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Afforestation of European landscapes: How do different farmer types respond to EU agri-environmental schemes?

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Abstract This paper investigates how different types of farmers manage the landscape with primary emphasis on farmland afforestation, planned landscape changes, and the extent to which EU agri-environmental schemes take farm type specific characteristics into account in information strategies. The empirical data concern landscape practices of more than 2,000 landowners in 16 European areas in eight countries who were surveyed using quantitative questionnaires. Supplementary in-depth interviews were conducted for two case areas in Denmark to further investigate the role of the policy information environment. The analysis is based on a categorization of the farmers into hobby, part-time, full-time and retired farmers. This study shows that hobby farmers constitute a high proportion of landowners and manage a large part of the rural landscape. At the same time, hobby farmers are relatively more interested in landscape changes and differ from other landowners by considering farmland afforestation more often than full-time landowners, for example. Yet, 40% of the hobby farmers who are considering farmland afforestation are not familiar with the agri-environmental scheme for farmland afforestation. One reason may be their low membership rate in traditional information networks such as farmers' or foresters' associations, as revealed by the in-depth analysis of the cases in Denmark. Thus, it is proposed that policy impact may be improved if farmer type specific differences are explicitly taken into account in the scheme logistics for EU agri-environmental schemes.

Keywords Agri-environmental scheme · Afforestation · Hobby farmer · Landscape change · Part-time farmer

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Introduction

Reforms of the EU common agricultural policy (CAP) have enlarged the policy focus from production to also include environmental issues and a rural development perspective in the second pillar of the CAP (Lowe, Buller, & Ward 2002), with nearly 8,000 million Euros allocated for that purpose in the budget for 2006. At the same time, the general agricultural development has resulted in continued specialization and intensification of production on fewer and larger production units and many farms today depend mainly on other sources of income. The agricultural sector in the EU member states covers a wide variety of agricultural conditions, production and marketing

opportunities. This diversity represents a serious challenge for the preparation of well-targeted and acceptable policies. In addition, the increase in voluntary agri-environmental schemes has highlighted the need to address farmer diversity and national and local differences in agricultural opportunities in policy formulation.

The current study investigates how well the agri-environmental schemes within the second pillar are targeting different type of farmers including those with limited economic dependency of farming. Hence, the study seeks to provide insight into the 'farmer type, landscape management and the policy information environment' nexus. A comprehensive survey of 2,406 landowners from 16 European areas representing different rural conditions was used as the empirical basis. The data derive from the European FAIR project (CT 98-4223) ''Multifunctional forestry as a means to rural development'' (Elands & Wiersum, 2003; Elands, O'Leary, Boerwinkel, & Wiersum, 2004). The European survey is supplemented by in-depth studies of the two Danish areas in the survey in order to obtain more detailed information on the landscape management decision process and policy information environment.

A typology of farmers is applied to distinguish between hobby, part-time, full-time and retired farmers. The typology serves as a platform for investigating farmers' landscape management with specific focus on farmland afforestation. Farmer response to the agri-environmental schemes (EU Regulation 2080/1992 and 1257/1999) encouraging afforestation is investigated. Special attention is given to the ''information environment'' among the different farmer types (Wilson, 1997), although the study does not aim to provide a comprehensive evaluation of farmer participation levels in the afforestation scheme. Instead, the role of additional policy measures as well as the efficiency of the information environment including the farmers' network is reviewed by combining the survey data with detailed information from in-depth studies from the Danish case. Specific emphasis is placed on the analysis of the way in which information is communicated to and received by hobby and full-time farmers. This is done in order to test the hypothesis that both the landscape management and information environment of the hobby farmers differ significantly from those of full-time farmers.

Changing farming structures

It is widely acknowledged that the continuing restructuring of the European farming industry, which has led to falling numbers of farms, means not only that some agricultural land becomes available for purchase by people primarily occupied outside agriculture, but also that an increasing proportion of farmers are willing to take special care of the landscape and natural values of their land (van den Berg & Wintjes, 2000). Landowners managing full-time farms no longer constitute the majority in many areas of Europe (Linares, 2003). Other types of landowners have significant influence on the future landscape. However, these owners constitute a very heterogeneous group, ranging from retired farmers to hobby farmers with no agricultural background. Common to all these owners is their at most partial dependence on an economic income from primary production (Meert, Van Huylenbroeck, Vernimmen, Bourgeois, & van Hecke, 2005). Many of them have other motives for living on a property in the countryside, such as having a home in a greener ex-urban settings (Marsden, Banks, & Bristow, 2002) or ample space for personal interests and hobbies (van der Vaart, 2005). Also, non-agricultural activities in farm buildings or on the land are gaining economic importance for some of these land owners (Ilbery, Healey, & Higginbottom, 1997; Lobley & Potter, 2004; Meert et al., 2005).

EU agri-environmental schemes

The contemporary trends towards a changing use of the farm buildings and agricultural land have been further enhanced by a range of policy measures (Herzog, 2005): for example, the European Community encourages afforestation as an accompanying measure to the Common Agricultural Policy (EU Regulation 2080/1992 and 1257/1999). Farmers' response to and participation in such schemes are the result of many factors. A

distinction between the characteristics of the adopting or non-adopting farmers on the one hand and the technical and economic characteristics of the schemes on the other has been proposed (Brotherton, 1989). Hence, Wilson (1997) separated ''farmer factors'' and ''scheme factors'' when evaluating participation in agri-environmental schemes in a case study in Wales. ''Scheme logistics'' was one of the characteristics that Wilson included in the scheme factors and he found that the information about the scheme seemed to have targeted mainly larger farms. However, information about the scheme also relied on the farmers' individual ''information environment'' including e.g., contact to local networks, other farmers and associations. Contact with officers from the Agricultural Development and Advisory Service (ADAS) was identified as an important source of information, and since the ADAS mainly ''[targets] larger farms it is likely to influence participation'' or at least, small holders might be less informed about the scheme. Although the specific network with ADAS officers proved to be an important information environment, Wilson found that the general information environment ''has not greatly influenced participation'' compared to other characteristics (Wilson, 1997, 87).

