



BONUS BALTICAPP: Wellbeing from the Baltic Sea – applications combining natural science and economics



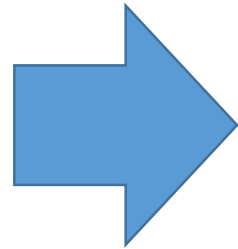
MEGATRENDS

Global population growth

Urbanization

Technological development, digitalization

Consumption patterns, life styles

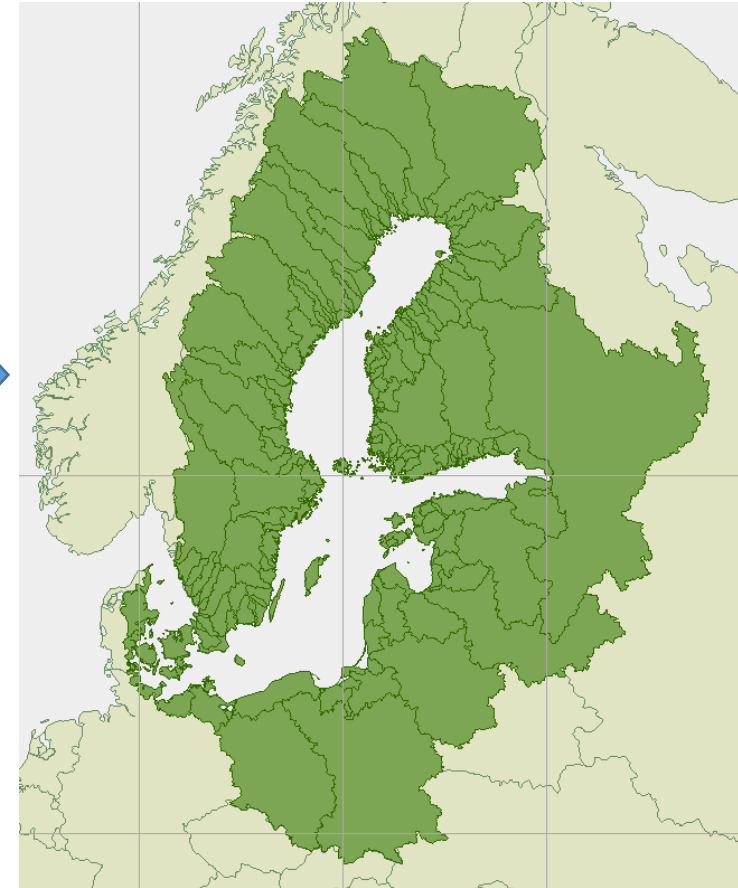
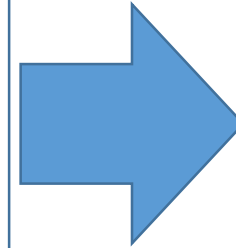


MULTIPLE PRESSURES

Nutrient loads

Fisheries

Hazardous substances,
Plastic,
pharmaceut.



