Spatial quantification and valuation of cultural ecosystem services in a Dutch case area

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Aim

- **Demonstrate a method for mapping cultural services**
  - Valuation by users
  - Technique for explicitly linking the values of services with mappable characteristics
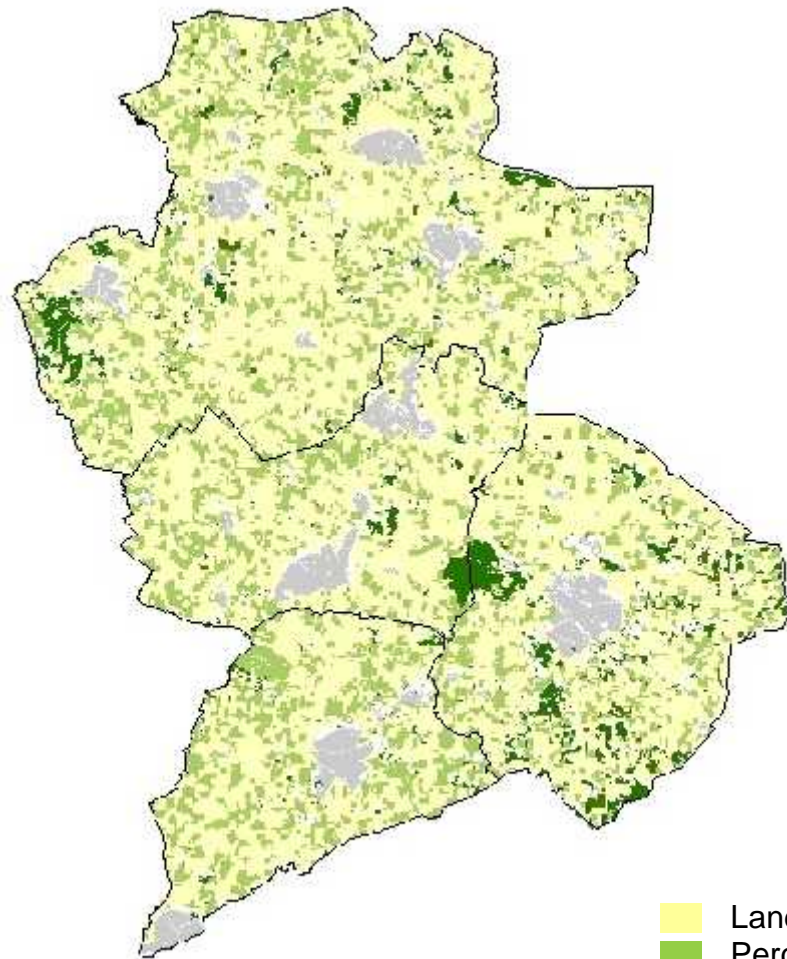 - Within the rural development context
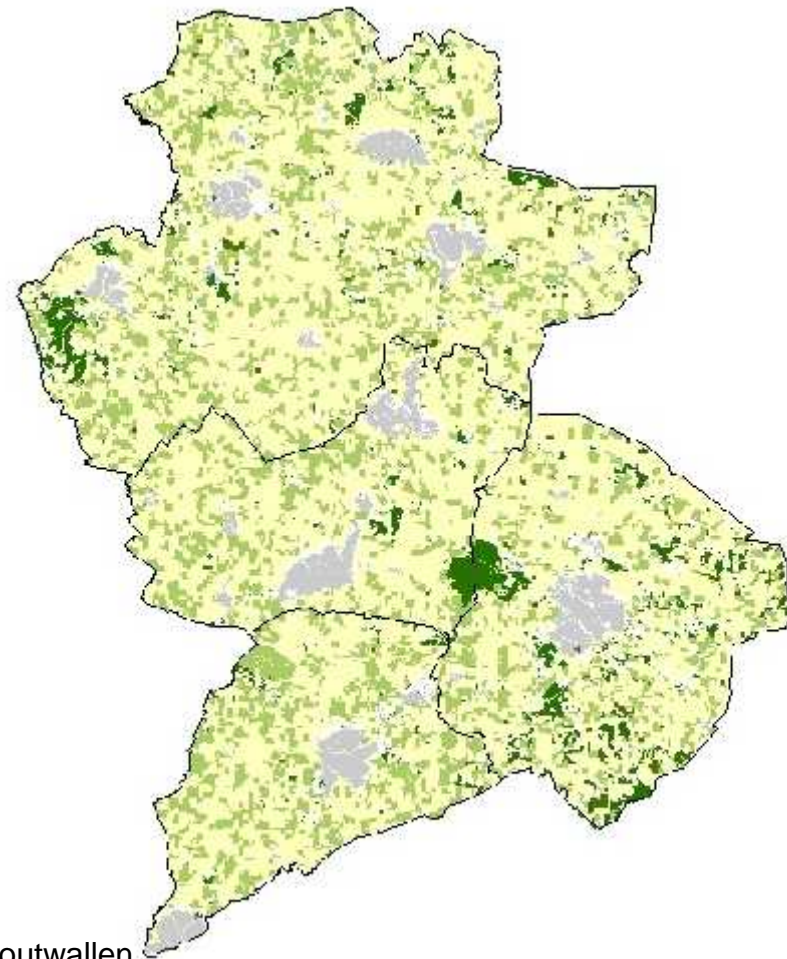
Case region: Achterhoek