Landscape management and farmer types

The landscape practices of the farmers depend on both biophysical and socio-economic settings (Reenberg & Baudry, 1999), including financial support such as the agri-environmental scheme and other regulations as determined by policy and planning measures. Landscape policy and planning do not, however, affect the landscape per se but are mediated through landowner practices (Oñate, Andersen, & Primdahl, 2000).

It is commonly believed that farmers deriving a marginal or minor income from agricultural production generally have other aims in mind in their landscape use and management practices than full-time farmers (van den Berg & Wintjes, 2000). A precise documentation of the way different farmer types manage the rural landscape is, however, not easy to establish. Among other, this has to do with the fact that it has been difficult to set up unambiguous terms to characterize the different types of farm properties that do not fully rely on income from agricultural production.

'Part-time farming' has often been referred to as combining agriculture with other economic activities (Mage, 1976; Gasson, 1988; Munton, Whatmore, & Marsden 1989; Wilson, Mannion, & Kinsella, 2002). One way of assessing the status of a farm unit is by looking at the number of ''annual work units'' (AWU), which compare working hours for farming to standard full-time employment in other sectors (Linares, 2003). The AWU is measured by a standard algorithm of farm size and kind of production, where a part-time farm equals less than one AWU. Using this definition, 60% of all farms were part-time farms in the EU-12 in 1989/1990 (European Commission, 1995), growing to 64% in 1999/2000 for the same 12 member countries and 63% in the EU-15 (European Commission, 2003). However, these percentages may not accurately reflect the real situation. For instance, a farmer might spend all his/her working time on what is statistically defined as a part-time farm, while a part-time farmer engaged in off-farm work may own and manage a full-time farm with contract workers or entrepreneurs in peak seasons (Lobley & Potter, 2004; Præstholm & Kristensen, 2004). Furthermore, the use of AWU is not adequate for measuring economic dependency on farming. The full-time farm mentioned above could be mainly dependent on the off-farm income, and would therefore not be considered a full-time farm from an economic perspective (Primdahl, 1999; Lobley & Potter, 2004).

Another problem with the classification of farmers is whether to focus on the owner alone or the entire household as the base unit (Gasson, 1988). The use of concepts like ''multiple job holding'' and ''pluriactivity'' (Fuller, 1990) exemplify the problems of using time, income or other indicators for the classification of farm types. The multiple job holding concept refers to the job situation of the owner or the household only, while the term ''pluriactivity'' is proposed as a more comprehensive concept covering all types of economic activities that sustain the individual farm family (Brun & Fuller, 1991). Diversification

has been used with a meaning similar to pluriactivity, e.g., in respect to different strategies for farm development (Bowler 1992; McNally, 2001; Meert et al., 2005), while ''other gainful activities'' (OGA) include non-agricultural enterprise only (Linares, 2003). Furthermore, a distinction is often made between on- or off-farm OGA diversification (Ilbery et al., 1997).

As a further complication, Fuller (1990) emphasizes that the practices of part-time farmers do not necessarily differ from those of full-time farmers. This is supported by an English case study where general differences were detected, but the variation among part-time landscape practices was as great as the variation ''between full-time and part-time farming'' (Munton et al., 1989). However, other studies demonstrate that compared to full-time farmers, part-time farmers have different landscape practices regarding afforestation and planting of hedgerows on farmland (Kristensen, 2003; Primdahl 1999).

Typologies of farmers/farms may not only be determined by single criteria like economic dependency on farming or annual working hours on the farm. Baudry and Thenail (2004) define farm type by combining the size of the holding (ha), the size of production (only dairy) and the predominant branch of production (cash crop or dairy) and also distinguish between different landscape practices among the farm types. Another method involves looking at ''styles of farming'' (Ploeg, 1994). Compared to a taxonomic typology based on e.g., annual working hours, ''styles of farming'' is a hermeneutic approach that takes into account farmers' orientation towards commodity markets and the adoption of technologies (Whatmore, 1994). Schmitzberger et al., (2005) demonstrate recent uses of this approach. By means of a wide range of both economic and social criteria derived from interviews with 84 Austrian farmers, they identify eight ''farming styles''. Taking a similar approach, Busck (2002) identifies different styles of landscape practices regarding improvement of nature content on farms. Moreover, applicants for field afforestation grants have been characterized by different styles (Madsen, 2003).

The challenges related to the establishment of a meaningful characterization of farm units, which can distinguish economically rational farm enterprises from the rapidly growing group of less intensive farm holdings, make it a complicated task to provide sound empirical evidence for landscape—farmer type interrelationships, not least if the characterization is based on generally available statistics. The use of ''farming styles'' has provided meaningful results in cases where in-depth knowledge of the individual farmer was available. However, these studies were highly resource demanding and not easily carried out on a large scale. Thus, in the current context a relatively simple approach based on farmers' own perceptions of their work has been employed.

