

## NL1 (Winterswijk, The Netherlands):

### *Economic and non-economic valuation methods to estimate landscape preferences: a choice modelling approach.*

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#### *Objective*

The importance of cultural ecosystem services in agrarian landscapes is increasingly recognized as the cultural and aesthetic qualities of agrarian landscapes are affected by scale enlargement and intensification of agricultural practices. Parallel to these processes of landscape change, there is a growing societal demand for cultural services in Winterswijk, especially through tourism and recreation. We have used choice experiment methodology to systematically measure the landscape preferences of visitors. In this study we have made several methodological advances, with multiple objectives.

On the one hand side, the objective of this study is to address the effect of including a financial trade-off on relative preferences for landscape attributes. We apply a split sample image-based choice experiment to address preferences for attributes of agricultural landscapes. About half of the interviewed respondents completed a choice experiment without a price attribute and the other half of the sample completed the experiment with a price attribute. On the other hand side, we aim to develop a novel approach to extrapolate landscape preferences from a visual landscape level to regional level. This enables us to map landscape preferences on a regional level.

#### *Methodology*

In July 2013, a total of 425 surveys were completed by face-to-face interviews in the Dutch municipality of Winterswijk. The respondents, who were all tourists, were interviewed on tourist accommodations such as campsites, bed & breakfasts and hotels. 191 respondents completed the choice experiment without price attribute, whereas 234 respondents participated in the experiment with price attribute. The price attribute is defined as the extra costs respondents would have to pay per overnight stay per room/tent.

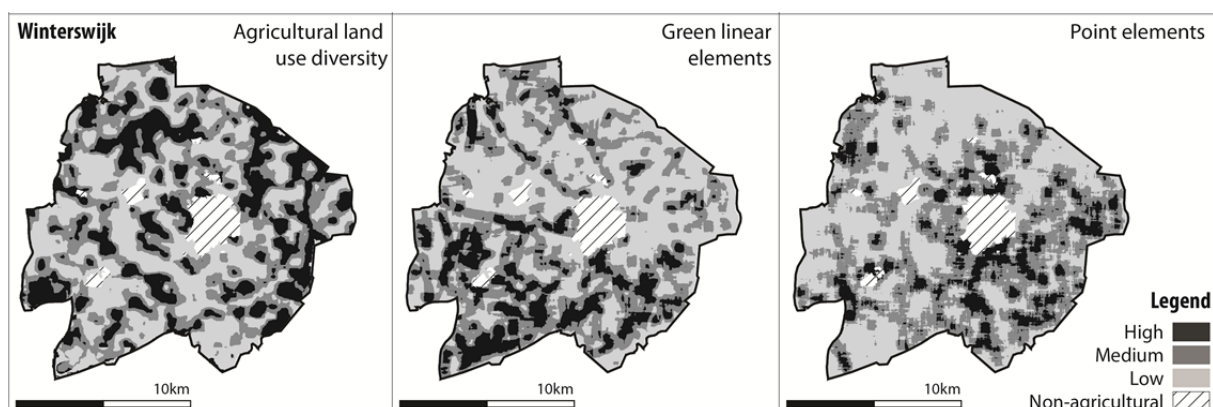


Figure 1. The spatial distribution of three of the four landscapes attributes in the case study area.

The type of landscape attributes that are included in the experiment – **presence of livestock, prevalence of hedgerows and tree lines, maize-grassland ratio** and the **prevalence of forest patches** – were selected based on a meta-analysis of European landscape preference studies and the appearance of attributes in the local landscape context was further specified in close collaboration with a local focus group of landscape experts. The landscape alternatives were presented to respondent using digitally calibrated images instead of the standard tabular format of choice cards. Figure 1 shows the spatial distribution of the levels of the landscape attributes except for presence of livestock. Subsequently, the landscape attributes were visualized in a representative landscape view. Figure 2 shows an example of a choice card with landscape alternatives as presented to visitors. The numbers above the cards indicate the attribute levels in the alternative for: 1) livestock, 2) maize-grassland ratio, 3) prevalence of hedgerows and 4) prevalence of forest patches.

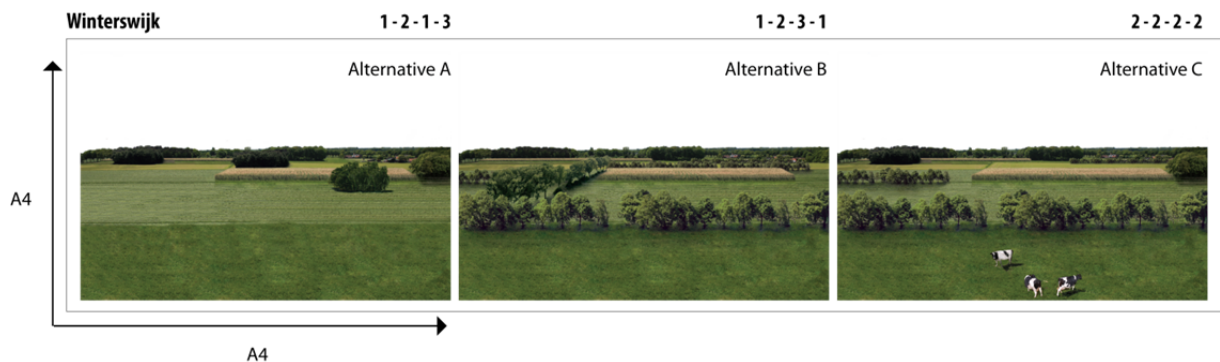


Figure 2. example of a choice card presented to the respondents.

