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**Paper Title: Landscape aesthetics: towards a better understanding of rural
landscape preferences**

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Abstract: The central aim of this study was to gain greater insights into the factors that affect individuals' preferences for a variety of landscape settings. To achieve this aim, this paper derived dependent variables (based on a factor analysis of respondents mean ratings of 47 landscape images) representing 5 different landscape categories. These variables were then utilized in separate OLS regression models to examine the effect of personal characteristics, residential location and environmental value orientations on landscape preferences. First in terms of visual amenity the results suggest that the general public have the strongest preference for landscapes with water related features as its dominant attribute which was followed by cultural landscapes. Second the results also demonstrate how there is significant heterogeneity in landscape preferences as both personal characteristics and environmental value orientations were found to strongly influence preferences for all the landscape types examined. Moreover the effect of these variables often differed significantly across the various landscape groupings. In terms of land use policy, given the diversity of preferences a one size fits all approach will not meet the general publics' needs and desires.

Keywords: Landscape preferences, environmental attitudes

Landscape aesthetics: towards a better understanding of rural landscape preferences

1. Introduction

To date, there has been a large body of research focusing on examining individuals' perceptions of rural landscapes. At a general level, particularly in Western countries the general public can be characterised as nature friendly, that is individuals largely acknowledge the intrinsic value of nature and its subsequent right to exist irrespective of its functions for mankind (De Groot and van den Born, 2003). Alterations in the landscape can bring about significant demographic and economic change in rural regions. Regional economic studies, for instance, suggest that migrants are attracted by amenities nearly as often as by low taxes (Waltert and Schlapfer, 2010). Moreover, a substantial body of research now asserts that individuals' preferences for nature extend well beyond the domain of aesthetics in that it can promote restoration from psychological stress and mental fatigue (Ulrich et al., 1991; Hartig et al., 1991).

Individuals regard their interactions with what can be termed as natural landscapes as more positive than their experiences with landscapes that have been shaped to a large degree by human interaction (Kaplan and Kaplan, 1989; Ulrich, 1993). This finding has been interpreted as supporting an evolutionary theory of landscape preferences whereby it is assumed that similarities in responses to natural scenes outweigh the differences across cultures or smaller groups of individuals (Wellman and Buhyoff, 1980; Daniel, 1990; Ulrich, 1993). There has, however, been widespread disagreement as to the validity of this consensus assumption. Specifically, much

research has found substantial individual and inter group differences in landscape preferences (Yu, 1995; Van Den Berg et al., 1998; De Groot and Van Den Born; 2003; Van Den Berg and Koole, 2006).

With this in mind, the central aim of this study was to gain greater insights into the individual characteristics that affect preferences for a variety of landscape settings. First this paper briefly outlines previous research examining the factors that influence landscape preferences. Next this paper presents the results of a nationally representative study of 440 residents in Ireland. The study was designed to gain greater insights into individuals' preferences towards a variety of rural landscapes. Factor analysis of 47 landscape images was utilised to yield 5 perceptual categories of landscapes by respondents, namely intensive and more extensive farming landscapes, landscapes associated with our cultural heritage, wild nature areas and finally landscapes with water as their dominant attribute. An ordinary least squares (OLS) regression model was then designed to examine not only if preferences towards the landscape differed according to individual characteristics but also examined the extent to which the effect of these individual characteristics differed across the five landscape types examined.

2. Associations between individual characteristics and preferences towards the landscape

Yu (1995) found living environment (urban v rural) and education level can significantly affect landscape preferences. Landscape preferences have also been found to differ with age (Balling and Falk, 1982; Lyons, 1983; Zube et al., 1983). In particular, it has been shown that the preferences of children can vary significantly to

that of adults. Additionally, elderly people have been found to display relatively low preferences for wild natural landscapes which it is hypothesised may be due to their greater physical and psychological vulnerability, which may make them more at risk from the dangers of wilderness areas (Van den Berg and Koole 2006). Place of residence has also been found to have a significant impact on landscape preferences (Van den Berg and Koole, 2006; Howley et al., 2010). Specifically, Van den Berg and Koole (2006) outlines how rural as compared to urban residents have been found to rate wilderness landscapes relatively low and attribute this to rural residents greater experience with managed local landscapes which in turn may foster a generic preference for this type of landscape (e.g., Lyons, 1983; Wellman and Buyhoff, 1980).

