the acceptability of additional conservation in Southern Finland.

from an overall preference for the status quo (no increased conservation in private forests), the amount of compensation as well as other specific terms of the contract were of great importance to its acceptability to the landowners. While long-term, non-cancellable contracts with tight restrictions on (or full exclusion of) forest use are strongly undesirable, shorter contracts with more flexible terms could be much more easily acceptable. Notably, the welfare analysis showed that with more undesirable terms, the compensation claim for a conservation contract will easily rise manyfold in comparison to a base scenario with more flexible terms.

Thirdly, our survey of Finnish citizens suggests that the use of incentive based, voluntary mechanisms can provide welfare gains over traditional policies. As an example, the average welfare change (Hicksian compensating variation) corresponding to a conservation scenario that would raise the protection percentage in Southern Finland to 4.2% of forest land (2.3 times the present protected area) was computed from the estimated multinomial logit model. To allow for the heterogeneity of public preferences, and to consider both winners and losers of the project, the respondents were grouped by their attitudes on forest use and conservation (timber production oriented vs. multiple values oriented). The average welfare change turned out to be negative if the programme was to be implemented through land acquisition, while the impact was positive when contract based mechanisms were assumed to be used.

Fourthly, voluntariness and participatory procedures can significantly improve the social acceptability of forest conservation, thus reducing the potential for conflicts. Among all Finnish citizens, three out of four respondents supported increased conservation (Fig. 3).

In contrast, almost two thirds of forest owners considered the present level of conservation in private forests appropriate, and more than every fifth even thought the present level of conservation to be too high (Fig. 4). Obviously, there is a need for conservation options with more easily acceptable terms for the conservation goals to be successfully reached in the long run.

Forest owners' opinions on the factors that matter the most in regard to an acceptable conservation contract are summarized in Fig. 5. Even beyond adequate compensation, the forest owners emphasized the importance of property rights and sovereignty in decision-making as ingredients of an acceptable contract. That is, part of those forest owners who are not willing to sell their land for permanent conservation under a top-down preservation programme, might still accept a voluntary fixed-term contract with more flexible terms, particularly one which retains land ownership and allows sovereign decision making even in the future.

4 Conclusions

We examined four potential socio-economic implications of incentive based conservation mechanisms in biodiversity conservation in Finnish private forests using stated preference data and the choice experiment method. The preliminary results support the following conclusions on the implications and potential advantages of incentive based mechanisms.

First, the implied acknowledgement of forest owners' property rights in incentive based mechanisms would seem to be in line with the general public's perception of property right issues in forest conservation. Perception of property rights also lays down the basis for fair distribution of the benefits and costs of conservation. Second, the voluntary, incentive based mechanisms provide an opportunity for more cost-effective conservation policy. Forest owners differ in terms of forest management goals and preferences for implementation of conservation policy. A set of different policy instruments to choose from, and the potential of flexibility in contract negotiations, would allow forest owners to enter into a conservation contract that would best suit their situation. Third, incentive based instruments could provide welfare gains over traditional policies if they are more readily accepted by the general public. If citizens hold different opinions on nature conservation and forest use, the impact of a conservation policy would vary between different segments of the society. Finally, the use of more participatory, bottom-up approaches could enhance the social acceptability of conservation among the forest owners, and thus reduce conflicts.

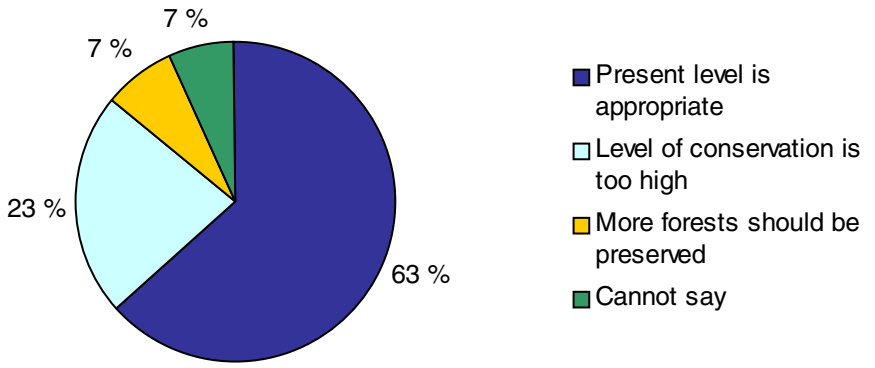

Figure 4. Forest owners' opinions about the present level of conservation.