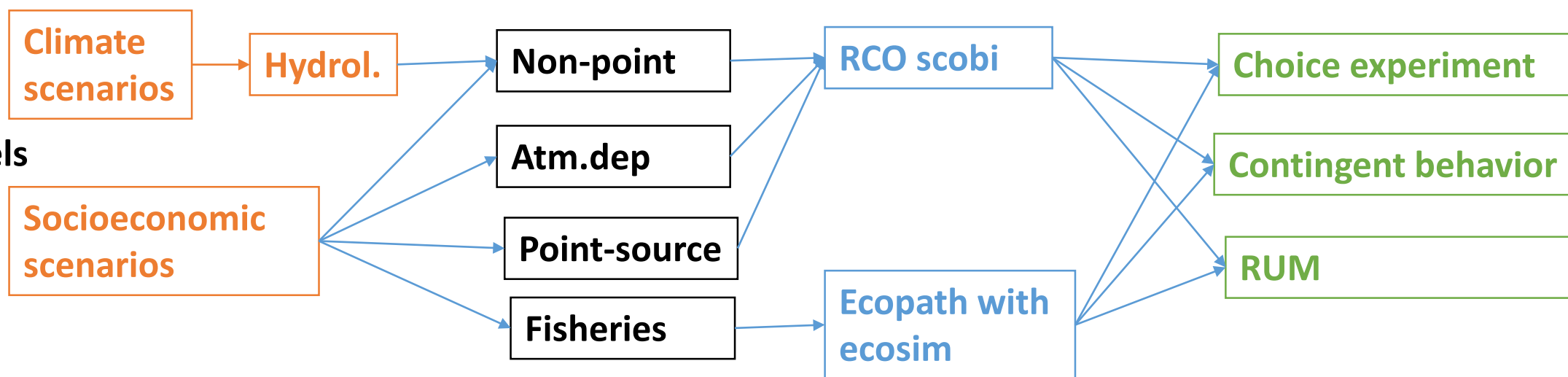
Source: Baltic NEST

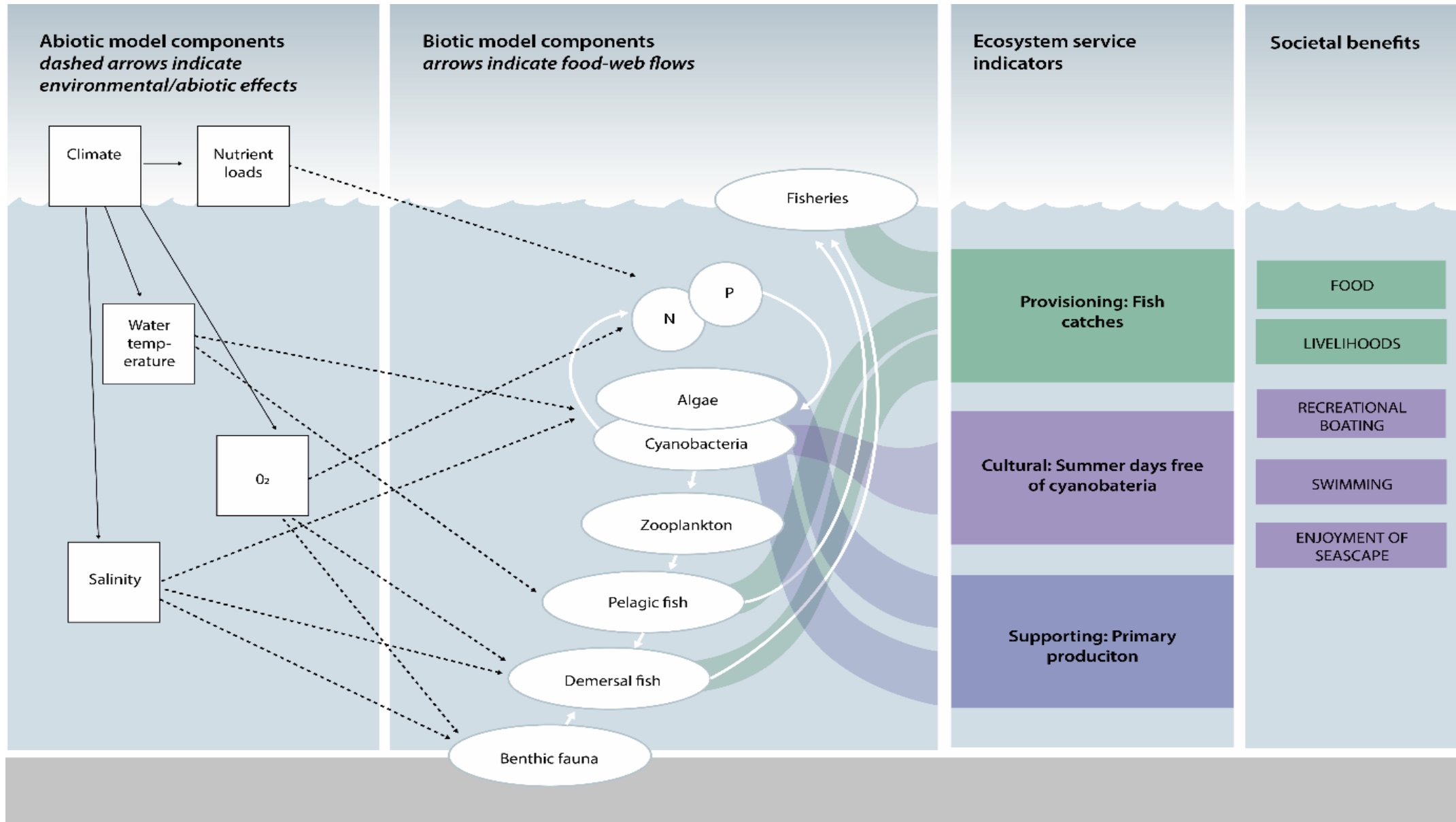
Integrated modelling as the tool to describe the causal human-nature-human interactions