- Agricultural intensification
  - Alter landscape elements
  - Threatens aesthetic beauty of the area
- Protection of the landscape
  - Less competitive
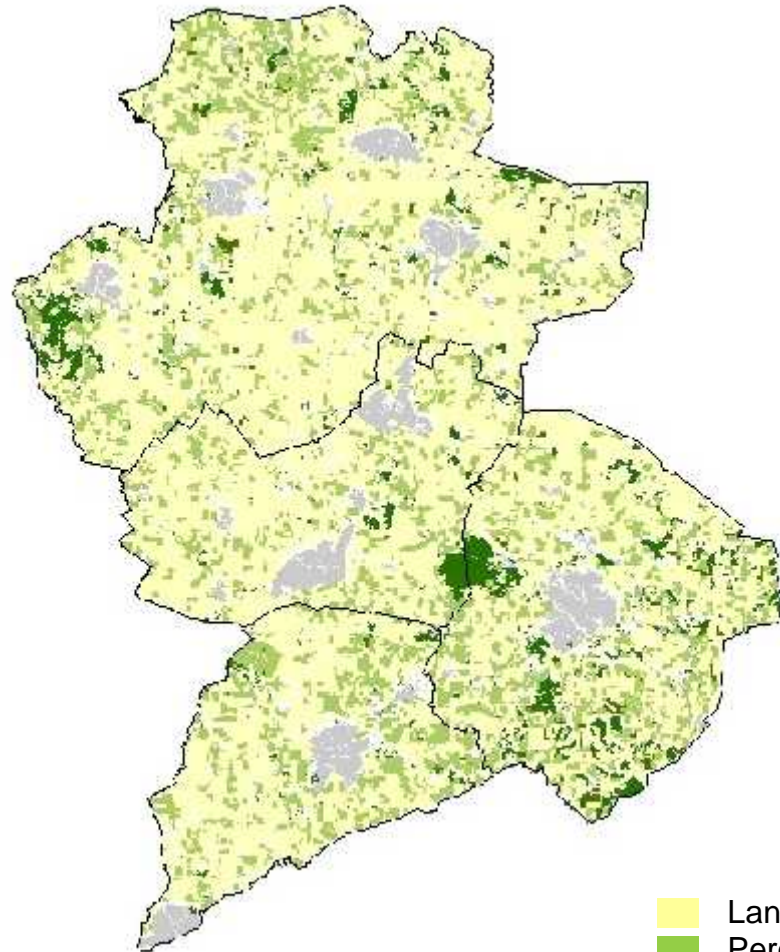 - Payments for ecosystem services
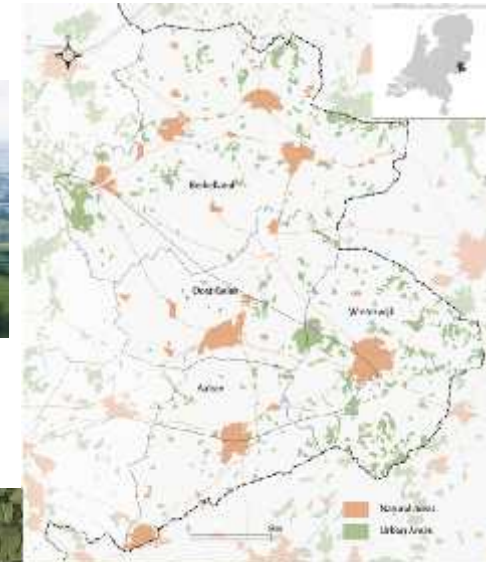
2005

