The landscape aesthetics of functional change in agriculture: how do they impact on rural residents in Scotland?

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Abstract: *Land use change in agriculture (for example new 'functions' such as new crop rotations) has multiple impacts - environmental, economic, and aesthetic (social). The research discussed in this paper relates to a project funded by the Scottish Government, as part of a five year work package called 'Sustainable crop systems'. The project involves working with local residents in ten rural parishes in eastern Scotland, where arable farming predominates, to uncover their preferences for arable landscapes. The project aims to answer two main questions: What aspects of lowland, arable landscapes do residents most strongly object to?; What aspects of lowland, arable landscapes are residents most in favour of? Local peoples' opinions about arable landscapes are being investigated through the use of Q methodology. Q methodology originated in the field of psychology and is increasingly used across a range of social science disciplines where the aim is to investigate attitudes and subjectivity. The approach has been applied to a number of landscape studies. The first stage of the research is underway with images being collected directly from residents. To address the issue of seasonal change, images are being collected throughout the year. After the collection of images, a process of image preference ranking will be undertaken with individuals in selected communities. The results from this ranking process will be correlated and factor analysed in order to derive factor groups - that is, groups of residents that have similar preferences for certain arable landscape views and features. Interpretation of these different groups will lead to detailed descriptions of preferences. The work being undertaken represents an interesting and somewhat novel use of a participatory tool in the investigation of a rural development issue, namely agricultural change. It will provide valuable information about how developments in the agricultural landscape impact on local residents' quality of life, and provide policy makers and others with the opportunity to design future changes that take their preferences into account. Significantly, the work represents an attempt to link the effects of on-farm management and change to the communities that occupy the neighbouring rural spaces.*

Keywords: *arable landscapes, Scotland, public preferences, landscape preferences, Q methodology*

Introduction

In rural areas there are many drivers of change in land management – policy, fluctuating food prices and demand, energy supply needs and policy, structural changes in society, and technological developments. All of these drivers (and more) can impact on agricultural landscapes and affect the environment for people living in those areas. The incorporation of sustainable development goals into all aspects of public planning and policy has particular relevance to issues relating to land use, land management and land use change. As policy-makers become increasingly concerned with sustainability it is important to understand the economic, environmental and social impacts of changes that arise as a result of policies. In rural areas where the changes relate to land use, for example, crop rotations, the social impacts can be connected to the visual environment (landscape) and ultimately the quality of life and well-being of the people who live there.

In line with the increasing emphasis on the need for sustainable policy-making there has been a growing recognition of the importance of the participation of all interested people and bodies in decisions that ultimately impact on their lives. This implies that the design of sustainable crop systems can only be achieved if the landscape preferences of the wider public, in particular those who live amongst arable farming, are understood and taken into account in the design of those systems.

There are many studies that have investigated preferences for landscape but few that have focused specifically on arable landscapes. In the majority of studies the emphasis has been on protected areas recognised as being of particularly high landscape beauty or other high profile landscapes such as areas of forestry. What many landscape studies have in common is the use of photographs as proxies

for actual landscapes, and in many cases studies have utilised some form of ranking to establish peoples' likes and dislikes.

The main objective of the research described here is to define a number of viewpoints that represent the range of preferences of residents in lowland arable areas of Scotland for certain landscape features.

The project will aim to answer a number of key questions, for example:

- What features of lowland arable landscapes do residents most strongly object to?
- What features of lowland arable landscapes are residents most in favour of?

Specifically the aim is to investigate public preferences for arable landscapes and features, including the impact of different crop types, field features such as conservation headlands and hedgerows, and management practices such as set-aside and winter cropping. This will help in developing an understanding of what is most important to members of the public for their enjoyment of arable landscapes, and give guidance for preventing conflict through the avoidance of inappropriate use of certain features, practices and crop rotation design.

The research will investigate public preferences for arable landscape features in Scotland using an approach called Q methodology (see Proops, 2000). When used to analyse discourse, this approach combines qualitative survey methods such as interviews, with quantitative statistical analysis. The objective of a Q methodology study is to identify a number of positions relating to the topic under consideration, positions that are part of the spectrum of opinion among the sampled population – in this case residents of lowland, arable farming regions of Scotland. In other words, the study will lead to the identification of clusters of participants with similar viewpoints of what is most desirable and least desirable about the visual aspects of arable landscapes.