Causal framework



Data & models



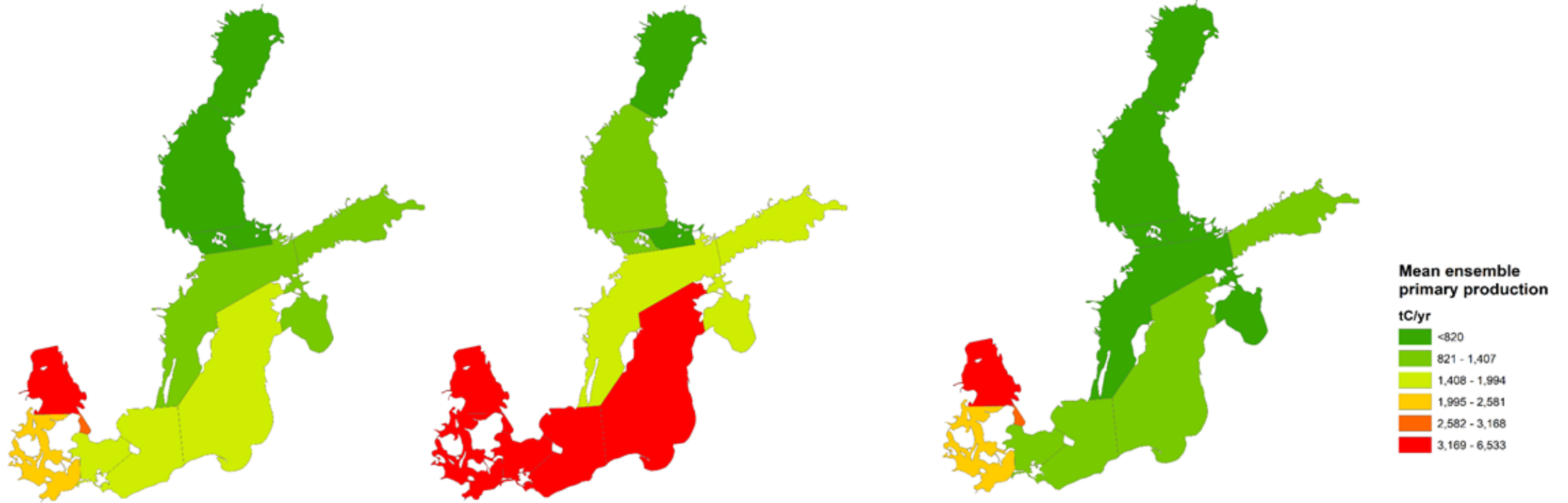


Source: Hyytiäinen et al. 2018

(a) 1986-2015

(b) 2069-2098 Fossil-fuelled development

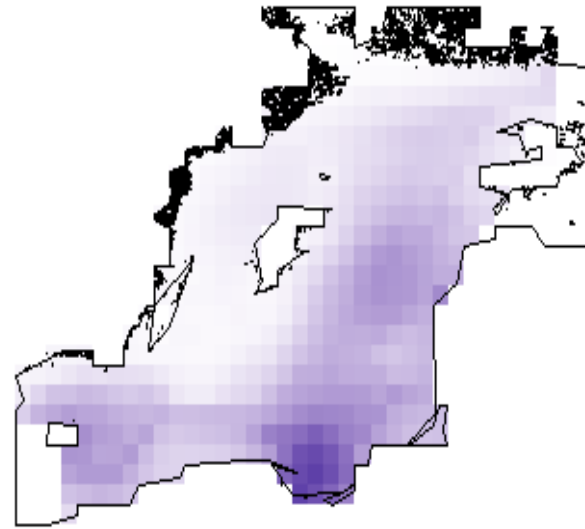
(c) 2069-2098 Sustainable wellbeing



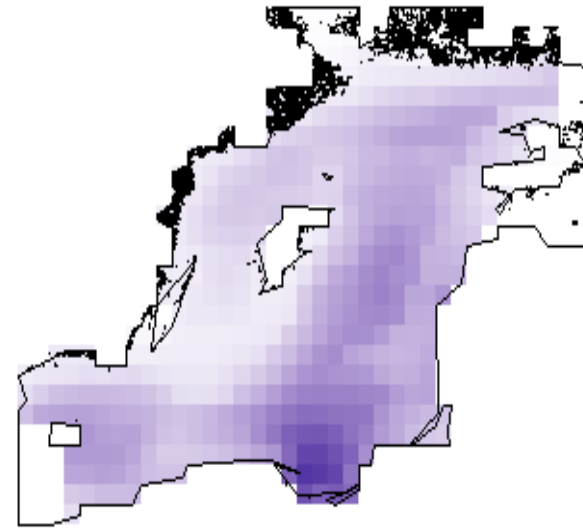
Ensemble mean primary production in the near past and by the end of the century for the two extreme scenarios described in terms of tons C year⁻¹

Source: Hyytiäinen et al. 2018

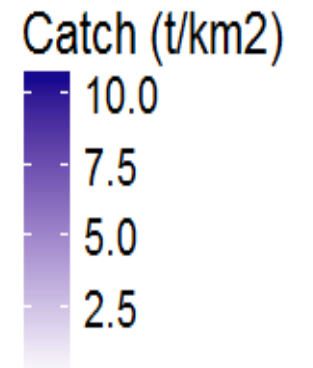
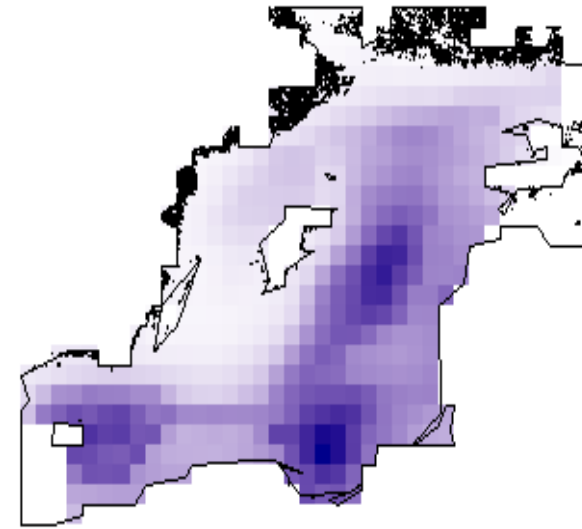
**(a) current
(2006-2015)**



**(b) Sustainable
well-being (2069-2098)**



**(c) Fossil-fuelled
development (2069-2098)**



Source: Hyytiäinen et al. 2018

Recreation in the Baltic Sea under Climate Change

- Recreation and values
- Survey of recreation
- Current recreation values
- Recreation values under moderate climate change
- Sources

The Baltic sea is an important part of the identity to people living in the littoral countries 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.

The importance that people place on recreation at the sea is not found in market prices as there are no entry fees of visits to nature. An economic value of recreation can however be approximated using the theory of the travel cost method and extended to account for spatial differences across sites using the discrete choice modelling framework.



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A survey was conducted in all nine Baltic Sea countries with approximately 1,000 respondents per country, 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 (Ahtiainen et al., 2013).

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.

We apply projections of environmental conditions under moderate climate change in the discrete choice framework to assess how climate change may impact on recreation values, keeping all else constant. Environmental conditions include precipitation, primary production, Secchi depth, sea surface temperature and air temperature.

