Linking Multi-Functional Forestry Goals with Sustainable Development Objectives: A Multi-National Q-Study

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A B S T R A C T

This paper applies Q-methodology to examine stakeholder perspectives on multi-functional forests in Scotland, the Netherlands, Poland, Romania and Sweden. Five groups of stakeholder attitudes were distinguished. The attitudinal diversity indicated the inter-dependence of economic, social and environmental benefits from forests. It is associated with differences in respondents' values which are shaped by institutional environments and political, economic and social developments as well as by cultural differences across the analysed countries. At the same time, in each country, forests are perceived as multipurpose resources and the findings reveal stakeholder understanding of a need to integrate biodiversity conservation with sustainable forest management. This study reveals a general consensus on the importance of forest regeneration, primarily through promotion of natural regeneration, and of forest use for multiple purposes, with sustainable forest management practices appearing to be of significance.

1. INTRODUCTION

Important characteristics of multi-functional land uses are: (i) the existence of multiple commodity and non-commodity outputs that are jointly produced; (ii) poorly functioning markets for public goods which constitute some of the non-commodity outputs [1]. Such characteristics are important for understanding processes observed in multi-functional forests in Europe, where the joint production (and consumption) of multiple ecosystem services may result in conflicts between stakeholder interests. Such interests are diverse in number, as is the range of stakeholders.

A better understanding of stakeholder perspectives on forestry is important for informing the design of policies to promote the delivery of ecosystem services, and the identification of future opportunities and management practices. Ecosystem services are the benefits humans receive, directly or indirectly, from ecosystems. The Millennium Ecosystem Assessment [2] grouped ecosystem services into: *supporting*, such as nutrient cycling, oxygen production and soil formation; *provisioning services* of food, fibre, fuel and water; *regulating services*, including climate regulation, water purification and flood protection; and *cultural/social services*, such as education, recreation, and aesthetic value.

The demand and supply of marketable forest commodities is analysed by economic models, with choices mediated by markets. Social expectations, preferences and needs for public goods place demands on valuation methods. Neo-classical axioms of consumer choice theory do not conform well to the accepted modes of human behaviour [3].

Such axioms have been challenged by those working in ecological and humanistic economics [4], socio-economics [5], post-Keynesian economics [6], and modelling behaviour (e.g. agent-based techniques [7]).

The literature provides strong arguments that preferences for the social states of public goods should be determined through non-market-oriented stated preferences, or by preferences revealed through mechanisms other than the market. Given these challenges, Q-methodology is potentially useful, since it avoids the challenge of questionable attributions of pseudo-market values.

This methodology originated in psychology [8], [9] and is applied in natural resource economics and management [10], [11], [12], [13], [14], [15], [16].

In this paper, Q-methodology is used to analyse attitudes of stakeholders in five European countries representing diverse natural and socio-economic conditions of forest development. Particular attention is paid to socio-economic and ecological aspects of sustainable resource management. These aspects can be grouped into: (i) matters of major importance to respondents for multi-functional forest use; (ii) major trade-offs they foresee, especially between biodiversity and timber production (including wood fuel); (iii) the shift in biodiversity conservation strategy in Europe from the 'save from harm' approach [17] towards a more sustainable provision of multiple ecosystem services.

2. THEORY AND METHODOLOGY

Q-Methodology enables researchers to reveal/explain existing attitudes/perspectives; identify criteria that are important; explain factors influencing attitudinal diversity; outline areas of consensus/conflict; and specify, select and evaluate policy options [9]. The method starts with consultation with stakeholders to identify research essentials followed by conducting interviews through survey and/or focus groups (fig. 1).
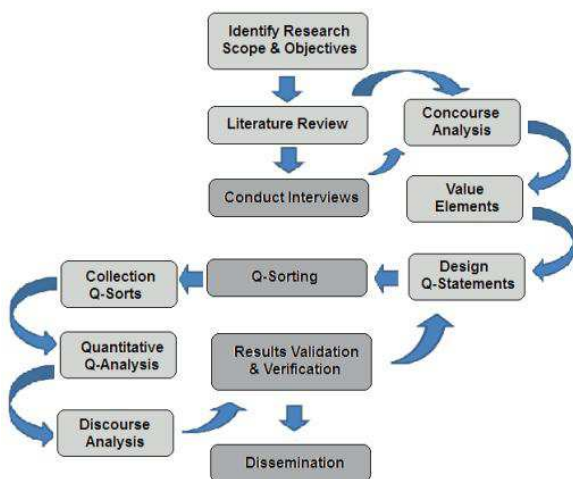

Fig. 1. The logical framework of Q-methodology research.