2005

Landbouw
Percelen met houtwallen
Natuur

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4

Doelgericht duurzamer (2025)

Liberaliseren van de markt (2025)
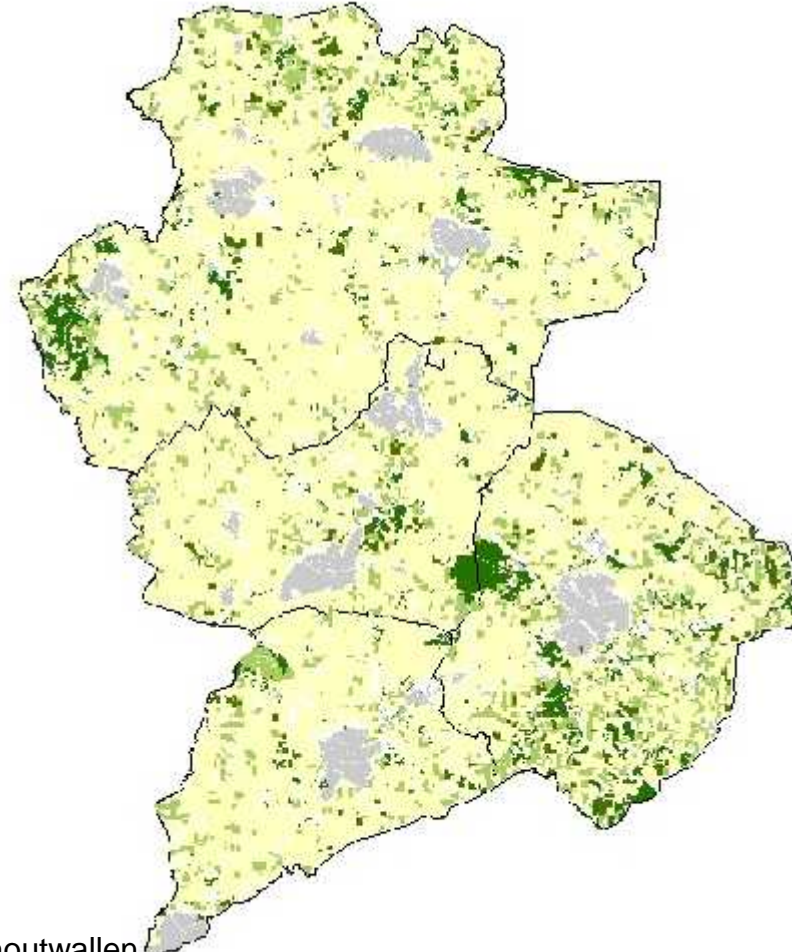
Landbouw
Percelen met houtwallen
Natuur