Materials and methods

European case studies

Two case study areas were selected in each of the following eight countries: Austria, Denmark, Germany, Greece, Hungary, Ireland, the Netherlands and Spain. The study areas were chosen by research teams in each country. It was determined that two types of landscapes should be represented in each country: (a) an area where forests had long been present (a traditional forest area) and (b) an area where recent afforestation had taken place and the establishment of new forest areas was desirable (designated as an afforestation area). The main aim was to illustrate a variety of rural conditions in Europe rather than to ''represent a priori-identified typical conditions at either national or European scale'' (Elands & Wiersum, 2003) (Fig. 1). Nevertheless, the eight countries do exemplify typical rural and agricultural settings in a European context. The case studies in Denmark and the Netherlands represent the northern European situation, where agricultural intensification over many decades has led to intensively used landscapes where most land is under cultivation and few areas of nature are left. Agricultural production in these intensively used landscapes has in recent decades been subject to strict environmental regulation in an effort to reduce nutrient leaching, pesticide

Fig. 1 Location of case study areas in the eight participating countries. Triangles indicate traditional forest area (tf) and squares indicate afforestation areas (af). See also Table 1

pollution and loss of biodiversity. The areas in Spain and Greece represent southern European settings, where agricultural production is less intensive and land abandonment is a serious problem in some areas. The areas in Austria and Germany represent settings where forestry traditionally plays an important role in the primary sector and in conserving biodiversity. Ireland has large grassland areas used for sheep grazing and only limited cropland and forest. Hungary represents one of the new EU member states where both land abandonment and intensification of land use are occurring simultaneously, as a result of political changes and the re-organisation of the agricultural sector. The case areas thus cover a wide range of rural situations, representing typical combinations of socio-economic and physical variables in the European countryside. All 16 areas corresponded to local administrative units, such as municipalities. However, they varied considerably in terms of size, population, land cover and socio-economic characteristics (Table 1).

A quantitative questionnaire survey included landowners in the 16 study areas. Landowners were defined as owners of forest, farmland or both. The questionnaire was developed on the basis of qualitative interviews in the Multifor.RD project (Elands & Wiersum, 2003). The survey was carried out in the spring of 2001, following a pilot test in each country and a subsequent adjustment of the questionnaire. The questionnaire was afterwards translated into all relevant native languages.

The information available on the landowners varied between the countries involved and different approaches were adopted accordingly in order to select target groups to whom the questionnaires could be distributed. In some of the areas, information and addresses of all landowners were easily provided by authorities, whereas in other areas information was scarce and the landowners had to be identified in various indirect ways, i.e., through fieldwork. The number of landowners and expected participation rate in the survey were both taken into consideration in determining the

Table 1 Characteristics of the different case study areas (end of the 1990s)

	Characteristics of the case study areas				
	Size (km^2)	Population	Forest cover (%)	Agricultural land (%)	Type of area*
Austria (AU) *af*	346	11,234	24	70	Primary +
Austria (AU) *tf*	302	8,731	55	41	Primary –
Denmark (DK) *af*	130	6,715	10	88	Diversified
Denmark (DK) *tf*	272	31,759	6	86	Urbanized
Germany (GE) *af*	197	22,893	31	57	Primary +
Germany (GE) *tf*	91	12,396	62	32	Urbanized
Greece (GR) *tf (1)*	55	2,858	9	18	Diversified
Greece (GR) *tf (2)*	125	5,245	44	45	Primary –
Hungary (HU) *af*	81	6,070	15	71	Diversified
Hungary (HU) *tf*	95	2,826	45	50	Primary –
Ireland (EI) *af*	112	3,477	6	77	Primary –
Ireland (EI) *tf*	77	4,147	6	93	Diversified
Netherlands (NL) *af*	121	32,908	3	86	Diversified
Netherlands (NL) *tf*	319	101,333	35	39	Urbanized
Spain (ES) *af*	65	7,726	53	25	Urbanized
Spain (ES) *tf*	150	264	82	16	Remote

After each country name, the afforestation area is indicated with ''af'' and the traditional forest area with ''tf'' as shown in Fig. 1

Source: Deugd and Elands (2001)

* Type of area refers to the classification used in the Multifor.RD project. The classification is made on the basis of quantitative economic and demographic parameters such as population density and the importance of the primary sector compared to the secondary and tertiary sectors. ''Remote'' indicates depopulated areas. ''Primary'' areas are dominated by the primary sector and trends can be either growth (+) or decline (–). ''Diversified'' areas have all sectors, but the primary sector is still of some importance compared to ''Urbanized areas'', where the tertiary sector predominates

size of target group in each area. The aim was to collect a random sample that would achieve a 95% confidence level on fifty-fifty (worst case) answers (McGrew & Monroe, 2000, p. 112). In many cases, all landowners in the target group were included because the number of landowners was relatively small and the frequency of participation was uncertain. Questionnaires were distributed either by mail or personally by the researchers. On average for all eight countries, 46% of the landowners in the target group completed the questionnaire. The participation rate, however, varied from 25% in one of the Spanish areas to 91% in one of the Hungarian areas, while it was 73% and 76% in the two Danish areas. The total number of respondents in each area ranged from 46 to 260, reflecting both different frequencies of landowners' participation and the total number of landowners in the areas. The final sample size did not fully meet the statistically defined demands mentioned above in any of the case study areas; however, all samples consisted of more than 30 respondents.

The total number of respondents in the entire survey was 2,406. A European database with results from all case studies was established and SPSS software was used to calculate descriptive statistics and chi-square tests. Because the sample sizes varied (from 46 to 260), the number of respondents in each area was weighted in statistical tests on the entire data (2,406 landowners) to avoid results skewed by the areas with many respondents.

Before the results are presented further, it should be noted that eight different teams investigated the situation in 16 different rural areas with very different cultural and socio-economic backgrounds. Despite a strong internal coordination effort within the Multifor.RD project (Elands & Wiersum, 2003), the cross-cultural character of the project inevitably implied certain differences in data collecting and uncertainties in analysis and interpretation. Although the in-depth interviews in the Danish cases primarily serve to cover additional aspects, they may also be regarded as a more solid ground for interpretation

of the general part of the survey in the sense that all data have been collected personally by the current authors.

