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SPATIALLY-EXPLICIT RECREATION MODEL OF THE BALTIC SEA

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INTRODUCTION

The Baltic sea is a part of our identity and recreative activities at the Baltic Sea coast play a significant role for most people: over 70% of the population in the littoral countries use the marine environment and the coast of the Baltic Sea for recreation, representing some 80 million recreation visits annually.

We apply a spatially-explicit discrete choice and count data model for coastal recreation across eight countries around the Baltic Sea to estimate the recreational value of individual coastal sites and the importance of water quality attributes. Results present the total recreational value per site, spatially identified recreational hotspots, and the potential welfare effects of improving environmental and infrastructure conditions to a level required by the Blue Flag standard in all sites.

DATA

Survey data comes from a survey conducted in all nine countries around the Baltic Sea (Ahtiainen et al, 2013). Approximately 1,000 respondents per country responded resulting in a total sample of 9,127 observations. The survey reveal details of origin and destination of travel, socio-demographics, attitudes and activities undertaken at the coast.

Travel distance to each of the sites were calculated using ArcGIS, correcting the Euclidian distance with a ratio of the average Euclidian distance to the routing distance.

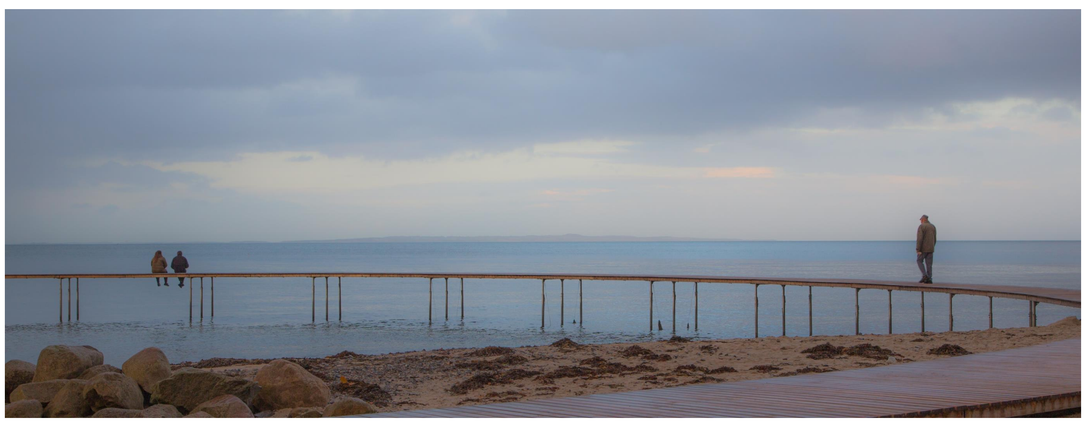
Travel costs were determined as vehicle operating costs and the opportunity cost of time for a return journey (Czajkoski et al., 2015).

Environmental qualities of coastal sites are characterized by certification of the eco-label Blue Flag and the monitored compliance level of the EU Bathing Water Directive.

METHOD

We apply a spatially explicit discrete choice model based on a two-stage budgeting (Hausman et al., 1995): an individual first decides *how many* trips to make, and then she decides *how* to allocate these trips across available recreational sites, based on utility maximizing behaviour. This first step is modelled using a count data model, and the second step using discrete choice model. The two models are linked by the inclusive value – the indirect utility function.

In practice we estimate a negative binomial Poisson model for the first stage trip demand model and a mixed logit for the second stage trip allocation.



	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Sweden
Mean WTP – per trip (EUR)	57.07 (6.89)	22.93 (2.79)	245.95 (17.59)	104.67 (16.80)	62.51 (5.49)	102.42 (13.68)	101.74 (9.19)	268.15 (41.35)
Predicted number of trips	4.33 (0.30)	0.21 (0.02)	2.11 (0.17)	0.70 (0.08)	2.68 (0.19)	1.65 (0.13)	0.58 (0.04)	5.33 (0.35)
Mean WTP – all trips (EUR)	175.05 (16.97)	4.03 (0.46)	422.30 (25.67)	38.35 (4.11)	81.49 (6.85)	102.79 (8.46)	39.20 (2.71)	640.63 (59.34)
Total value (billion EUR)	0.747	0.004	1.780	2.578	0.133	0.241	1.196	4.727