Cultural services

Recreation and amenity

Intrinsic value

| Aesthetics beauty | Cultural heritage | Inspiration | Spiritual |

Type 1

Type 2

Type 3
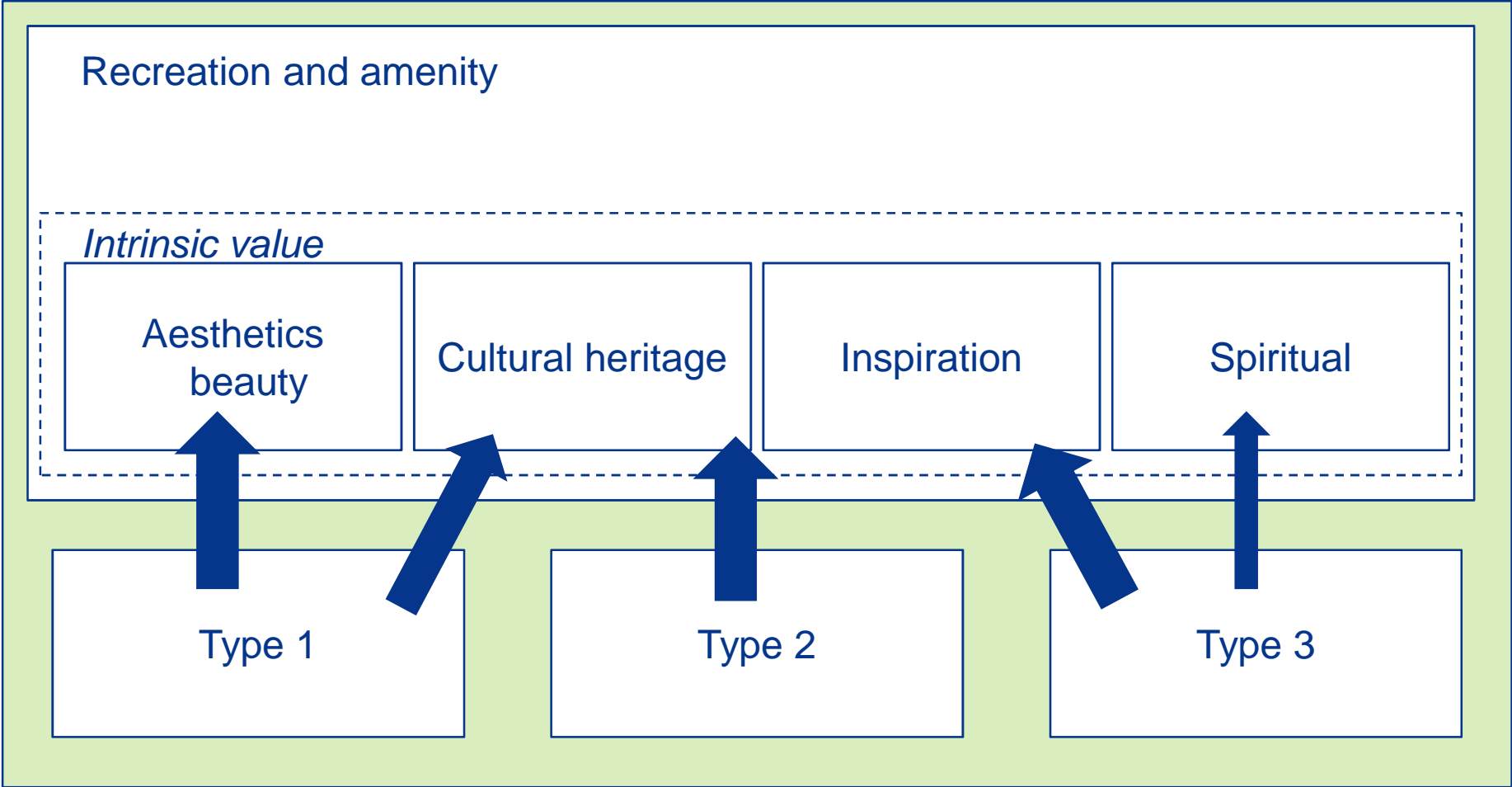
Method: Mapping cultural services

Survey

- Landscape's cultural service importance
- Personal data
- Willingness to pay
- Landscape preferences