Supplementary studies of the Danish cases

The surveys of the two Danish case areas have been further supplemented by a set of qualitative interviews. Agricultural land dominates both areas, and forest only covers 6% and 10% of Haderslev and Hvorslev municipality respectively, which is a relatively low percentage compared with most other European case study areas (Table 1). Haderslev is a traditional forest area with old deciduous forests. The soils are mostly fertile, composed of sand and clay mixtures. The mean property size is 67.1 ha (2001) while the second area, Hvorslev, is characterized by smaller properties (34.5 ha) and less fertile soils (Madsen, Nørr, & Holst, 1992; Danmarks Statistik, 2002). The forests in Hvorslev are mostly coniferous and planted on marginal land along the rivers.

In these two Danish areas, qualitative interviews were conducted with a total of 33 landowners, 13 community inhabitants, and 13 decision makers and members of NGOs. The aim of the interviews was to investigate the variety of local actors' practices and attitudes. A three-step strategy was applied for selecting interviewees. First-round interviewees were selected based on the information provided by authorities, farmers associations and other NGOs. For the second round, interviews were arranged during fieldwork in the case study areas. Some interviewees were met by chance while walking or driving around in the areas, while others were contacted because their property seemed interesting. Finally, each interview usually gave hints on several other relevant persons to interview (a snowball effect).

Each interview dealt with the individual practices and attitudes structured within four overall themes: (1) professional and economic activities in the area; (2) non-professional activities in the area; (3) special attention to the issue of forest and forestry in the area; and (4) the general situation and living conditions in the rural area (Elands & Wiersum, 2003). Temporal development (past–present–future) was implied under each theme and special attention was given to the influence of internal or external factors on practices and attitudes, including issues of planning and incentives. The investigation of policy and ''information environment'' issues related to forest and afforestation[1] was a special concern.

Classification of landowners into farmer types

The classification of the landowners into farmer types was based on occupational status. Thus, landowners were asked to describe their ''present situation with respect to work'' in the survey questionnaire (Elands & Wiersum, 2003). Respondents could choose one or more relevant options from a list. One of the options was ''farmer/forester''. The classification of the landowners was based on the following criteria:

1. Hobby: Landowners who did not tick the option ''farmer/forester''.
2. Part-time: Landowners who ticked ''farmer/forester'' but also another occupation, e.g., ''employee''.
3. Full-time: Landowners who only ticked ''farmer/forester''.
4. Retired: Landowners who ticked ''retired'' were classified as such, irrespective of whether they had ticked other options.

Thus, apart from the retired landowners, the landowners are classified as farmer types according to their own subjective perception of their working situation rather than according to prefixed objective criteria. Retired landowners were classified exclusively as retired because they are directly supported by retirement benefits and are

[1] The Danish policy aims at doubling the forest cover within the next 80–100 years (Danish Forest and Nature Agency, 2002). One of the means to achieving this is the scheme within Regulation No 2080/1992 and 1257/1999, which gives financial encouragement to landowners willing to engage in afforestation. Applications for subsidies are prioritized according to spatial criteria. The county authorities have designated three types of areas: afforestation areas, neutral areas and areas where afforestation is not allowed. The allocation of subsidies is given highest priority in the afforestation areas, but other criteria are also considered when applications are prioritized by the authorities, e.g., tree species and distance to urban areas. The grants are also higher in the afforestation areas (Madsen, 2002)

likely to abandon their own activities in the near future.

Results

The paper seeks to test the hypothesis that landscape practices, in this case, planting of forest, as well as the information environment vary between different farmers with different degrees of dependency on agriculture. The respondents are therefore first classified into four farmer types. Subsequently, the degree of interest in farmland afforestation is presented for each farmer type while the final section presents the importance of afforestation schemes and landowners' familiarity with them.

Distribution of farmer types

Most of the landowners in the European survey owned farmland, while 9% of the respondents owned forest only (no farmland). Hobby farmers are the largest group among the respondents (35% of landowners) but there are significant differences in the distribution of farmer types between countries and areas (see Fig. 2). Especially in the former socialistic case studies (Hungary), the proportion of hobby farmers is extremely high. The landowners are either hobby farmers or retired while very few of the respondents are solely depending on full-time farming. The frequency of hobby farmers is also high in the urbanised areas in Germany and the Netherlands. The proportion of retired is generally high in the Mediterranean areas (apart from one GR *tf 2*) while combining farming with other employment (part-time farmers) is most frequent in the areas located in Ireland, Denmark and Germany. The frequency of full-time farmers is less than 50% in all areas except for one area (GR *tf 2*). Differences in the proportion of land owned by different farmer types can also be detected. Despite that farming is of marginal importance to the hobby farmers, they constitute an important group of landowners owning 23% of the land, and may therefore greatly influence future land management. Full-time farmers own 51% of the land; thus, nearly half of the land is used by other farmer types. Retired and part-time farmers own 17% and 19% of the total land respectively. In one of the Danish cases (DK tf), only 7% of the land is owned by hobby farmers, while hobby farmers own 80% of the land in the traditional forest area in the Netherlands (NL tf). However, it should be noted that the area in the Netherlands is an exception, as a few conservation groups that own large areas have been classified as hobby ''farmers''.