It has also been shown that landscape preferences can vary between the users of the landscape on the one hand and policymakers or landscape experts on the other (Rambonilaza and Dachary-Bernard 2007; Hunziker et al. 2008). This distinction is important given that it has been much debated in the literature as to the best way to evaluate the landscape for planning purposes (see Swanwick, 2009 for a review). Many commentators assert that landscape policy should be focused on expert evaluations. The alternative view is that landscape policy should be based on public preferences as distinct from expert ratings and essentially captures the idea that experiential value is significant. Landscape preferences have also been found to differ across occupational groups with farmers and tourists in particular found to have very different preferences (Van Den Berg et al., 1998; Scott et al., 2002). Farmers, for instance, have been found to respond negatively to wild unmanaged nature scenes which could be attributable to their different interactions and experience with the

landscape. As Swanwick et al. (2009) notes farmers have a predominantly functional perspective, and regard land as a productive resource and traditionally seen as supporting basic human needs for shelter, food and fibre (Swanwick, 2009). Brush et al. (2000) also found in a study of roadside landscapes in rural Wisconsin that preferences differed significantly among different groups of the population (farmers, foresters, logging contractors, members of lake associations and tourists). These differences were partly explained by varying levels of knowledge regarding the landscapes under examination.

Value orientations have also been found to be a significant determinant underlying landscape preferences. Values have been defined as important life goals or principles that guide choices people make and in contrast to attitudes, values are relatively permanent and reflect a belief that certain behaviour and end states are preferred to alternative ones (Hyytia and Kola, 2006). In addition to general values, it is thought we may have values orientated towards specific aspects of our environment called beliefs or value orientations (Kaltenborn and Bjerke, 2002). Individuals' environmental beliefs are often classified by whether their values are more anthropocentric or ecocentric in nature. Ecocentric values refers to an underlying belief as to the intrinsic value of nature whereas an anthropocentric value implies a much more functional view regarding the landscape; one that satisfies basic needs for food and shelter (Park et al., 2008; Milfont & Duckitt, 2004; Callicott, 2005).

There is now an established link between environmental value orientations and individuals' preferences regarding environmental issues. Howley (2010) found a significant positive relationship between an ecocentric value and attitudes towards

landscape conservation. Similarly Park et al. (2008) noted that people with an ecocentric value orientation are much more likely to be against even a low degree of human influence on natural landscapes. They also report that those with an anthropocentric value held a 'human-centred' rather than intrinsic value of the environment. Kline and Wichelns (1998) found that respondents with stronger than average attitudes that land preservation should protect the environment, have a relatively strong preference for beaches, wetlands and woodlands. In addition to these two pro-environmental value orientations, the role of negative environmental value orientations on landscape preferences has also been explored. For instance, Kaltenborn and Bjerke (2002) found that environmental apathy was negatively associated with a preference for wildlands and for cultural landscapes.

On the basis of the previous discussion, it was expected that socio-demographic factors, place of residence and environmental value orientations would be systematically related to landscape preferences. It was, however, far less certain to what extent the effect of these variables would be the same or differ across different landscape types. To examine this issue, this paper derived dependent variables (based on a factor analysis of respondents mean ratings of 47 landscape images) representing 5 different landscape categories. These variables representing different landscape categories were then utilized in separate OLS regression models to examine the effect of personal characteristics, residential location and environmental value orientations on landscape preferences.

3. Research methods

3.1 Data collection

A survey of 430 individuals living in Ireland was conducted in the summer of 2010. A quota controlled sampling procedure was followed to ensure that the survey was nationally representative for the population aged 15 years and above. Quota sampling sets demographic quotas on the sample based on known population distribution figures. The quotas used here were based on known population distribution figures for age, sex, social class and region of residence taken from the Irish National Census of Population undertaken in 2006. Interviews were spread across different days of the week and across different times of day to ensure all population sub groups had an equal chance of being interviewed. Pilot testing of the survey instrument was conducted prior to the main survey¹. Along with expert judgment, the results from the pilot were used to refine the questions asked in the main survey.