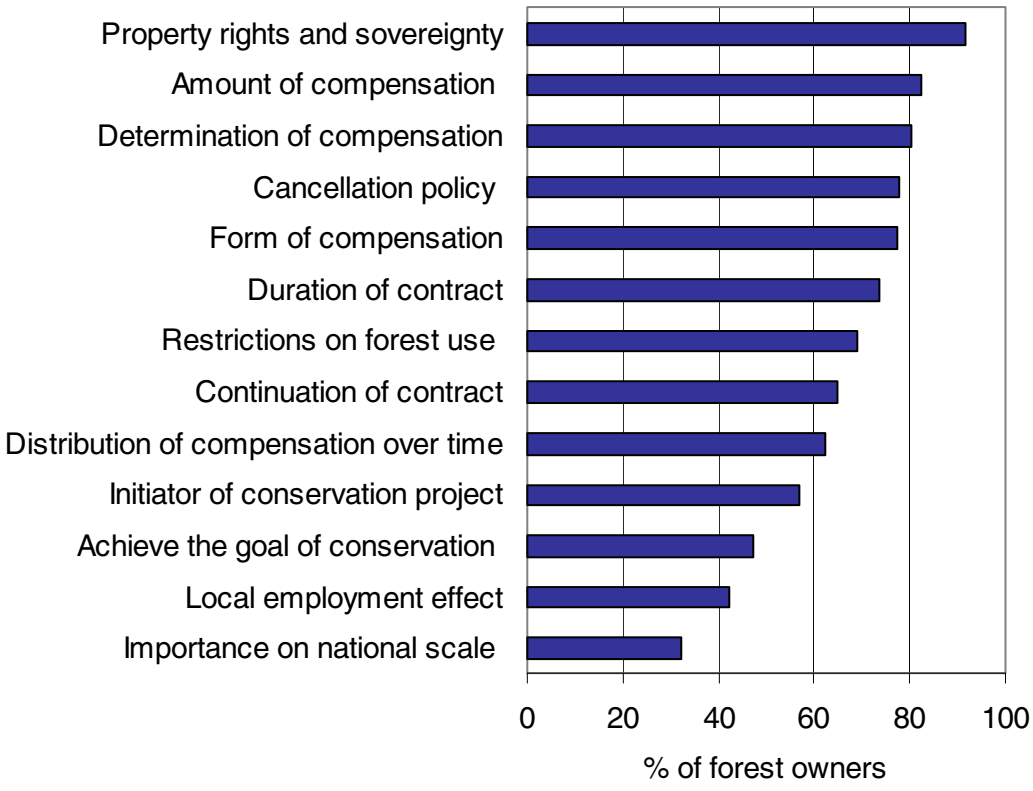

Figure 5. Forest owners' opinions on the factors that matter the most in regard to an acceptable conservation contract.

It remains to be estimated in more detail how much the suggested incentive based policy mechanisms can eventually help in implementing the realistic conservation programme. Nevertheless, our preliminary results suggest that the use of incentive based mechanisms can potentially increase the social acceptability and cost-effectiveness of forest conservation. Thus, they appear as promising new tools to complement, even though not to replace, the traditional policies.

References

Finland's National Forest Programme 2010. Ministry of Agriculture and Forestry 2/1999. Helsinki. 39 p.

Horne, P. & Ovaskainen, V. 2001. Luonnon monimuotoisuuden suojelu virkistysalueilla kävijöiden näkökulmasta. Siitonen, J. (ed.). Metsäluonnon monimuotoisuuden tutkimusohjelman loppuraportti. Metsäntutkimuslaitoksen tiedonantoja 812: 223–226. (In Finnish).

Horne, P. & Petäjistö, L. 2003. Preferences for alternative moose management regimes among Finnish landowners: A choice experiment approach. Land Economics 79(4): 472–482.

Louviere, J. J., Hensher, D. A. and Swait J. D. 2000. Stated choice methods: analysis and applications. Cambridge University Press.

Luonnontilan hallinnan talous. 2002. Luonnonarvokaupan kehittämishankkeen raportti. Satakuntaliitto. Suunnittelu- ja tutkimusjulkaisut A:264. 43 p. (In Finnish).

Metsien suojelun tarve Etelä-Suomessa ja Pohjanmaalla. 2000. Etelä-Suomen ja Pohjanmaan metsien suojelun tarve-työryhmän mietintö. Suomen ympäristö 437, Helsinki. 284 p. (In Finnish).

Metso Leaflet 6/2003. Finnish Ministry of Agriculture and Forestry and Ministry of Environment. 2 p. [Internet site]. Available from: http://www.mmm.fi/metso/. [Cited 5 Feb 2004].

Statistical yearbook of Finland 2002. 378 p. Helsinki (In Finnish).

Valtioneuvoston periaatepäätös toimintaohjelmasta Etelä-Suomen, Oulun läänin länsiosan ja Lapin läänin lounaisosan metsien monimuotoisuuden turvaamiseksi 2002. [Internet site]. Available from: http://www.mmm.fi/metso/asiakirjat/ [Cited 3 Feb 2004]. (In Finnish).

Footnotes

[1] Professor Ilkka Hanski from the University of Helsinki and Dr. Juha Siitonen from the Finnish Forest Research Institute calculated the number of threatened species on the bases of conservation percentages. Their contribution is gratefully acknowledged.