In reference to the Danish cases, there is a higher proportion of full-time farmers in the more fertile area of Haderslev (42%) compared to

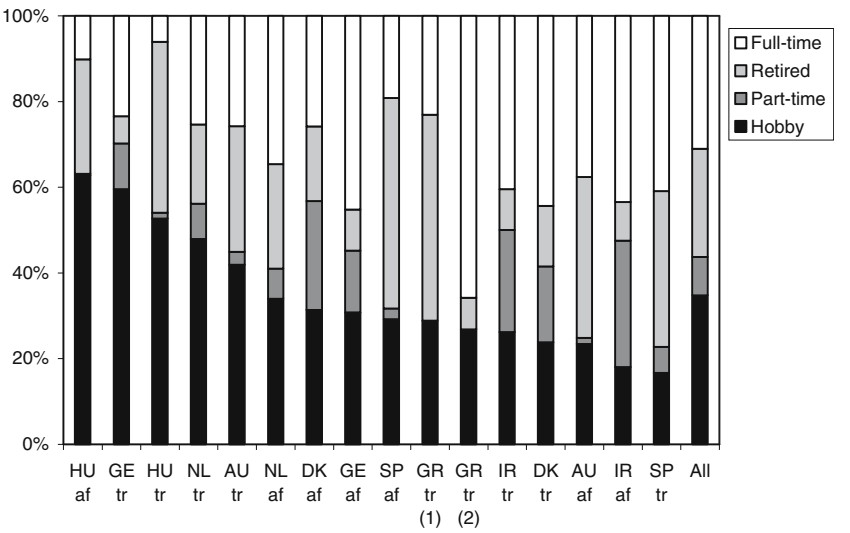

Fig. 2 Classification of landowners in farmer types. In the column for ''all'', the data are weighted so each of the 16 areas counts equally. (N = 2,384)

Hvorslev (25%) (Fig. 2). In Haderslev, hobby farmers only own 7%, while full-time farmers own 74% of the land and have greater influence on land use. In Hvorslev, the hobby owners own 19% of the land, while full-time owners own 50%.

Farmers' interest in farmland afforestation

The farmers' interest in farmland afforestation was investigated by analysing differences in their perception if current forest cover and future afforestation plans. The survey shows a significant difference in the perception of current forest cover between the four types of farmers. Approximately three-quarters of the respondents are satisfied with the local forest cover both next to their home and in the municipality. However, the hobby farmers appear to be significantly more negative and less satisfied in their evaluation of the landscape, answering that there is ''too little'' forest cover next to their home ($P = 0.000$), in the municipality ($P = 0.015$) or in the country ($P = 0.000$) (Table 2).

The same trends are seen in the Danish cases, where very few owners perceived the forest cover as ''too much''. The majority of landowners are satisfied with the forest cover both next to their home and in the municipality, especially the full-time farmers in Haderslev, who had a satisfaction rate of 97% and 86% respectively. In contrast, many hobby farmers found the forest cover next to their home ''too little'' (14% in Haderslev and 36% in Hvorslev).

The fact that many hobby farmers seem to find the forest cover on the property too little (Table 2), is reflected in their plans for future changes on their own property. In the survey, landowners with agricultural land were asked if they were considering planting forest within the next 5 years, and a significantly higher proportion of the hobby farmers indicated that they have plans for afforestation (25%) ($P = 0.000$). The interest in future farmland afforestation is lowest among full-time farmers (Table 3).

Again, there are large variations between the results from different areas and countries in the survey. However, the highest frequencies of landowners with afforestation plans are found among the hobby farmers in most of the areas. In a few areas, the percentage is highest among part-time farmers, while the Hungarian afforestation area is the only case where full-time farmers dominate.

In general, one would expect a relatively high level of interest in planting forest in the eight case areas that were chosen to represent 'afforestation areas' in the survey (cf. above). This is reflected in the summarized results of the survey, which indicate that 21% versus 16% are considering planting forest in the afforestation areas and traditional forest areas respectively.

The Danish case reveals further details. A quarter of the landowners in both areas are considering farmland afforestation within the next 5 years. This is a high proportion compared to the afforestation that took place throughout Denmark in the 1990s (Skov- og Naturstyrelsen, 2000). In Haderslev, 40% of the hobby farmers are currently considering farmland afforestation, compared to only 15% of the full-time farmers ($P = 0.020$). In Hvorslev, both hobby and part-time farmers have an above-average frequency: 28% and 33% respectively, compared to 16% of the full-time farmers, although the differences are not significant ($P = 0.196$) (Table 3). Fears about the lack of land for future agricultural development

Table 2 Perception of present forest cover on different geographic scales by each farmer type: percentage of respondents answering ''too little'' forest

In percentage	Farmer type				
	Retired	Hobby	Part-time	Full-time	Total
Forest cover is too little					
Next to home	18.7	24.4	9.2	15.3	18.6
In the municipality	16.9	20.2	13.9	13.4	16.6
In the country	35.4	45.2	36.6	29.2	36.9

The data are weighted so each of the 16 areas counts equally. *N* ranges between 2,167 and 2,236

Table 3 Consideration of afforestation as an option on farmland within the next 5 years

In percentage	Farmer type				
	Retired	Hobby	Part-time	Full-time	Total
Consider to plant forest					
All areas	13.1	24.5	20.9	14.1	18.0
Haderslev	25.1	40.0	29.7	15.1	24.6
Hvorslev	17.4	27.5	32.7	15.6	24.6

Only owners of agricultural land were asked. The data for ''all areas'' are weighted so each of the 16 areas counts equally. N = 1,560, 183 and 171 respectively

are stated as one of the reasons why full-time farmers are less likely to consider farmland afforestation in Haderslev. A full-time farmer expressed it this way during an interview: ''I think it is a shame to take land out of rotation when it can be used for agriculture. No more [land] is going to appear, and there's enough of a struggle over it already''.

Afforestation schemes: farmers' knowledge levels, adoption patterns and information environment

Generally, subsidies are an important incentive. Sixty-two percent of all landowners agreed that they would not engage in farmland afforestation without subsidies, while the remaining landowners were not sure (21%) or disagreed (17%). Though the scheme for planting on farmland seems important for encouraging the landowners, one-fifth of the landowners who considered farmland afforestation within the next 5 years did not find grants necessary.