The results from the study will be useful in a number of ways. First, by adding to the understanding of land managers, advisory services and policy makers regarding public preferences for arable landscape features. Second, by assisting in the design and implementation of 'sustainable crop systems' where 'sustainable' is understood to encompass relevant social preferences and concerns, thus avoiding potential conflict. Third, by providing case study evidence of successes and problems in engaging with rural communities, in the context of conducting research.

Background

Investigating landscape aesthetics

There is an increasing requirement for issues relating to the visual landscape to be included in landscape policy, management and planning (Dramstad *et al*, 2006). Concerns about the pace and extent of landscape change, particularly in agricultural landscapes, have lead politicians and land management bodies to recognise a need for information about landscape condition and change (Dramstad *et al*, 2006). In Europe the growing recognition of the importance of landscape issues is demonstrated by the ratification of the European Landscape Convention (Council of Europe, 2000). The Convention places an obligation on countries that have signed it to enable the participation of the general public, local and regional authorities and other interested parties in matters concerning landscape (Jones, 2007). Within the EU, the Convention is the clearest demonstration yet of the recognition that the perceptions of the general public should be investigated and taken into account in matters concerning landscape change. The aim of achieving a participatory approach to landscape evaluation means that the values and meanings attached to landscapes by different groups will need to be investigated and taken into consideration.

In recent years, the scenic beauty of the landscape has become an increasingly important component of planning practices and landscape management strategies (de la Fuente de Val *et al*, 2006). Whilst knowledge of the elements that make up landscape, and the processes that shape landscape is important, so too, increasingly so, are the perceptions, opinions and valuations of the public (de la Fuente de Val *et al*, 2006). Thus, visual landscape quality can be examined in terms of the value placed on it by an observer. There have been important developments in recent years in the assessment of landscape aesthetics. There are two main paradigms of the theory of landscape aesthetics, both of which are built on methods of assessment. In the "objective" paradigm, visual

quality is inherent to landscape properties. In the "subjective" paradigm, landscape quality is 'in the eye of the beholder' (de la Fuente de Val *et al*, 2006). Hence the latter is concerned with subjective perceptions of landscape quality. This is important because, as Lowenthal (2007) states "landscape is where we all make our homes, do our work, live our lives, dream our dreams. Yet for each of us it means something different". Accordingly, most people, if asked, will have an opinion about whether a particular landscape is aesthetically pleasing or not (Dramstad *et al*, 2006).

The importance of "everyday" landscapes to the general well-being of people who live there is receiving increasing attention (Dramstad *et al*, 2006). Thus, while landscape beauty has historically played a significant role in landscape conservation and protection of areas considered to be of particularly high aesthetic beauty, it is important that those more 'ordinary' landscapes that constitute peoples' everyday environment are studied. Hence the focus of this paper on arable landscapes.

Approaches for investigating perceptions of landscape

In seeking to investigate subjective perceptions of landscapes a range of visual methods has been utilised, most commonly employing the use of photographs as 'proxies' for actual landscapes. A number of studies have found Q methodology to be of value. Fairweather and Swaffield (1999) describe the development of the use of Q methodology in landscape research, referring to a number of studies conducted throughout the 1970s, 1980s and 1990s. They note, however, that the approach has received only "modest" attention in landscape studies. They describe the advantages of using Q methodology for landscape research, in particular stressing that Q methodology can be used in an interpretative way, focusing on small samples of respondents, and complementing Q sorting with in-depth interviews, to uncover the underlying attitudes and values that lie behind the ranking of images.

As noted, a number of studies have used Q methodology in landscape assessment studies (Swaffield & Fairweather, 1996; Palmer, 1997; Fairweather & Swaffield, 1999). These studies investigated changes in landscape perceptions over time (Palmer, 1997); public perceptions of the natural character of the Coromandel Peninsula in New Zealand (Fairweather & Swaffield, 1999), and public preferences related to the effects of proposed changes to land use in the New Zealand high country (Swaffield & Fairweather, 1996). The first two studies utilised photographs in the Q sorting process, while the latter used 36 information cards that described possible impacts of different land use changes under different scenarios.

At the heart of Q methodology is the process of 'sorting' or ranking items against a standard likert scale. While Q methodology involves much more than simply ranking images, additional landscape assessment studies have frequently employed a straight-forward ranking process in order to uncover landscape preferences (Kaltenborn & Bjerke, 2002; Arriaza *et al*, 2004; Rogge *et al*, 2007; Dramstad *et al*, 2006; Van Den Berg *et al*, 1998; de la Fuente de Val *et al*, 2006).