Statements in line with study objectives are designed through concourse analysis (see 2 for more

details on the method). Our questionnaire consisted of thirty-six statements (e.g. "After clear cutting, the ecosystem will never return to its previous state" or "Many wild species require an uninterrupted forest for nesting"), and there were 36 boxes in a sorting-chart. Each respondent was asked to distribute the statements across the chart, on a scale ranging from +5 through -5, based on their agreement/disagreement with the statements. The statements were pre-tested for their practicability to respondents, and the questionnaire then was slightly refined, and used in a study of 66 participants. Participants with diverse responsibilities and social-economic backgrounds were selected in Scotland, the Netherlands, Poland, Romania and Sweden to include, following Van Asselt et al. [18], decision makers; citizens; representatives of interest groups, such as NGOs; business men, including land/forest managers; and scientific experts.

The output data from the interviews (i.e. Q-sorting) were assessed using the sequential application of multiple regression and factor analysis. This allowed identification of the groups of people based upon their opinions towards sets of statements. The resulting 'factors' represented the heterogeneity of attitudes for use in explaining the diversity of opinions expressed, and a basis for interpretation of why people hold their opinions. Each statement in the Q sample was also scored for each factor, enabling an analysis of their significance to each factor [15]. The final steps comprise discourse analysis (i.e. interpretation of the social discourses uncovered by the Q-analysis); contrasting the value outputs with the socio-economic backgrounds of respondents and verification, and communication of the results with/to stakeholders.

3. RESULTS AND DISCUSSION

Five groups of attitudes were identified on the basis of the differences in participants' responses towards multipurpose forestry and ecosystem services issues addressed in the questionnaire (table 1). Of these five, three are major groups associated with 'Conservationists', 'Productivists' and 'Recreationists' beliefs (and we therefore named these groups accordingly).

Those with the Conservationists beliefs were recognised as Extreme and Moderate (groups 1 & 4), and the Productivists comprised of Extreme and Moderate Productivists (groups 3 & 5). The Conservationists give their priority to biodiversity conservation in managed forests over more traditional practices. The Extreme Conservationists (group 1) would rather not allow any disturbance to wild habitats (e.g. close roads and prohibit logging operations of any kind). The Moderate Conservationists (group 4) favour multi-functional forestry, and support nature conservation equally with forest provisioning services.

The major preference of the Recreationists (group 2) is given to the regeneration of forests to provide human social and economic benefits. They support provision of leisure facilities, and suggest that hunting/fishing are necessary to maintain the quality of countryside.

The Productivists consider sustained timber production as the goal of forest management. The Moderate Productivists (group 3) are keen to maintain a balance between timber production and other ecosystem services. They support grazing and farming in woodlands, and care for the quality of forest stands, as well as of old growth forests, and of hardwood and native species, whilst maintaining that forests remain a source of timber. They consider forest tourism (e.g. pony trekking, mountain biking) as socially beneficial activities.

The Extreme Productivists (group 5) endorse the use of forests as a source of wood (for construction and fuel) and the associated need for clear-cutting operations. This group also supports the presence of entertainment/leisure facilities in forests used for recreation, and considers forestry and farming as separate businesses. It tends to deny the legitimacy of additional nature conservation measures and their financial support, arguing that there is a range of other environmental niches for animals/plants.

Table 1. Q-Method modelled outputs.

	Number		Group	Total number of respondents	Number of unique respondents	Number of mixed respondents
Participants	66		Group 1	22	15	7
Rigorous (valid) answers	51		Group 2	10	3	7
Distinguishing answers	45		Group 3	12	4	8
Unique answers	30		Group 4	9	3	6
Mixed answers	15		Group 5	10	5	5