In the European survey, all owners who owned farmland but had not yet planted forest on their land were asked if they knew about the scheme. The knowledge level differed significantly between the four farmer types (P = 0.001) (Table 4). Approximately half of the hobby farmers knew of the scheme, while 60–70% within the other three groups were familiar with it. This observation makes it even more remarkable that the hobby farmer group had the highest proportion of respondents who were considering farmland afforestation within the next 5 years (Table 3). Nearly 40% of the hobby farmers who were considering farmland afforestation did not know of the scheme. However, the differences are not significantly different from the mean value for all farmer types of 28%.

The Danish cases show a relatively high level of knowledge about the afforestation scheme. Similar to the general trend for all 16 European areas, the hobby farmers are significantly less informed compared to the other farmer types: 60% of hobby farmers in Hvorslev and 50% in Haderslev (Table 4). There are no differences between the Danish hobby farmers who are considering farmland afforestation within the next 5 years and those who are not.

The landowner networks were analysed through questions regarding membership in farmers' or foresters' associations and the advisory service, which is sometimes attached to the

Table 4 Knowledge of the farmland afforestation scheme

In percentage	Farmer type					
	Retired	Hobby	Part-time	Full-time	All groups	P
Knew the scheme						
All areas	60.7	51.3	70.7	63.8	60.0	0.001
Haderslev	90.0	50.0	78.9	75.0	69.9	0.06
Hvorslev	66.7	60.0	94.6	82.6	76.8	0.003

Only landowners that have farmland and have not previously planted forest are included. The data for all areas are weighted so each of the 16 areas counts equally. N = 811, 73 and 112

association. On average, 62% of the landowners in the European survey are members of either a farmers' or a foresters' association. Although the percentage ranges from 17% to 92%, more than half of the landowners are members of an association in 11 of the 16 areas. The hobby farmers have the lowest membership rate (45%), while the full-time farmers have the highest (81%). Similar results are seen for both types of associations: 36% and 16% of the hobby farmers are members of farmers' or foresters' associations respectively, while the same is true of 75% and 27% of full-time farmers.

In the Danish cases, networking through membership in farmers' or foresters' associations predominates, and only 11% of the owners in Haderslev and 20% in Hvorslev are not members of an association. Membership status seems to influence the level of information since 80% of the members of a farmers' association knew about the afforestation scheme compared to 60% of the non-members. Almost all the members of a foresters' association (96%) were familiar with the scheme. Two-thirds of Danish hobby farmers were members of farmers' associations, which is a relatively high proportion compared to one-third of hobby farmers in all 16 European areas. However, this frequency is still lower than for the other farmer types, and full-time farmers have the highest membership rate (96%) in general.

Discussion

The results indicate that hobby farmers are an important group in the agricultural sector in the EU-member states, both in terms of their number and interest in landscape management.

The group seems proactive in terms of landscape changes: a higher proportion of the hobby farmers are actively considering afforestation on their property than are other farmer types, especially the full-time farmers. The figures are very high in the Danish case, especially when compared with the degree of afforestation in the decade prior to the survey. Grants were only made in eight cases each in Hvorslev and Haderslev between 1994 and 2004 (Danish Forest and Nature Agency, pers. com). Hence, the figures should be interpreted with care because the step from actively ''considering'' to actually ''planting'' forest may be uncertain. However, even if the figures are overestimated, it is unlikely that such an overestimation would skew the difference between the hobby farmers and full-time farmers and explain the recorded significant differences on preparedness to afforest (Table 3). The results of the study, therefore, confirm other lateral studies indicating that hobby farmers are more active in terms of planting than other farmer types (Primdahl, 1999; Kristensen 2003).

Meanwhile, the knowledge of the afforestation scheme varies significantly between different farmer types. Even though they tend to be more interested in afforestation, the hobby farmers are generally less informed, as illustrated by the average figures for the European cases indicating that 40% of the hobby farmers who consider farmland afforestation are not aware of the afforestation scheme. To use the terminology proposed by Wilson (1997), the findings may indicate that ''scheme logistics'' do not target hobby farmers adequately, or may indicate a suboptimal functioning of hobby farmers' ''information environment''. This is in line with other studies showing that attachment to landowner associations and advisory services was an important source of information regarding the agri-environmental schemes of EU Regulation 2078/1992 (Wilson, 1997). The two Danish case studies support the claim that knowledge of the afforestation scheme correlates with membership status in a farmers' association. This in turn implies that the information environment is weaker among hobby farmers, since their membership frequency in farmers' or foresters' associations is much lower than that of full-time farmers.

An important aspect of these results is the indication that it may not be a serious problem that hobby farmers are less informed about the afforestation scheme. Many hobby farmers consider farmland afforestation irrespective of their lack of knowledge about subsidies. These findings are in accordance with another Danish study which documented that one-third of the initial applicants planted forest on their farmland despite a rejection of their application for subsidies within the afforestation scheme (Madsen, 2001). Other

findings support the opposite view, however, and most landowners in the 16 European case areas emphasize that grants for planting are necessary. Prior experience in Denmark and Ireland points in the same direction. Private afforestation in Denmark increased significantly after the grant within the scheme was raised in 1997 (Skov- og Naturstyrelsen, 2000), and in Ireland it has been concluded that the most efficient way to increase private afforestation is to enhance the planting grants (McCarthy, Matthews, & Riordan, 2003). These findings, though somewhat ambiguous, seem to justify the modification of scheme logistics by authorities in order to reach hobby farmers more effectively. This would improve the overall efficiency of the schemes, and, from an ethical perspective of equal rights, it could further be argued that authorities are obliged to target information equally towards all types of landowners and not rely on dissemination through the individual landowners' own networks such as the farmers' associations.