## Results

We found positive preferences for all attributes in the experiment. A high prevalence of hedgerows and tree lines is the most preferred attributes in both the experiment with and without monetary attribute (Figure 3). Also, in both experiments the presence of livestock was ranked as the third attribute, before a high level of point elements (forest patches). We observe subtle differences between the experiments with and without price attribute. A medium and high prevalence of linear elements are relatively more important in the experiment with price-attribute. Other landscape attributes, such as especially the presence of livestock and a high maize-grassland ratio, are relatively more important in the experiment without price-attribute.

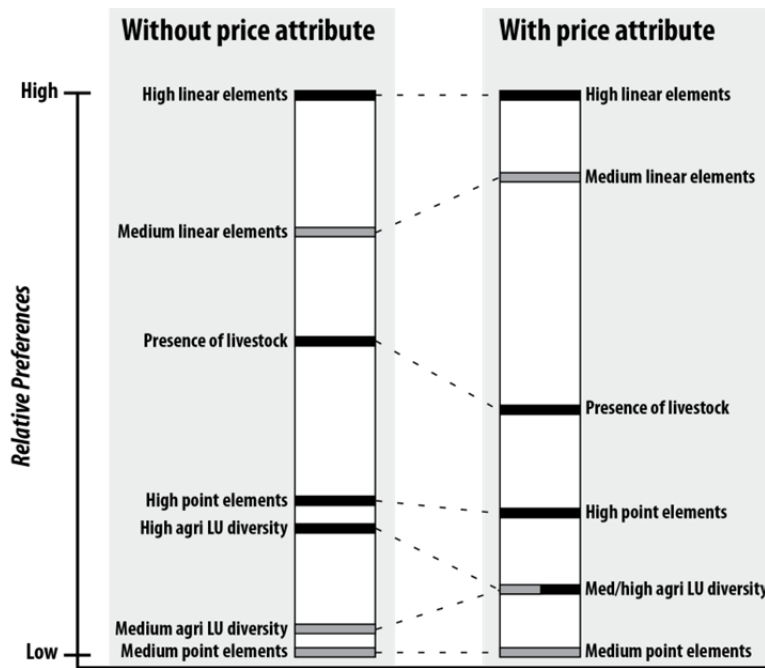


Figure 3. relative preferences for landscape attributes with and without price attribute.

Our approach also enables to estimate the relative landscape preferences of visitors in Winterswijk for a number of possible landscape scenarios, which is presented in Figure 4. Using a similar approach, Figure 5 shows a spatial extrapolation of landscape preferences over the case study area. In this map, the dark blue cells possess the highest visual landscape quality and yellow cells the lowest.




<p><b>Scenario 1</b></p> <p>Scale enlargement as a result of the removal of hedgerows, tree lines and forest patches.</p>	<p>3%</p> 
<p><b>Scenario 2</b></p> <p>Regional average amount of hedgerows, tree lines and forest patches. Presence of livestock.</p>	<p>56%</p> 
<p><b>Scenario 3</b></p> <p>High level of hedgerows, tree lines and forest patches. No presence of livestock.</p>	<p>41%</p> 

Figure 4. The market shares of different landscape scenarios.

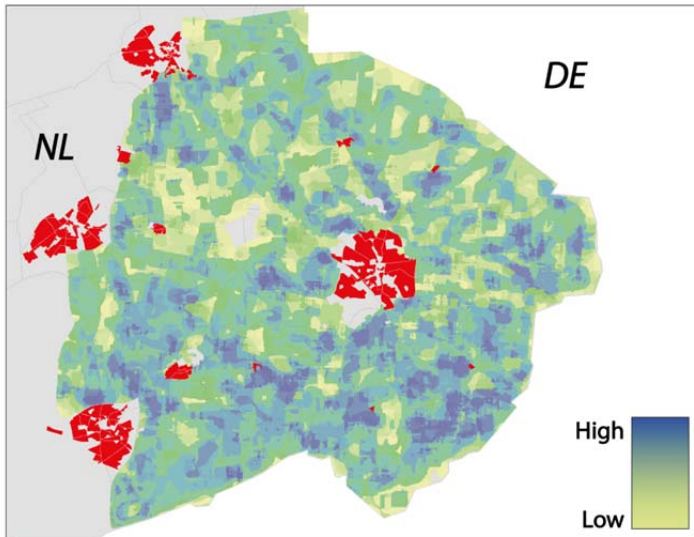


Figure 5: A map of visual landscape quality: the spatial distribution of landscape preferences.

### *Lesson learned & Policy Recommendations*

In this study, we learned that preferences for attributes of agrarian landscapes are relatively stable when measured with or without price attribute. In the case study area of Winterswijk, we found that linear wooden elements in the landscape as well as livestock are highly appreciated. If we translate these observations to the map, we can predict the variation in visual quality.

Understanding the key predictors of landscape quality is essential to maintain the value of cultural ecosystem services. In Winterswijk, stakeholders involved in landscape management are well aware of the cultural value of the landscape and the economic importance of rural tourism. Our method helps to steer the targeting of locally designed agri-environment measures to preserve the capacity of the landscape to provide in cultural ecosystem services as well as other ecosystem services.

### *Reference*

Van Zanten, B. T., Koetse, M. J., & Verburg, P. H. (in preparation). Effects of including a price attribute in a choice experiment on preferences for agricultural landscape attributes. *Ecological Economics*.

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