Note: The table shows that a total of 30 respondents among the 66 participants are uniquely associated with one or the other of the 5 factors. For example, 15 respondents are uniquely associated with the first factor (i.e. with the attitudinal Group 1), or 5 are uniquely associated with the fifth factor (i.e. with the attitudinal Group 5). 33 respondents are mixtures of the five types (groups), and 3 remain without a significant loading. The number of factors is, therefore, not totally deterministic: not every individual is a member of only one group. Factor loadings are correlation coefficients indicating the extent to which each Q-sort is similar to the composite factor array.
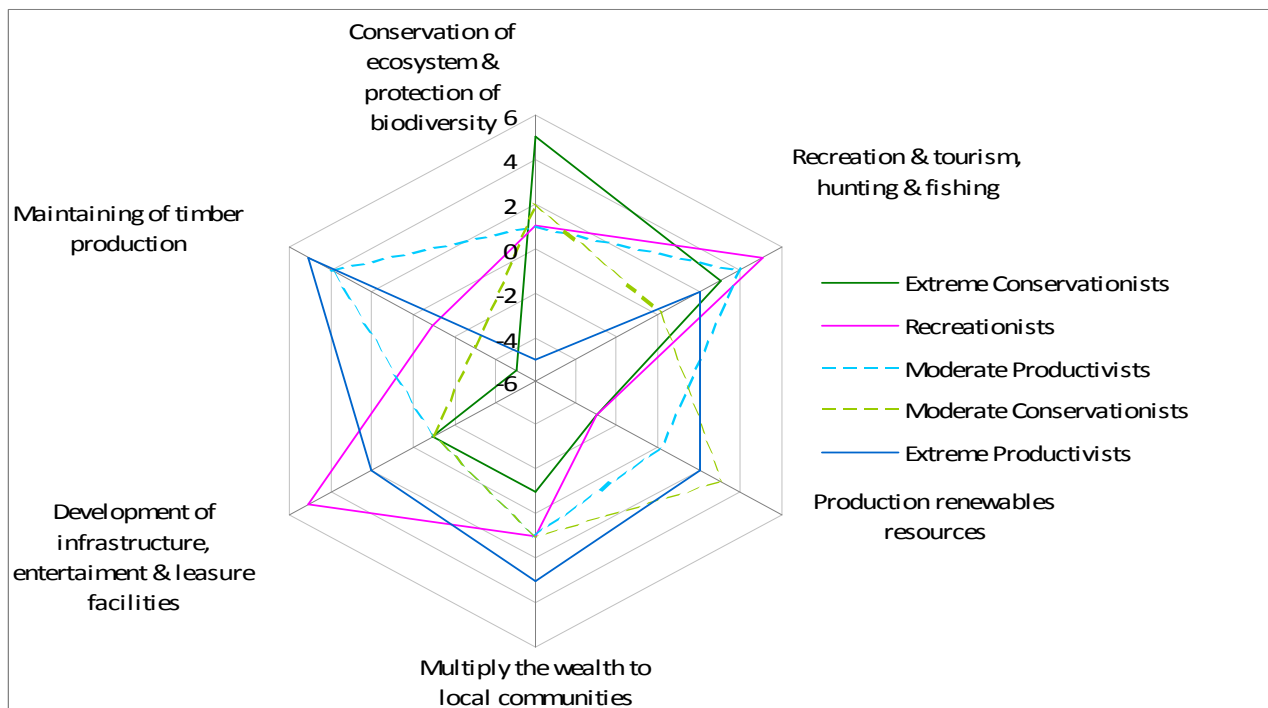

Fig. 2. Distribution of preferences held by different attitudinal groups as identified by Q-analysis.

Discourse analysis (explained e.g. [13]) was used to explore and explain the essence and details of each 'factor' (i.e. attitudinal group) identified. The protection of biodiversity received support of all

attitudinal groups, with the exception of one which was therefore labeled as the Extreme Productivists. All groups, except the group that was named as the Moderate Conservationists, encourage the development of recreation, and hunting and fishing opportunities in forests. The necessity to increase wealth of local communities is supported by all groups, except the Extreme Conservationists; whilst only those named correspondingly as the Productivists rate the importance of maintaining forests for timber, therefore, prioritizing the *provisioning services* above all others (fig. 2). The two attitudinal groups named as the Moderate Conservationists and the Moderate Productivists are similar in their understanding of trade-offs and the balancing of, often competing, objectives of forest multi-functionality. Importantly, that despite these distinct views, all groups support the regeneration of forests and the resilience of their ecosystems.