3.2 Questionnaire

The respondents were asked to indicate their preferences for rural landscapes by rating 47 landscape images on a scale from 1 (not very highly) to 6 (highly). The 47 landscape images were selected from a larger pool of over 1,000 images of rural landscapes in Ireland that was obtained by the author². The photographs themselves were selected with the aim of representing a broad geographic and thematic representation of rural landscapes in Ireland. The photographs were provided on a separate sheet allowing larger formats of the pictures and also high quality

¹ The survey company Ipsos MRBI was hired to conduct the interviews for both the pilot and main phase of the survey.

² The author would like to thank the following individuals for supplying the digital images used in this study: Ciaran Kerins, Teagasc; Robert Mehan, Monty Loftus, Toddy Radford and the Spatial Analysis Unit, Department of Agrifood Business and Spatial Analysis, Teagasc and Stephen Hynes, Department of Economics, NUIG.

reproduction. Pictures were selected that roughly had the same weather and light conditions to improve reliability.

Environmental value orientations were measured by including a series of attitudinal statements in the survey. The statements were designed to capture two distinct attitudes regarding the value of the environment which is classified for simplicity as ‘multifunctionality’ and ‘agricultural productionist’ as well as an overall negative attitude towards the environment which is classified as environmental apathy. The statements relating to ‘multifunctionality’ in this study were devised to capture the value individuals place on the environment as a provider of a range of public goods and services as well as its overall intrinsic value. Here respondents are primarily concerned with the non-trade benefits of the landscape, that is, benefits other than the production of food. The agricultural productionist statements refer to a more functional view of the landscape - one that emphasises the importance of using the landscape for producing food and fibre. In this study, respondents were given 12 statements and asked to indicate how strongly they agreed or disagreed with each statement on a scale from one to 10.

3.3 Data analysis

A factor analysis (principal component analysis with varimax rotation) was employed on the attitudinal statements designed to capture environmental value orientations and also on respondents mean scores of the landscape images. Factor analysis is predominantly concerned with data reduction and is performed by examining the pattern of correlations (or covariances) among independent variables and reveals simple underlying structures among these variables using analytical solutions from

linear algebra. If some of the original variables are highly correlated, they are effectively 'saying the same thing' and factor analysis identifies a small number of common factors that account for most of the variation in ratings (Kline and Wichelns, 1998). As Chatfield and Collins (1980) point out, one of the main uses of factor analysis lies in reducing the dimensionality of the data in order to simplify later analysis.

As expected the factor analysis resulted in three factors with an eigenvalue > 1 , together explaining 61 percent of the variance. The statements relating to individuals support for the environment for its overall intrinsic value as well as its capacity to provide a range of public goods loaded highly on the first factor and as such this factor was termed 'multifunctionality' (see table 1). The statements relating to environmental apathy loaded highly on the second factor and finally the statements relating to agricultural production loaded highly on the third factor. Therefore these individual factors were labelled as 'environmental apathy' and 'agricultural productionist' respectively. In addition to factor loadings, individual factor scores were produced which were the scores of an individual on a particular factor. These individual factor variables were utilised in an OLS regression model discussed later in order to examine their relative influence on preferences towards a variety of landscape types.