PCA

Cultural services
- Type 1
- Type 2

T-tests

Determinants of landscape preferences

Landscape characteristics

- Land cover
- Tree lines
- Recreation areas
- Index of biodiversity

Map cultural services
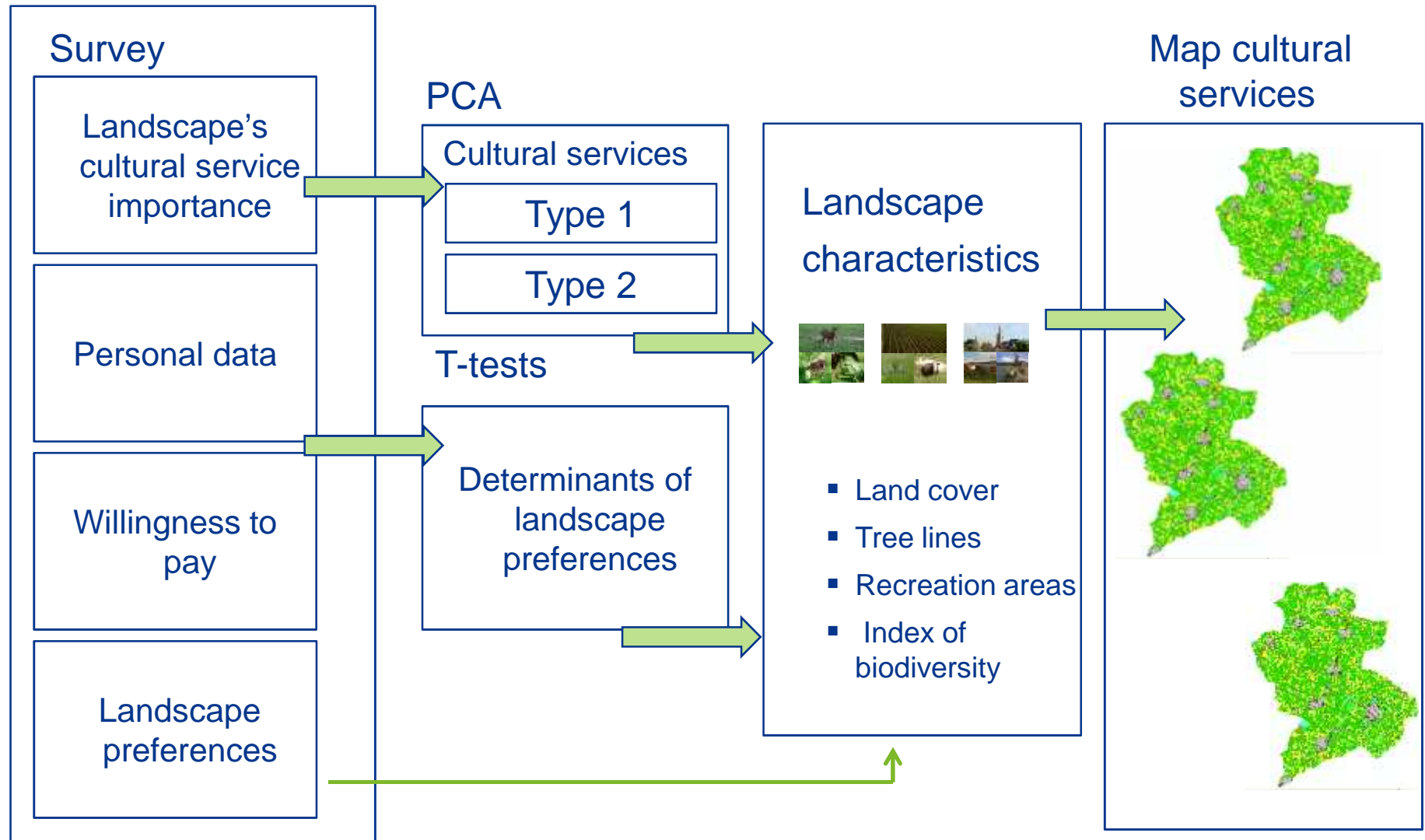
Methods/Data

- Questionnaire
  - Tourists (n=115)
- Photos of landscape
  - characteristics and structure
- Photo manipulations
  - different landscape evolutions