The low level of knowledge of the afforestation scheme reflects a suboptimal information environment regarding planning and regulation issues among hobby farmers. Under such conditions, hobby farmers might cause unwanted landscape changes or natural impacts simply because they are unaware of planning or legal guidelines. The hobby farmers' involvement in the traditional networks of the farmers' or foresters' associations are anticipated to be even lower in the future as growing proportions of farms are sold to households without any agricultural background (X & X, 2004; van der Vaart, 2005). Therefore, it seems more appropriate for authorities to improve communication in general, also with regard to the afforestation scheme.

The design of appropriate modifications to scheme logistics constitutes a considerable challenge. Landowners classified as hobby farmers in this European study represent a very heterogeneous group, which is problematic in the classification process. Fuller (1990) questions the existence of a causal relationship between taxonomic groups and practices of the landowners. It may be more relevant to consider practices of each landowner as evolving out of an individual and complex interrelationship of many variables. The multi-criteria typology behind the ''farming styles'' approach by Schmitzberger et al. (2005) represents a step in that direction. They conclude that agri-environmental schemes could have a ''far better effect if they were tailored to the individual needs of different regions and predominant farming styles''. Similarly, Madsen (2003) concludes that the economic rationale behind the scheme for farmland afforestation does not match the practices and values characterizing some of the farming styles that she identified.

An implementation of farm-nature plans as a policy tool in Haderslev may provide inspiration for modifications to the information environment among e.g., hobby farmers (see also Smeding & Joenje, 1999). Haderslev municipality has tried to improve natural qualities of the landscape, including afforestation, by assisting landowners in formulating a voluntary farm-nature plan for their property. An officer from the municipality and the owner discuss landscape qualities and possibilities for improvement, and at the same time the owner is informed of relevant schemes for which subsidies can be applied. The landowners interviewed in the current study had a very positive view of the service. This direct communication between authorities and farmers might be the way forward in improving the information environment for farmers who are not already well informed through their own networks such as the farmers' associations. Also, it offers possibilities for creating solutions appropriate to the specific local area. In the current study, a range of very different case study areas were included. Although responses to agri-environmental schemes may vary not only between farmer types but also between areas; the EU agri-environmental scheme targets areas as diverse as a highly urban influenced area with many newcomers in the Netherlands and a remote and depopulated area in Spain.

Conclusion

The empirical results from the case study show that landowners with marginal interests in production, classified as hobby farmers in this study, are important agents in the contemporary rural

landscape and cannot be ignored when discussing the future of landscape and its management. Hobby farmers are smallholders, but they are numerous. Therefore, as a group they own and manage a relatively high proportion of the rural landscape in the investigated areas. The results support the need for stratified scheme logistics to counterbalance a weaker information environment among the hobby farmers. It is appropriate to perceive hobby farmers as a group with distinctive characteristics both in terms of landscape changes and logistics. Thus, policy impact may be improved if farmer type specific differences are explicitly taken into account in initiatives aimed at promoting environmental awareness such as the scheme for farmland afforestation.

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References

Baudry, J., & Thenail, C. (2004). Interaction between farming systems, riparian zones, and landscape patterns: a case study in western France. *Landscape Urban Plan, 67*, 121–129.

Bowler, I. R. (1992). Sustainable agriculture as an alternative path of farm business development. In I. R. Bowler, C. R. Bryant, & M. D. Nellis (Eds.), *Contemporary rural systems in transition, Vol. 1* (pp. 237–253). Wallingford: CAB International.

Brotherton, I. (1989). Farmer participation in voluntary land diversion schemes: Some observations from theory. *Journal of Rural Studies, 5*, 299–304.

Brun, A. H., & Fuller, A. (1991). *Farm family pluriactivity in western Europe*. Oxford: The Arkleton Trust Ltd.

Busck, A. G. (2002). Farmers' landscape decisions: relationships between farmers' values and landscape practices. *Sociol. Ruralis, 42*, 233–249.

Danish Forest, Nature Agency (2002). *The Danish national forest program in an international perspective*. Copenhagen: Ministry of the environment.

Danmarks Statistik, (2002). *Statistiske efterretninger: Landbrug 2002:12*. Danmarks Statistik [Statistics Denmark], København.

Deugd, M., & Elands, B. H. M. (2001). *Comparative characterisation of case study areas—Multifor.RD working paper D1T3*. Wageningen University, Wageningen (available on http://www.dow.wau.nl/multifor/).

Elands, B. H. M., & Wiersum, K. F. (2003). *Forestry and rural development in Europe: Research results and policy implications of a comparative European study*. Forest and Nature Conservation Policy Group—Wageningen University, Wageningen (available on http://www.dow.wau.nl/multifor/).

Elands, B. H. M., O'Leary, T. N., Boerwinkel, H. W. J., & Wiersum, K. F. (2004). Forests as a mirror of rural conditions; local views on the role of forests across Europe. *Forest Policy and Economics, 6*, 469–482.

European Commission (1995). *Farm structure—1989/1990 survey: Main results*. Luxembourg: EUROSTAT.

European Commission (2003). *Farm structure; 1999/2000 survey*. Luxembourg: Office for Official Publications of the European Communities.

Fuller, A. (1990). From part-time farming to pluriactivity: a decade of change in rural Europe. *Journal of rural studies, 6*, 361–373.

Gasson, R. (1988). *The economics of part-time farming*. Harlow: Longman Scientific & Technical.

Herzog, F. (2005). Agri-environment schemes as landscape experiments. *Agriculture, Ecosystems & Environment, 108,* 175–177.

Ilbery, B. W., Healey, M., & Higginbottom, J. (1997). On and off-farm business diversification by farm households in England. In B. W. Ilbery, Q. Chiotti, & T. Rickard (Eds.), *Agricultural restructuring and sustainability—A geographical perspective* (pp. 135–151). Wallingford: CAB International.