These studies used a variety of ranking approaches, such as a seven point scale ranging from 'do not like at all' to 'like very much' (Kaltenborn & Bjerke, 2002); 10 panels of 16 photos each where the best and worst four pictures on each panel had to be selected (Arriaza *et al*, 2004); 20 images in a slide show, where respondents had to score the overall attractiveness of each picture on a seven point scale ranging from 'totally unattractive', through 'neutral' to 'very attractive' (Rogge *et al,* 2007); and the presentation of a five point scale indicating how much respondents liked the view, from 'least preferred' to 'most preferred' (Dramstad *et al*, 2006). In another study, respondents ranked six photos (one actual photograph and five simulations relating to proposed landscape development plans) according to overall preference, perceived beauty and seven landscape characteristics, including biodiversity, cultivatedness, roughness and wetness (Van Den Berg *et al*, 1998). Finally, in a study carried out in the Mediterranean, eight landscape photographs were evaluated for 11 visual attributes (de la Fuente de Val *et al*, 2006) .

One important study investigating residents' sense of place drew on studies conducted with visitors to countryside areas that utilised visitor-employed photography (VEP). In VEP participants are given a (disposable) camera and asked to take their own photographs. In the 'sense-of-place' study (Beckley *et al*, 2007) residents were provided with a camera and instructed to photograph places and images within their local neighbourhood, specifically, people, places and things that mattered most to them. The use of such tools allows respondents to define the boundaries of the images under consideration and gives them the opportunity to "articulate nuances" about why the images are important (Beckley *et al*, 2007). Researchers have claimed that such 'resident-employed photography' provides a potentially

useful tool for studying the nuances and complexities of place relationships, meanings, and attachments (Williams & Patterson, 2007).

Although, as noted above, the majority of landscape perception studies relate to landscapes considered to be of important and high landscape beauty, or high profile landscapes such as forests, there have been a number of studies that have addressed perceptions of agricultural landscapes (Kaltenborn & Bjerke, 2002; Arriaza *et al*, 2004; Rogge *et al*, 2007). The latter study tested the degree to which respondents considered each of six landscape aspects (vegetation, buildings and man-made structures, openness, maintenance or tidiness, agricultural crops, variety) when expressing landscape preferences. Arriaza *et al* (2004) found that perceived visual quality increased with the degree of wilderness of the landscape, the presence of well-maintained man-made elements, the percentage of plant cover, the amount of water, the presence of mountains and the colour contrast.

There has been an accumulation of evidence supporting the position that participants generally demonstrate a positive response to naturalness in landscape images (Van Den Berg *et al*, 1998). The degree to which a scene is 'natural' seems to be one of the most important positive predictors for landscape preference (Rogge *et al*, 2007). Indeed, when studying preferences for local landscapes in southern Norway, Kaltenborn and Bjerke (2002) found that the highest preference was expressed for wildland scenes containing water, followed by cultural landscapes and traditional farm environments. Landscapes with elements of modern agricultural practices were the least preferred category. That being the case, it is significant that farmers are increasingly expected to incorporate 'green services' into their on-farm management decisions (Rogge *et al*, 2007). This implies a necessity for understanding public preferences for 'public goods' arising from agriculture, including perceptions of the landscape.

There are a number of key points within the literature reviewed above that have served to inform the design of the study reported here. There is a growing need to understand residents' perceptions of their everyday landscapes and this is at the heart of the study. There is a need for a participatory approach to involve local people in a land use issue that can impact directly on their own quality of life. This is encompassed within the growing pervasiveness of sustainable development. There is a general acceptance that approaches using photographs and ranking exercises are valid methods for understanding landscape perceptions. However, there is a recognition that it is important to understand the subtleties of peoples' preferences and that there must be opportunity to probe for reasons behind the preferences revealed by ranking images. There is methodological value is seeking to avoid limiting the visual scope of a study by using resident-employed photography. There is a general consensus that more managed, less natural-looking agricultural landscapes are less preferred but there remains scope for further testing of this notion.

Research approach

As noted, the research utilises Q methodology in order to investigate peoples' subjective preferences for arable landscapes. Put simply, Q methodology is about identifying attitudes, usually towards a certain topic, but in this case, attitudes about landscape. Here the stages of the methodology are described.