The research results also provided information on the differences in opinions of stakeholders coming from different countries (fig. 3).
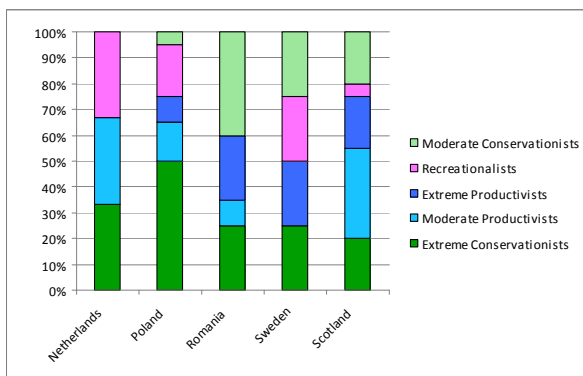
Note: Each column totals to 100%, showing the percentage of respondents which belong to different attitudinal groups in each country.

Fig. 3. Dispersal of the groups within each country respondents.

The heterogeneity of attitudes across countries could be explained by the diverse institutional environments, competences, and capacities, influencing stakeholder preoccupation with multiple opportunities, problems and consequences of forest management and use. Stakeholder attitudes towards biodiversity management in multi-functional forests and to the provision of ecosystem services seem to be dependent upon the socio-economic, political and historical preconditions, cultural standards and ethical principles operating in each of the EU states. Nonetheless, respondents from all countries are represented in the group of Extreme Conservationists.

The results suggest that respondents from Scotland, the Netherlands and Sweden have a wider outlook on sustainable resource development, and interest in the production function of forestry. Farming is seen as an important part of wooded landscapes.

There is support for old growth and hardwood forests; and the development of a modern infrastructure is encouraged.

The respondents from Sweden are distributed evenly across the attitudinal groups, which may indicate the importance of forestry for both timber production and provision of other ecosystem services. In the Netherlands, where the economic role of forestry is insignificant, the Extreme Productivists are not represented. Respondents from Poland, where woodland cover is comparatively extensive, have quite radical nature conservation views, which also allow for recreational opportunities.

The Romanians have moderate nature protection motivations. Their principal support is given to forest regeneration. The low representation of Recreationists in Scotland may be explained by a legacy of monoculture forest plantations.

More specific attitudes revealed in our earlier paper suggest that people in Scotland prefer natural woodlands over plantations, and native species over invasive, paying attention to the enhancement of the aesthetic component of woodlands in landscapes in support of their potential role in tourism [12], [13].

The results did not distinguish attitudinal differences associated with gender in any of the countries. However, the differences vary by age, living conditions and other aspects of life history of the respondents (e.g. across countries they are coming from, as it is shown here, above). The results can be interpreted to provide insights for understanding why certain aspects of multi-functional forest use are unfavourably viewed by some respondents, and favourably received by others.

The results suggest that it is not only long-term issues of nature conservation and/or timber production that matter, but also medium and short term objectives, concerning the supply of income, creation of jobs, development of housing, of transport and infrastructure, and the provision of forest products and amenities.

The findings indicate that there are commonalities in preferences towards forestry and its functions, across the countries studied. The mix of groups in each country implies a broad recognition of the importance of multiple objectives for forest land uses, and an indication of the types of ecosystem services that are characteristic of each grouping, which cross provisioning, cultural, supporting and regulating services.

4. CONCLUSION

Contemporary societies expect a range of goods and services to be supplied from forest ecosystems and their growing importance is clearly reflected in EU policies [19], [20].

However, successful implementation of multifunctional forestry remains a challenge in part because of historic traditions in some places of managing forests for single or at best complementary services [21]. Satisfying contemporary trends seeking a shift towards multifunctional forestry could be a challenge since the combination of multiple ecosystem services may be very different.

Furthermore, stakeholders' priorities with respect to individual forest functions and ecosystem services may be even more variable.

This variation depends on a high number of factors, e.g.: bio-geographical zone, elevation above sea level, relief, site conditions, land-use, population density, culture/traditions, demand conditions, and welfare level.