Estimated economic benefits associated with recreational use of the Baltic Sea

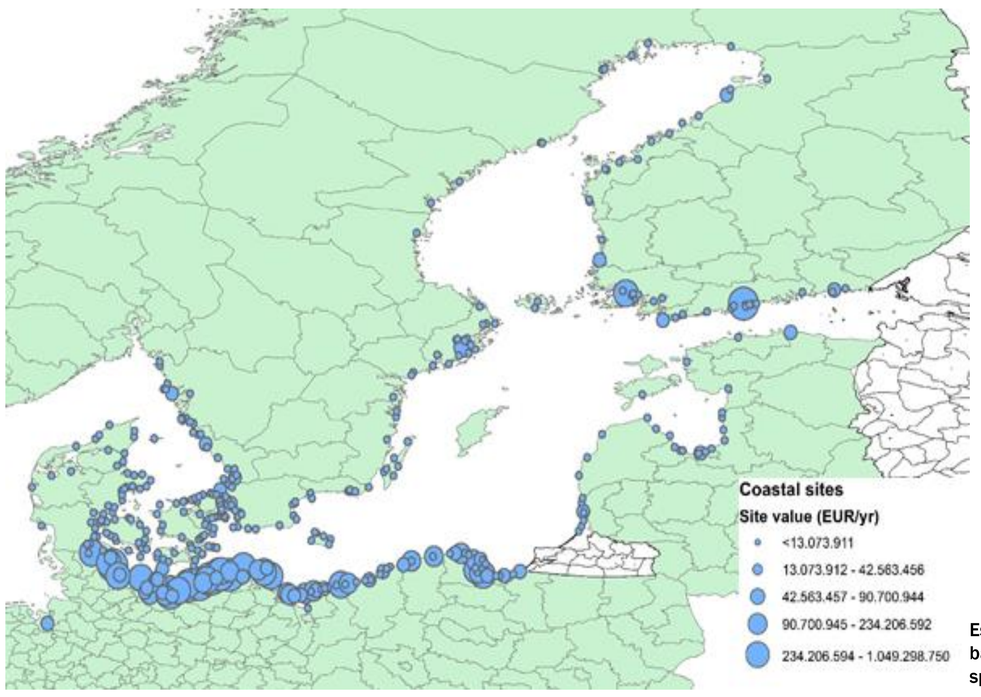
RESULTS

We find that Sweden and Finland have the highest WTP per trip (246-268 EUR) and for all trips jointly (422-641 EUR). Estonia has the lowest WTP, partly driven by the low number of trips and partly the low value per trip. Total WTP associated with the recreational use of the Baltic Sea accounts to 11.4 billion EUR annually.

Recreational value per site is calculated as the mean loss in welfare per site, divided by the average number of trips and multiplied by the adult population of each country.

Total annual value of sites ranges from 55,600 EUR in Latvia to more than 1 billion EUR in Germany.

Mapping the spatially explicit values per site reveals hotspots of recreational use of the Baltic Sea. These are situated primarily along the German and Polish coastline, around Stockholm in Sweden, Turku and Helsinki in Finland. In Denmark, with many coastal sites and relatively short distances to the coast for population spread all around the country, site values are relatively low. Nevertheless, sites' values range from around 74 thousand EUR to more than 10 million EUR.



Estimates of the recreational value of Baltic Sea coastal sites based on numbers of recreational trips, travelling costs and a spatially explicit random utility model

IMPROVING CONDITIONS MATTERS

We simulate the welfare effects of improving water quality to a Blue Flag status – i.e. complying with the EU Bathing Water Directive and providing toilet facilities and information.

Considerable heterogeneity exist across countries with average marginal value of a Blue Flag status ranging from 26 EUR in Latvia to 247 EUR in Germany.

If all sites would comply with a Blue Flag status, the simulated welfare change, that is the economic value people attach to upgrading all sites in their country to the Blue Flag conditions, could amount to 8.93 billion EUR.

ACKNOWLEDGEMENTS

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