Selection of parishes

The initial stage of this research required the selection of 10 rural parishes in the east of Scotland, where arable farming predominates. The research reported here is part of a larger Scottish Government-funded work package, entitled 'sustainable crop systems'. For another part of the work package, involving field surveys and data analysis of land-use change over time, 10 clusters of rural parishes were selected across the east of Scotland (50 parishes in all). In this part of the research, the aim was to select one parish from each cluster, based on population size. The Scottish Executive urban-rural classification (Scottish Executive, 2006) considers populations of 3000 or less to be rural. Therefore parishes with populations over 3000 were disregarded and 12 parishes were removed, leaving 38. The next step was to select from each of the 10 clusters, the parish with the median population. In four clusters there was an even number of parishes. Hence there were two parishes from which to choose. In two of these parish clusters the parish with the smaller population value was selected, and in the other two parish clusters, the parish with the larger population value was selected.

Of these final 10 parishes, there are five parishes with populations less than 1000, and five with populations over 1000. Details of the parishes are as shown in table 1. Note, there was a problem with obtaining names and addresses for participants in Rescobie and Monikie. In both cases, therefore, the parish with the nearest equivalent size of population was selected as a replacement.

Table 1. Parishes selected for image collection stage of Q methodology

Name of parish	Parish cluster name	Population
Chapel of Gairoch	Around Inverurie	1542
Hutton	Berwick	497
Knockbain	Black Isle	2078
Inchture	Carse of Gowrie	1033
Athelstaneford	East Lothian	659
Kettle	Fife	1422
Dyke and Moy	Nairn Coast	687
(Rescobie) Replaced with Inverarity	North Angus	(427) 354
(Monikie) Replaced with Arbilot	South Angus	(1053) 1133
Meigle	Strathmore	559

Image collection process

Having selected the parishes to be involved in the study, the first stage of the methodology involves the collection of images from residents of the selected parishes. These are being collected from participants via a postal invitation. Potential participants have been randomly sampled from the electoral register for each of the selected parishes, and 100 people in each parish will receive a letter, inviting them to submit photographs of the farming landscape in their area. In order to address the issue of seasonal change in the landscape – this is considerable for many arable landscapes – images are to be collected throughout the year. Two parishes are to be contacted every two months (excluding December and January as people are busy with christmas and new year). Thus, parishes will be contacted as outlined in table 2.

Table 2. Timetable for contacting residents in selected parishes

Electoral register mail-out	Parishes (and parish cluster)	
Oct/Nov 2007	Inverarity (North Angus)	Knockbain (Black Isle)
Feb/Mar 2008	Arbilot (South Angus)	Inchture (Perth & Kinross)
Apr/May 2008	Meigle (Perth & Kinross)	Athelstanesford (East Lothian)
Jun/Jul 2008	Kettle (Fife)	Chapel of Gairoch (Inverurie)
Aug/Sep 2008	Dyke and Moy (Moray)	Hutton (Berwick)

Participants are asked to submit photographs, electronically if possible, and all participants will be entered into a prize draw. In order to gather a range of images, participants are being asked to submit photographs under the following categories:

- Particular features found in the landscape (one that you like and one that you dislike)

- General landscape views (one that you like and one that you dislike)

Participants are reminded that images must relate to arable landscapes (that is, crops not livestock).

Selection of representative images

Having collected photographs from residents in all 10 parishes over the course of 12 months, the next stage will be to select about 30 'representative' photographs from all those collected. A previous Q methodology landscape study with photographs used a matrix of five landform categories (hills, foothills, estuarine, beach and headland) by six key features (water, land use, vegetation type, landscape pattern, artefacts and cues for care) to sample the available images (Fairweather & Swaffield, 2000) (figure 1). All images are placed in the relevant box within the matrix and a sample is then selected ensuring representation of all categories and features. Where a category or feature is particularly popular the final selection should represent this. Thus, if, in the example matrix shown in figure 1, there were three times more images under the category 'beach' than under the category 'hills' this ratio should be reflected in the final image selection. Although the categories and features shown in figure 1 are not likely to be directly relevant to the current study, a similar approach will be used to minimise researcher bias in the choice of images. The specific categories and features will be decided upon based on the visual material collected.