The question is how the contribution of the location, social and economic dimensions and geographic context of forest types (e.g. tree species) and specific landscape features influences the implementation of multifunctional forestry and what are suitable institutions and capabilities that allow forest management to facilitate the provision of ecosystem services and their transition to more sustainable use with the balancing stakeholders interests? Various stakeholders, with the diversity of their priorities, are an integral component of many ecosystems [22].
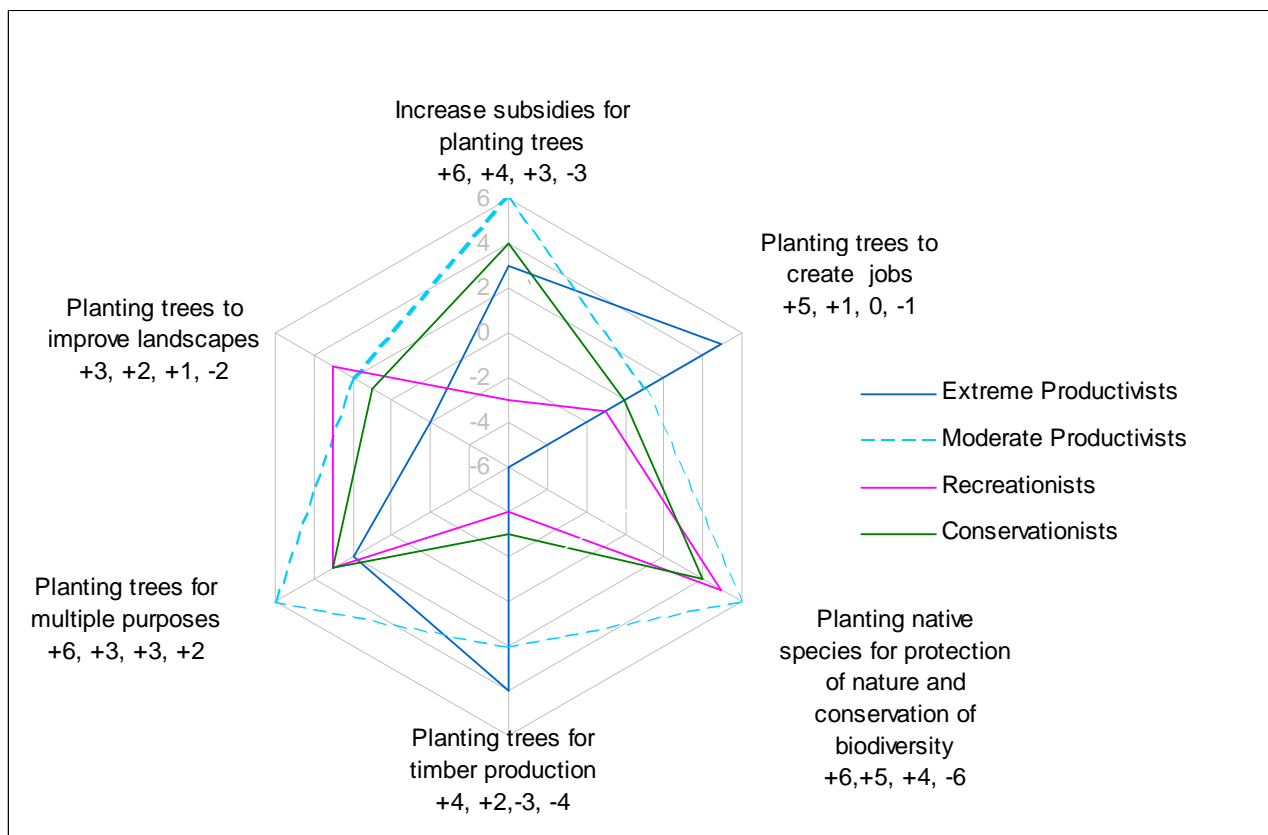

Fig. 4. Preferences for Scotland over the planting trees.

Different end-users' views regarding prioritization among ecosystem services are very important. The use the ecosystem approach framework (and its "people included" principle) to model scenarios of forest management under climate change and other drivers forms a general framework and is a strategy for the integrated management of forests to promote their conservation and sustainable use.

The current research is complementary to the Q-surveys carried out earlier [23]. It supports, for example, the findings of [13] regarding multi-functional development of woodlands in Scotland, which showed preferences for physical and visual accessibility to landscapes, and their spatial continuity. This research gives a discursive evaluation of the major issues identified by a range of stakeholder groups. It should be further complemented by an analysis of decision making which takes into account more complex organizational forestry matters, such as coordination and common pool resource problems.

The use of the research findings to inform forest policies or management objectives will require exploitation of advances in the evaluation of ecosystem services (supply and demand), and vertical and horizontal (e.g. cross-sectoral, cross-regional, and cross-national) co-ordination of practical efforts. It will also benefit from development of institutional capabilities (e.g. multi-level governance) for linking sustainability goals to local, regional, national, and international level forestry policies and practices.

5. ACKNOWLEDGEMENTS

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