A factor analysis was also employed on respondents mean ratings of the 47 landscape images. A five factor solution with 40 landscape images proved to give the best solution. Thus 7 of the landscape images were omitted since they did not belong to any of the key dimensions on landscape preferences. The landscape images that had a

high factor loading for factor 1 and factor 4 were all agricultural landscapes with those under factor 1 being images that would be representative of more intensive farming practices, whereas those for factor 4 were more indicative of less intensive traditional farming landscapes (see table 2). These variables were, therefore, labelled as ‘intensive farming’ and ‘extensive farming’ respectively. Factor 2 was the variable that was broadest in scope and included wild unmanaged nature areas, bogland and forest landscapes. Therefore this variable was termed as ‘wild nature scenes’. The third factor variable had high factor loadings on landscape types associated with our cultural heritage and therefore this factor variable was labelled as ‘cultural landscapes’. The final category of landscape relates to images that had water features (e.g. the sea, river or a stream) as its dominant attribute and as such this variable was classified as ‘water related landscapes’. Variables did not always load highly on just one specific factor. Respondents classified some landscapes into multiple groupings and this was due to the fact that some images had multiple dominant elements which could be reflective of differing overall themes. Many of the agricultural landscape images, for instance, contained attributes that would be reflective of both traditional as well as intensive farming landscapes.

The derived factors represent different preferences on the part of the general public towards different features of the landscape. They can be used to describe differences in landscape preferences by computing individual factor scores for each survey respondent and using these in follow on multivariate analysis. Factor loading coefficients are used to compute standardized factor scores for survey respondents with each having a mean of zero and a standard deviation of one. The factor scores measure the degree to which an individual’s landscape preferences deviate, either

positively or negatively from the sample mean score for each factor (Kline and Wichelns, 1998). In this analysis, the individual factor scores for each category of landscape were used as a dependent variable in separate OLS regression models designed to examine if they were any socially differentiating factors affecting individual landscape preferences. Factor scores representing respondents' different environmental value orientations were also utilised as explanatory variables in the following analysis to examine if these influenced the general public's landscape preferences.

Table 1: Factor loadings – environmental value orientations (values > .5 are highlighted in bold)

	Factor scores			Eigen values	Variance
<i>Multifunctionality</i>				3.99	33.3
I like to relax and enjoy the scenery in the countryside	0.840	-0.151	0.109		
It is important to me that the countryside is kept in a good environmental state	0.788	-0.271	0.176		
I feel that maintaining wildlife habitats is an important function of Irish agriculture	0.572	-0.020	0.369		
I like to use the countryside for recreational activities (e.g. walking, hiking, fishing)	0.774	-0.197	0.020		
I believe it is important to keep rivers and lakes clean so that people can have a place to enjoy water sports	.627	-.174	.354		
<i>Environmental apathy</i>				2.32	19.3
I find it hard to get too concerned about environmental issues	-0.369	0.561	0.206		
I believe society places too much emphasis on environmental issues	-0.112	0.815	0.083		
To me the preservation of various protected landscapes is not that important	-0.162	0.802	-0.088		
I believe too much taxpayers money is spent on programs to protect wildlife and habitats	-0.142	0.730	0.030		
<i>Agricultural productionist</i>				1.01	8.4
I believe producing high quality food is the most important function of Irish agriculture	0.18	0.056	0.738		
I believe that more of our land should be used for producing food	0.139	0.231	0.730		
I believe that it is important Ireland is self sufficient when it comes to producing food	0.101	-0.093	0.772		

Extraction method: principal component analysis, Rotation method: Varimax with Kaiser normalisation