Kristensen, S. P. (2003). Multivariate analysis of landscape changes and farm characteristics in a study area in central Jutland, Denmark. *Ecological Modelling, 168*, 303–318.

Linares, D. (2003). *Structure of agricultural holdings in the EU—Part-time work on agricultural holdings, Statistics in focus*. Luxembourg: EUROSTAT.

Lobley, M., & Potter, C. (2004). Agricultural change and restructuring: Recent evidence from a survey of agricultural households in England. *Journal of rural studies, 20*, 499–510.

Lowe, P., Buller, H., & Ward, N. (2002). Setting the next agenda? British and French approaches to the second

pillar of the Common Agricultural Policy. *Journal of Rural Studies, 18*, 1–17.

Madsen, H. B., Nørr A. H., & Holst K. A. (1992): *Den Danske Jordklassificering: Atlas over Danmark I (3)*. Copenhagen:Kongelige Danske Geografiske Selskab/ C.A. Reitzels forlag.

Madsen, L. M. (2001). Location of farm woodlands in Denmark: A quantification of the results of the scheme for field afforestation in Ribe and Vejle counties. *Danish Journal of Geography, 101*, 87–99.

Madsen, L. M. (2002), The Danish afforestation programme and spatial planning: New challenges. *Landscape and Urban Plan, 58*, 241–254.

Madsen, L. M. (2003). New woodlands in Denmark: The role of private landowners. *Urban Forestry & Urban Greening*, *1*(3), 185–195.

Mage, J. A. (1976). A typology of part-time farming. In A. Fuller, & J. A. Mage (Eds.), *Part-time farming: Problem or resource in rural development* (pp. 6–37). Norwich: Geo Abstracts Ltd.

Marsden, T., Banks, J., & Bristow, G. (2002). The social management of rural nature: understanding agrarian-based rural development. *Environment and Planning, A34*, 809–825.

McCarthy, S., Matthews A., & Riordan, B. (2003). Economic determinants of private afforestation in the republic of Ireland. *Land Use Policy, 20*, 51–59.

McGrew, J. C., & Monroe, C. B. (2000). *An introduction to statistical problem solving in geography*. Boston: McGraw-Hill.

McNally, S. (2001). Farm diversification in England and Wales—What can we learn from the farm business survey? *Journal of rural studies, 17*, 247–257.

Meert, H., Van Huylenbroeck, G., Vernimmen, T., Bourgeois, M., & van Hecke E. (2005). Farm household survival strategies and diversification on marginal farms. *Journal of rural studies, 21*, 81–97.

Munton, R. J. C., Whatmore, S. J., & Marsden, T. (1989). Part-time farming and its implications for the rural landscape: A preliminary analysis. *Environment and Planning, A 21*, 523–536.

Oñate, J. J., Andersen, E., Peco, B., & Primdahl, J. (2000), Agri-environmental schemes and the European agricultural landscapes: The role of indicators as valuing tools for evaluation. *Landscape Ecology, 15*, 271–280.

Ploeg, J. D. v. d. (1994). Styles of farming: an introductory note on concepts and methodology. In J. D. v. d. Ploeg, & A. Long (Eds.), *Born from within—Practice and perspectives of endogenous rural development* (pp. 7–30). Assen, The Netherlands: Van Gorcum.

Primdahl, J. (1999). Agricultural landscapes as places of production and for living in owner's versus producer's decision making and the implications for planning. *Landscape and Urban Plan, 46*, 143–150.

Præstholm, S., & Kristensen, S. P. (2004). *Rural innovation in the urban fringe agricultural landscapes of the Sound Region. TAPAS Working Paper 2004:01*. Institute of Geography, University of Copenhagen, Copenhagen.

Reenberg, A., & Baudry, J. (1999). Land-use and landscape changes – the challenge of comparative analysis of rural areas in Europe. In R. Krönert, J. Baudry, I. R. Bowler, & A.Reenberg (Eds.), *Land-use changes and their environmentalimpact in rural areas in Europe* (pp. 23–41). Paris: UNESCO.

Schmitzberger, I., Wrbka, T., Steurer, B., Aschenbrenner, G., Peterseil, J., & Zechmeister, H.G. (2005). How farming styles influence biodiversity maintenance in Austrian agricultural landscapes. *Agriculture, Ecosystems & Environment, 108*, 274–290.

Skov- og Naturstyrelsen (2000). Evaluering af den gennemførte skovrejsning 1989–1998 [Evaluation of afforestation 1989–1998], Skov- og Naturstyrelsen [Danish Forest and Nature Agency], København.

Smeding, F. W., & Joenje, W. (1999). Farm-nature plan: landscape ecology based farm planning. *Landscape and Urban Plan, 46*, 109–115.

van den Berg, L., & Wintjes, A. (2000). New 'rural lifestyle estates' in The Netherlands. *Landscape and Urban Plan, 48*, 169–176.

Van der Vaart, J. H. P. (2005). Towards a new rural landscape: consequences of non-agricultural re-use of redundant farm buildings in Friesland. *Landscape and Urban Plan, 70*, 143–152.

Whatmore, S. J. (1994). Farm household strategies and styles of farming: Assessing the utility of farm typologies. In J. D. v. d. Ploeg, & A. Long (Eds.), *Born from within—Practice and perspectives of endogenous rural development* (pp. 31–37). Assen, The Netherlands: Van Gorcum.

Wilson, G. A. (1997). Factors Influencing Farmer Participation in the Environmentally Sensitive Areas Scheme. *Journal of environmental management, 50*, 67–93.

Wilson, S., Mannion, J., & Kinsella, J. (2002). The contribution of part-time farming to living countrysides in Ireland. In J. D. v. d. Ploeg, A. Long, & J. Banks (Eds.), *Living Countrysides* (pp. 164–174). Doetinchem: Elsevier Bedrifjsinformatie bv.