Landscape features

Stone quarry

Recreation areas

Ponds and streams

Heath

Marshes

Forest

Hedgerows & tree lines

Cultural buildings

Animals

Agricultural land

Villages

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Landscape structure

Landscape evolution

Landscape evolution

Results

- Age
  - 53 years old

- Travel
  - 107 km

- Income
  - 2500-3500 €

- Education
  - Preparatory and Secondary vocational education (*MBO, HBO*)

	Act1	Act 2	Act 3	Weighted value
Cycling	204	36	8	248
Walking	36	82	7	125
Swim	39	22	4	65
Tranquility/rest	27	10	8	45
Shopping	0	18	14	32
Eat and Drink	0	8	20	28
Farm-based camping	6	8	6	20
Different landscape than home	3	6	6	15
Visit family	9	0	5	14
Recreation	6	4	1	11
Festivals	3	2	4	9
Camping	3	2	4	9
Museum	0	0	7	7
Fishing	3	2	1	6
Horseback riding	3	2	0	5
Visit village	0	2	0	2
Vineyard	0	0	2	2
Nothing	0	8	18	

Landscape preferences

	Charact 1	Charact 2	Charact 3	Weighted value
Cultural buildings	22	26	21	139
Tree lines and hedgerows	24	17	11	117
Brooks and streams	15	8	24	85
Forest	15	14	10	83
Flora and fauna	9	17	10	71
Villages	8	13	12	62
Agricultural land	9	10	10	57
Marsh	4	3	7	25
Recreation areas	3	3	4	19
Heath	3	3	3	18
Stone quarry	3	0	2	11

Mostly forested	11
Mixed forest with tree lines	56
Mostly tree lines with some forest	26
Only tree lines	11
A number of tree lines mostly open	6
open	3

Landscape's cultural service importance

	Min	Max	Mean	Std. D
Recreation	1	5	4.16	0.99
Aesthetic beauty	3	5	4.70	0.53
Cultural heritage	1	5	3.70	1.30
Inspiration	1	5	3.27	1.23
Spirituality	1	5	2.38	1.45

Cultural service appreciation types

PCA

	Component		
	1	2	3
Recreation	.053	.000	.984
Aesthetic beauty	.203	.825	.129
Cultural heritage	.149	.848	-.120
Inspiration	.848	.220	-.087
Spirituality	.855	.140	.168

Rotation Method: Varimax with Kaiser Normalization.

Comp 1
- Spiritual and inspiration
  - Appreciate: Streams and lakes, agriculture land
  - Less value: villages

Comp 2
- Beauty and cultural heritage
  - Appreciate: Forests, Rec. areas and Agriculture
  - Less value: Tree lines

Comp 3
- Recreation
  - Tree lines, Rec. areas, biodiversity
  - Less value: Agricultal

Total Variance Explained

Comp onent	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulati ve %	Total	% of Variance	Cumulati ve %	Total	% of Variance	Cumulati ve %
1	2.10	42.06	42.06	2.10	42.06	42.06	1.52	30.35	30.35
2	1.07	21.33	63.40	1.07	21.33	63.39	1.47	29.37	59.72
3	.85	17.03	80.43	.85	17.04	80.43	1.04	20.71	80.43
4	.52	10.47	90.90						
5	.46	9.10	100.00						