Table 2: Factor loadings – landscape preferences

	Intensive farming	Wild nature scenes	Cultural Landscapes	Traditional farming	Water related landscapes
Beach	0.184	0.217	0.122	0.049	0.747
Field covered with hedges and bushes	0.244	0.647	0.182	0.183	0.205
Stream surrounded by wild bushes	0.005	0.518	0.286	0.276	0.396
Bogland covered with rushes and wild grass	0.285	0.694	0.225	0.123	0.102
Old castle standing on top of a hill	0.028	0.263	0.565	0.004	0.36
Recently cut hayfield	0.626	0.255	0.155	0.28	0.116
River running through grassland/marsh	0.281	0.118	0.384	0.148	0.579
Horses in open grass covered field	0.382	0.06	0.285	0.488	0.193
Neolithic stone monument on top of small hill	0.215	0.363	0.561	-0.049	0.277
Sugar beet field	0.637	0.364	0.129	0.16	0.114
Mountain/commonage landscape	0.265	0.385	0.506	-0.041	0.283
Wheat field	0.715	0.28	0.101	0.112	0.157
Old dilapidated farm building surrounded by trees	0.184	0.185	0.701	0.222	0.093
Wild grassland with hayfields in the background	0.649	0.424	0.186	0.036	0.135
Cultural monument	0.196	0.156	0.734	0.236	-0.016
Cliffs overlooking the sea	0.069	0.182	0.607	0.017	0.444
Sikta forest landscape with wild grass in foreground	0.522	0.504	0.149	-0.016	0.099
Cut grassland	0.726	0.069	0.143	0.127	0.198
Recently cut turf stacked	0.6	0.18	0.1	0.249	-0.018
Potato plant field	0.704	0.226	0.066	0.19	0.108
Open native woodland	0.392	0.437	0.232	0.11	0.309
Cattle grazing on grassland with traditional stone wall and forestry in the background	0.513	0.196	0.325	0.454	0.063
Sheep in open grassland	0.586	0.108	0.27	0.545	0.003
Peat bog with no vegetation	0.562	0.242	0.24	0.159	-0.135
Farm field producing carrots	0.647	0.271	0.103	0.139	0.136
Wild vegetation	0.189	0.769	0.093	-0.019	-0.07
Intensive tillage landscape	0.611	0.126	-0.005	0.334	0.183
Mixed woodland	0.253	0.712	0.137	0.225	0.023
Scrub landscape with mountains in the background	0.219	0.52	0.389	0.023	0.189
Cattle grazing on open grass covered fields	0.448	0.243	0.078	0.66	0.056
Field with wild rushes and forestry in the background	0.331	0.592	0.062	0.26	-0.006
Well maintained grass covered fields with yellow gorse bushes in the foreground	0.453	0.058	0.082	0.52	0.225
Broadleaved woodland	-0.039	0.582	0.17	0.321	0.308
Traditional farm cottage with sheep grazing to the front	0.243	0.333	0.136	0.67	0.103
Statue in rural town	0.092	0.091	0.51	0.347	-0.013
Bogland with a large amount of vegetation such as heather	0.232	0.643	0.213	0.14	0.078
Sheep grazing in open grass covered fields surrounded by well maintained stone walls	0.377	0.303	0.13	0.608	0.172
Coastal landscape	0.121	0.071	0.118	0.174	0.727
Mixed woodland	0.245	0.7	0.091	0.15	0.159
Grassland and marsh	0.257	0.729	0.173	0.106	0.156

4. Results

4.1 Landscape preferences

Respondents' perception of attractiveness, i.e. how highly they rate each of the farm landscapes are presented in table 3. The mean ratings ranged from a minimum figure

of 3.31 to a maximum of 5.37 on the 6 point scale. Water related landscapes attracted the highest mean scores by respondents. Cultural related landscapes are also highly regarded by respondents as all of the images in this category also attracted relatively high mean scores. In relation to the agricultural landscapes, respondents rated all of these quite highly as all the mean scores were at the upper end of the 6 point scale. The agricultural landscapes that respondents appeared to like least, however, were the more intensive farming landscapes such as the images showing wheat, potato and sugar beet fields. Wild unmanaged vegetation and bogland were the landscape types that respondents liked the least.