Key feature	Landform category				
	Hills	Foothills	Estuarine	Beach	Headland
Water					
Land use					
Vegetation type					
Landscape pattern					
Artefacts					
Cues for care					

Figure 1. Example matrix for selecting representative images

Q sorting

Having selected approximately 30 photographs, in the next stage of the research, participants will be asked to rank the representative images on a scale from 'most preferred' to 'least preferred'. In Q methodology, this ranking is known as 'Q sorting'. Images will have to be ranked in a way that limits the number of photographs at the extremes, in order to identify the key preferences held by individuals. Effectively, the Q sort will result in the photographs being arranged into the shape of a normal distribution curve (see figure 2). This will place the majority of images somewhere in the middle of the scale and very few images, only those that participants feel particularly strongly about, at the extremes of 'most preferred' and 'least preferred'. The set of ranked photos will constitute the 'Q sort' for each individual. The Q sorting will be done with 30 residents during face-to-face interviews in communities in six of the parishes.

PLACE TWO IMAGES IN THIS COLUMN	PLACE THREE IMAGES IN THIS COLUMN	PLACE FOUR IMAGES IN THIS COLUMN	PLACE SIX IMAGES IN THIS COLUMN	PLACE FOUR IMAGES IN THIS COLUMN	PLACE THREE IMAGES IN THIS COLUMN	PLACE TWO IMAGES IN THIS COLUMN
Most preferred images			Neutral / no particular opinion either way			Least preferred images

Figure 2. Template for ranking (sorting) selected images

Analysis of the Q sorts

In the next stage the Q sorts from each participant will be correlated with each other and factor analysed. This can be done using software packages such as PCQ or PQMethod which are specifically designed for Q methodology. The correlation of each Q sort with every other Q sort produces a correlation matrix which is then factor analysed. Factor analysis of the rankings will lead to the extraction of a few typical Q sorts (usually three or four), each representing distinct collective preferences. These are the factor groups. Preferences for (and against) certain images will characterise particular factor groups.

Interpretation of typical Q sorts

In this, the largely qualitative aspect of the approach, the typical 'Q sorts' (factor groups) will be interpreted and explained in terms of commonly shared preferences. This will make it possible to describe different groups of residents in terms of their preferences for particular landscapes and landscape features. Further materials collected during the interviews will add to the understanding of peoples' preferences.

Early results

A number of initial images collected for the Q sorting process are included here to provide examples of the kinds of issues and concerns that are emerging as being of importance to local residents (figures 3, 4, 5 and 6). They relate to the four categories that respondents were requested to photograph.

Figure 3. View liked

Figure 5. Feature liked

Figure 4. View disliked

Figure 6. Feature disliked

Conclusions and next steps

The initial images received from participants already serve to reveal interest in, and concerns about, a number of important issues relating to arable landscapes. These encompass land management, agricultural change, development in rural areas, social changes and access to land. Thus participants express dislike for features which suggest neglect and a lack of management, dislike for encroaching housing development, and concerns about changes in agricultural labour (this is from a comment sent with photographs). Some interesting diversity of opinion is also emerging with some demonstrating a liking for intensive arable landscapes that appear to be well-managed and productive, and others disliking a landscape so managed and ordered. As images are collected from residents in the remaining parishes it is expected that further issues and concerns will emerge. For example, in some areas the planting of short-rotation coppice is radically changing arable landscapes, and the extensive use of polytunnels and other highly visible crop protection materials for soft fruit production may be of interest to residents. Further, issues such as high cereal prices, removal of set-aside payments for 2008, and on-going impact of de-coupled payments can all be expected to influence landscapes in rural areas, and thus the images that local residents record. In addition, it is expected that the increasing geographical diversity of additional parishes, and seasonal variation of additional months, will further extend the issues demonstrated to be of interest and concern to residents through photographs. As described in the methodology section above, next steps are to continue photograph collection in additional parishes, select a small number of photographs from all of those received, and then ask participants in a number of the parishes to rank those selected images in terms of preference. Analysis of the image rankings completed by individuals will lead to detailed understanding of different groups of residents who hold similar preferences for landscape features and thus who can be expected to respond in similar manner to processes of landscape change.

Ultimately, the study will help to address issues raised by one of the key questions that are posed within workshop four of the 8th European IFSA Symposium, namely, "How can we plan landscapes in such a way that they can fulfil their multi-functional role to an optimal level?". This study will provide the detailed understanding of residents' preferences for arable landscape views and features that are necessary in order to achieve one aspect of multi-functionality, namely, to provide aesthetically acceptable environments for rural residents.

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