Extraction Met

Scree Plot
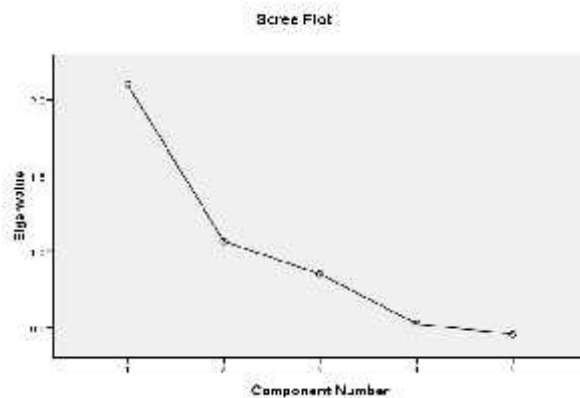
KMO and Bartlett's Test

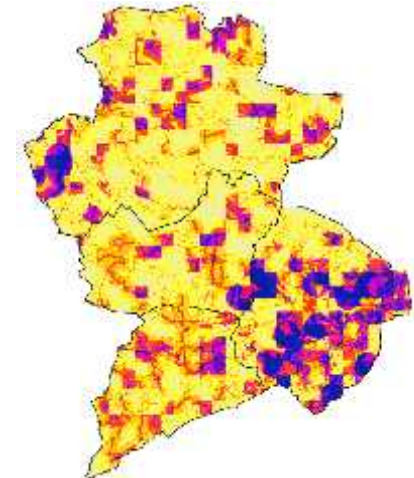| Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.647
Bartlett's Test of Sphericity	Approx. Chi-Square	87.750
	df	10.000
	Sig.	.000