Table 3: Landscape preferences

Landscape description	Landscape category	Mean	Median
River running through grassland/marsh	Water related landscapes	5.37	6
Coastal landscape	Water related landscapes	5.37	6
Cliffs overlooking the sea	Cultural/Water related landscapes	5.29	6
Horses in open grass covered field	Traditional farming	5.18	6
Old dilapidated farm building surrounded by trees	Cultural landscapes	5.14	5
Beach	Water related landscapes	5.03	5
Stream surrounded by wild bushes	Wild nature scenes/water related landscapes	5.02	5
Well maintained grass covered fields with yellow gorse bushes in the foreground	Intensive/Traditional farming	4.95	5
Old castle standing on top of a hill	Cultural landscapes	4.93	5
Neolithic stone monument on top of small hill	Cultural landscapes	4.79	5
Mountain/commonage landscape	Cultural landscapes	4.79	5
Scrub landscape with mountains in the background	Wild nature scenes	4.79	5
Open native woodland	Intensive farming/Wild nature scenes	4.78	5
Cultural monument	Cultural landscapes	4.77	5
Sheep in open grassland	Intensive/Traditional farming	4.77	5
Broadleaved woodland	Wild nature scenes	4.77	5
Sheep grazing in open grass covered fields surrounded by well maintained stone walls	Traditional farming	4.74	5
Cattle grazing on grassland with traditional stone wall and forestry in the background	Intensive/Traditional farming	4.72	5
Cattle grazing on open grass covered fields	Traditional/Intensive farming	4.67	5
Cut grassland	Intensive farming	4.55	5
Field covered with hedges and bushes	Wild nature scenes	4.5	5
Traditional farm cottage with sheep grazing to the front	Traditional farming	4.5	5
Statue in rural town	Cultural landscapes	4.5	5
Wheat field	Intensive farming	4.46	5
Farm field producing carrots	Intensive farming	4.39	4.5
Sikta forest landscape with wild grass in foreground	Intensive farming	4.38	5
Wild grassland with hayfields in the background	Wild nature scenes/Intensive farming	4.37	4
Mixed woodland	Wild nature scenes	4.36	4
Potato plant field	Intensive farming	4.35	4
Intensive tillage landscape	Intensive farming	4.34	4
Recently cut hayfield	Intensive farming	4.27	4
Recently cut turf stacked	Intensive farming	4.24	4
Field with wild rushes and forest to the background	Wild nature scenes	4.18	4
Mixed woodland	Wild nature scenes	4.17	4
Grassland and marsh	Wild nature scenes	4.17	4
Sugar beet field	Intensive farming	4.14	4
Bogland with a large amount of vegetation such as heather	Wild nature scenes	4.09	4
Bogland covered with rushes and wild grass	Wild nature scenes	4.08	4
Peat bog with no vegetation	Wild nature scenes	3.84	4
Wild vegetation	Wild nature scenes	3.31	3

4.2 Multivariate regression analysis

Multivariate regression analysis was used to examine what factors influenced respondents' preferences for each of the landscape types derived from the factor analysis. The dependent variable was individuals' factor scores for each of the

derived 5 perceptual categories of landscape. More specifically, the regression model was specified as:

$$Y_i = \gamma^0 + \gamma^1 Age + \gamma^2 Female + \gamma^3 Soc + \gamma^4 Farm + \gamma^5 Rural + \gamma^6 Town + \gamma^7 Multi + \gamma^8 Agri + \gamma^9 Env$$

Where Y_i is a factor variable representing one of the derived landscape types, Age^3 is the age of the respondent, Soc is Social class (lower social class (C2,D or E) is the reference category), $Female$ indicates if the respondents is female, $Farm$ indicates if individual is from a farming background, $Rural$ indicates if an individual is from a rural area (city or surrounding suburbs is the reference category), $Town$ indicates if an individual is from a town (city or surrounding suburbs is the reference category), $Multi$, $Agri$ and Env indicates the respective value orientations, multifunctionality, agricultural productionist and environmental apathy. The results from each of the 5 regression models are presented in table 4.

It can see from table 4 that background socio-demographic characteristics as well as environmental value orientations are important predictors of landscape preferences. The effect of these variables does, however, vary significantly across the landscape categories examined. The following section explores these differences in greater depth.

4.3 Socioeconomic differences

Age was the socioeconomic variable that was perhaps the strongest predictor of preferences in that it was statistically significant in determining preferences for three

³ Age in the survey was grouped as a continuous variable from 1 to 12 e.g. respondents aged 15-19 were given a value of 1 and those aged 65 plus were given a value of 12.

of the landscape categories (intensive and extensive farming and water related landscapes). The positive relationship between age and both agricultural landscapes could be reflective of generational differences in culture and upbringing with relatively elderly respondents more likely to be familiar with agricultural landscapes. Age had a negative association with water related landscapes and this could be attributable to older people's greater vulnerability to the dangers of this type of landscape. Gender was not found to have an effect on preferences with the exception of traditional farming landscapes where females were found to be more likely to rate this type of landscape in terms of beauty higher than male respondents.

Respondents in the relatively higher social classes were found to be less likely to rate traditional farm landscapes highly and more likely to rate wild nature scenes highly than respondents in the relatively lower social class groupings. The finding that respondents in the high social class groupings are more likely to prefer wild nature landscapes is supportive of previous work by Van den Berg et al. (1998) who reported that highly educated people had a stronger preference for computer-simulated wilderness landscapes. Finally, the variable 'farming background' was found to have a statistically significant effect on preferences for traditional farming landscapes with respondents who have a farming background more likely to rate this type of landscape in terms of visual amenity highly.

4.4 Place of residence

Two regional dummy variables were incorporated into the model to examine, all things being equal, if whether a respondent lives in an urban or rural environment affect preferences towards the various landscape categories. These dummy variables

represent firstly individuals who live in the countryside or a village and secondly individuals living in a town. They compare the effect of living in these residential locations on landscape preferences as compared to living in a city or its surrounding suburbs. Both dummy variables were found to be statistically significant determinants of preferences for intensive farming landscapes with the dummy variable 'rural' also a significant explanatory variable behind preferences for extensive farming landscapes. This effect could reflect a generic influence of rural residents' greater familiarity with farming landscapes. Respondents living in rural areas were also more likely to prefer 'water related landscapes' which again could be attributable to these individual's greater familiarity with this type of landscape.

4.5 Environmental value orientations

Environmental value orientations were perhaps the most significant determinant of landscape preferences as these were found to strongly affect preferences for each of the landscape types examined. There were, however, some interesting differences in the effect of these value orientations. First in relation to the agricultural landscapes, the respective environmental value orientations 'multifunctionality' and 'agricultural productionist' were found to have a positive association with preferences for extensive farming landscapes. Neither of these variables had a statistically significant effect on preferences for intensive farming landscapes. This was somewhat surprising since it might be expected to have a positive association between anthropocentric attitudes and intensive farming landscapes. Environmental apathy was, however related to preferences for intensive farming landscapes as respondents who were indifferent to environmental issues were more likely to rate this type of landscape in terms of beauty highly. Multifunctionality was positively associated with preferences

for both cultural landscapes and water related landscapes whereas environmental apathy was found to have a statistically significant negative effect. Finally, in relation to wild nature scenes multifunctionality was found to have a positive effect. On the other hand, agricultural productionist and environmental apathy were negatively associated with preferences for wild nature scenes. It could be that the relatively unproductive nature of this type of landscape makes it unattractive for respondents with either of these types of value orientations.

Table 4: OLS regression model examining factors influencing landscape preferences (statistically significant variables highlighted in bold)

Coefficient	Intensive	Traditional	Wild nature scenes	Cultural	Water related landscapes'
Age	0.027*	0.043***	0.010	0.002	-0.036**
Gender (males is the reference category)	0.083	0.371***	-0.134	-0.125	0.073
Social class (lower social class is the reference category)	0.113	-0.194**	0.273***	0.019	0.057
Rural (city is the reference category)	0.302**	0.312***	0.079	-0.088	0.206*
Town (city is the reference category)	0.353***	-0.027	-0.095	0.047	0.070
Farming background	0.127	0.347***	-0.101	-0.106	-0.115
Multifunctionality	0.026	0.255***	0.210***	0.202***	0.133***
Agricultural productionist	-0.038	0.097**	-0.130***	0.032	0.019
Environmental apathy	0.090*	0.062	-0.193***	-0.186***	-0.202***

* significant at 10 percent level, **significant at 5 percent level, ***significant at 1 percent level

Conclusion

Historically the agricultural sector has been valued primarily for its capacity to provide food and other raw materials necessary for growth and development. In more recent times public concern has shifted from food production and food security towards protecting and enhancing the quality of the countryside landscape (Pruckner 1995; Kantelhardt 2006). Policy perceptions of rural landscapes have changed over time from sites of mass agricultural commodity production to areas of socio-cultural, economic and ecological diversity in which a range of goods are both produced and consumed (Gray, 2000). The landscape can be viewed as an economic resource and

as a local public good in that it provides amenities and supports recreational as well as productive activities (Oueslati and Salanie, 2011). Many of the distinctive characteristics of particular landscapes are in danger of being lost, even though they are highly valued by society. This is due to external economic and environmental pressures which can lead to radical changes in the landscape except where appropriate policies are in place.