Cultural service maps

Combined landscape
preference
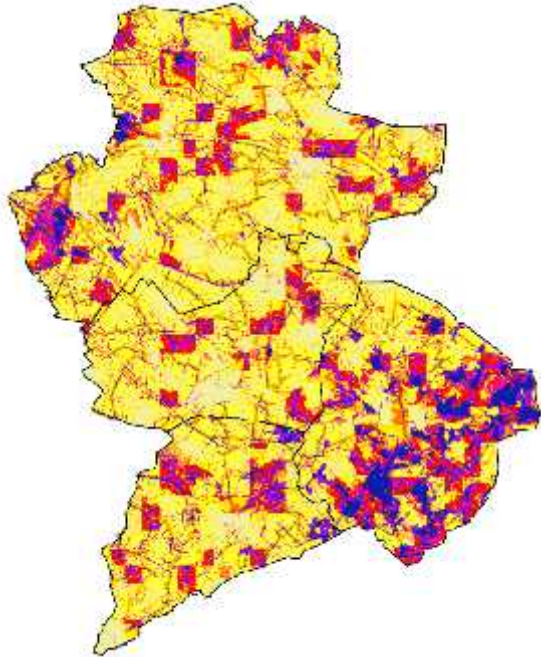
Spiritual and inspiration
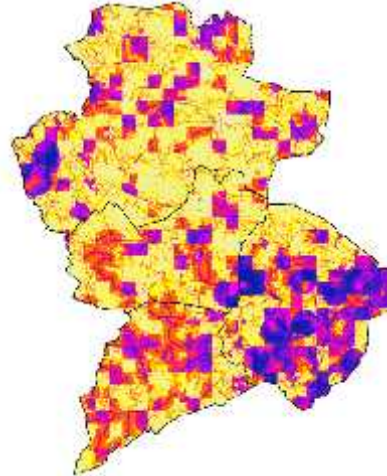
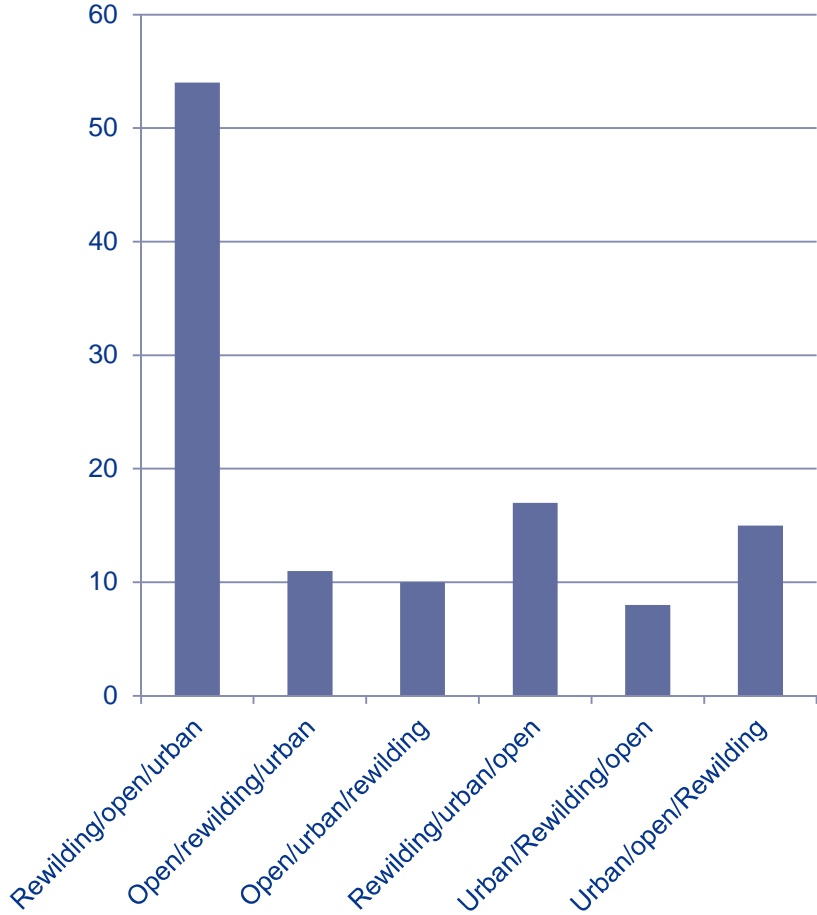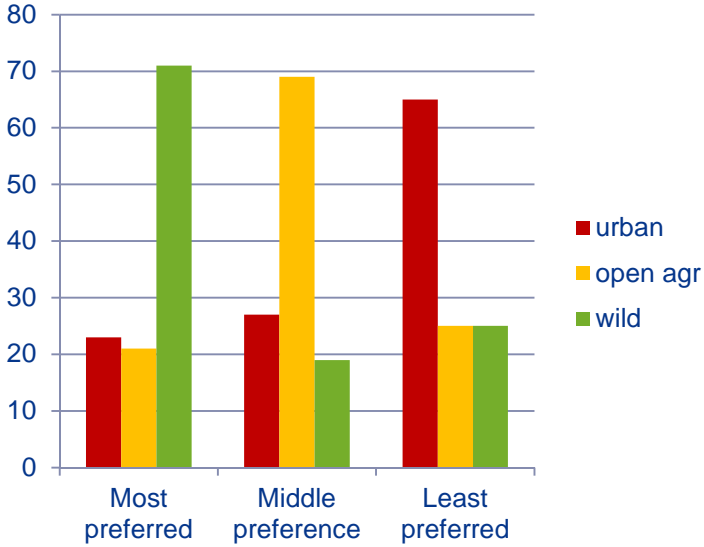Beauty and
Cultural heritage

Recreation

1

0

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18
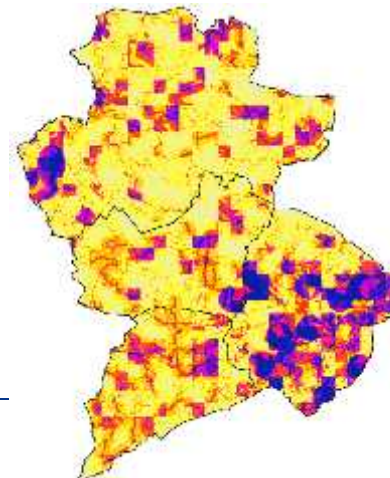
Future landscapes?

Intial impressions

- Assessments of cultural services are data intensive requiring considerable investment into ascertaining preferences
- Photos can be used as a tactile prompt to illicit respondents' assessments of landscape aesthetics
    - This can be linked to intrinsic characteristics like spirituality and inspiration
- Trade-off between cultural services
- Re-wilding landscape an aesthetically displeasing development.