Given its amenity, recreational as well as productive capacity it will be important to maintain the landscape in line with the general public's needs and preferences. In terms of visual amenity value the results in this paper would suggest that the general public have the strongest preference for landscapes with water related features as its dominant attribute. This preference for water related landscapes mirrors findings from several previous studies such as Burmil et al. (1999) and Arriaza et al. (2004). Cultural landscapes were the next category of landscape favoured by respondents. In relation to agricultural landscapes, respondents preferred the more extensive farming landscape over the more modern intensive farming landscapes. This supports findings in a variety of other studies which suggest that modern intensive farming landscapes are less attractive to the general public due mainly to the homogeneity of this type of landscape (Arriaza et al., 2004). Landscapes with wild unmanaged vegetation and bogland were the least preferred landscapes by respondents.

The results also suggest that there is significant heterogeneity in landscape preferences as personal characteristics were found to strongly influence preferences for the landscape types examined. Moreover the effect of socio-demographic characteristics often varied significantly across the various landscape types examined.

For instance, while age had a significant positive impact on preferences for farming landscapes it had a significant negative effect on preferences for water related landscapes. Similarly social class had a positive effect on preferences for wild nature scenes but its effect on extensive farming landscapes was negative. Place of residence was also found to strongly affect preferences as rural residents were more likely to rate the agricultural landscapes and water related landscapes highly.

The strongest factor found to influence respondents' landscape preference was their environmental value orientations. Environmental value orientations are defined as individual or societal beliefs about the importance of the natural environment and in particular how the natural world should be viewed and treated by humans (Reser and Bentrupperbaumer 2005). Individuals with what we classified as a multifunctional value orientation were more likely to rate all the landscape types examined as highly (extensive farming landscapes, cultural landscapes, wild nature scenes and water related landscapes) with the exception of intensive farm landscapes where it was not found to have a statistically significant impact. These landscape types may be preferred over intensive farming landscapes by these respondents because of their strong amenity, ecosystem or wildlife aspects.

Similarly to personal characteristics the effect of these value orientations often differed depending on the landscape type examined. Specifically, individuals with an agricultural productionist value orientation were more likely to prefer 'extensive farming landscapes' but less likely to prefer 'wild nature scenes'. It could be that the functional nature (albeit predominantly extensive in nature) of the farming landscape in terms of its capacity for producing food and fibre makes it attractive for

respondents with more of an anthropocentric value. On the other hand, the relatively wild unmanaged character of the 'wild nature scenes' make it relatively unattractive for respondents with an agricultural productionist mindset. Finally respondents who were relatively indifferent to environmental issues (environmental apathy) were found to be less likely to prefer 'cultural landscapes', 'wild nature scenes' and 'water related landscapes'. In contrast there was a positive association between environmental apathy and 'intensive farm landscapes'.

Rural landscapes witness considerable transformation reflecting changes in agricultural production, biophysical alterations as well as rural to urban migration (Ode et al., 2009). Land use policy can be improved if decision makers in both the environmental and agricultural sectors are better informed about the landscape preferences and attitudes toward the environment among various user groups. The results presented here suggest that there are distinct differences in terms of landscape preferences between different demographic groupings and also depending on individuals' environmental value orientations. Accordingly, in studying landscape preferences in particular areas it will be necessary to consider the personal characteristics of the population as well as the physical aspects of the landscape. Moreover in terms of land use policy, given the diversity of preferences a one size fits all approach will not meet the general public's needs and desires.

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