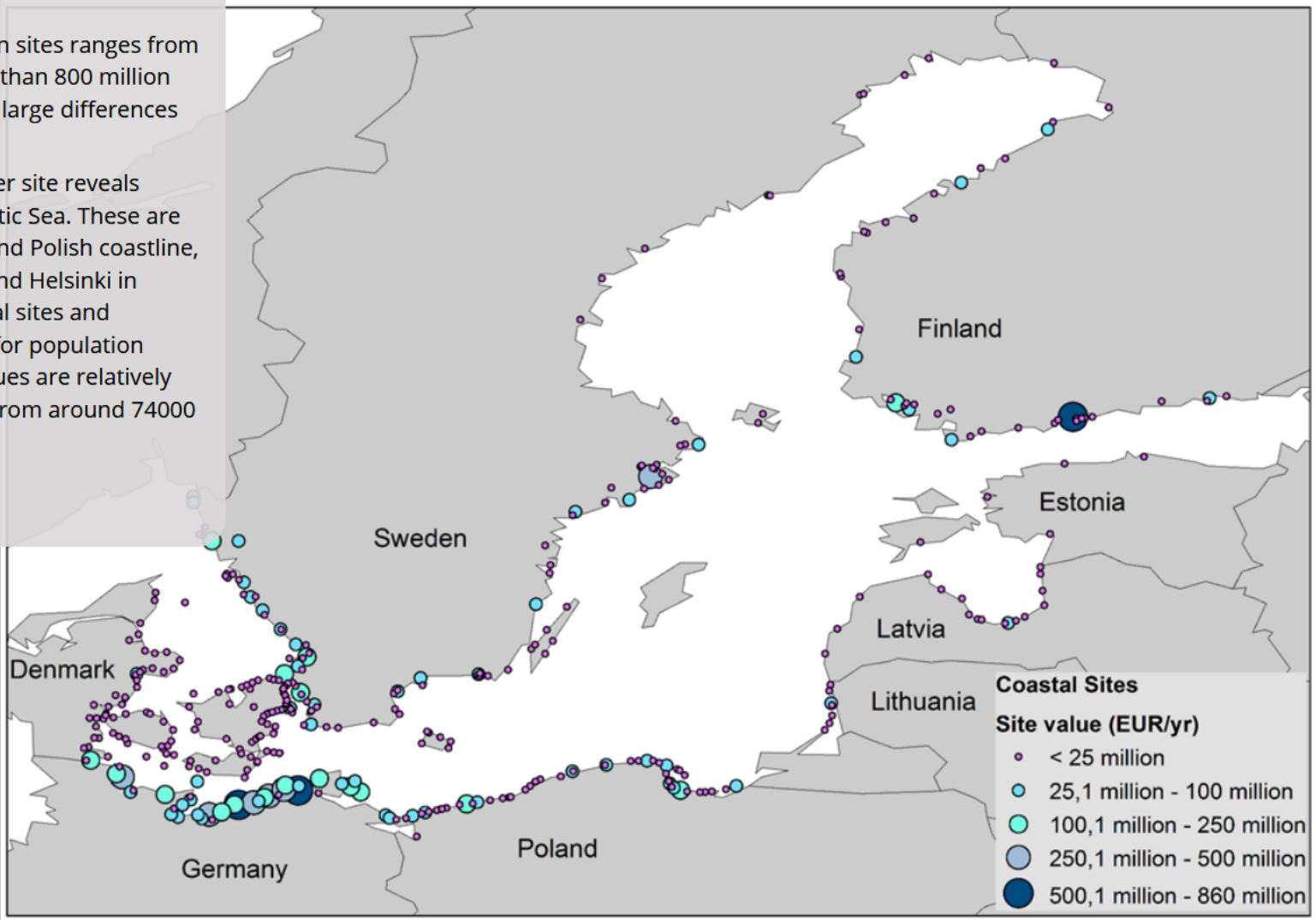


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Total annual value of coastal recreation sites ranges from 61.3 thousand EUR in Estonia to more than 800 million EUR in Germany and Finland, showing large differences across sites and across countries.

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 74000 EUR to more than 10 million EUR.



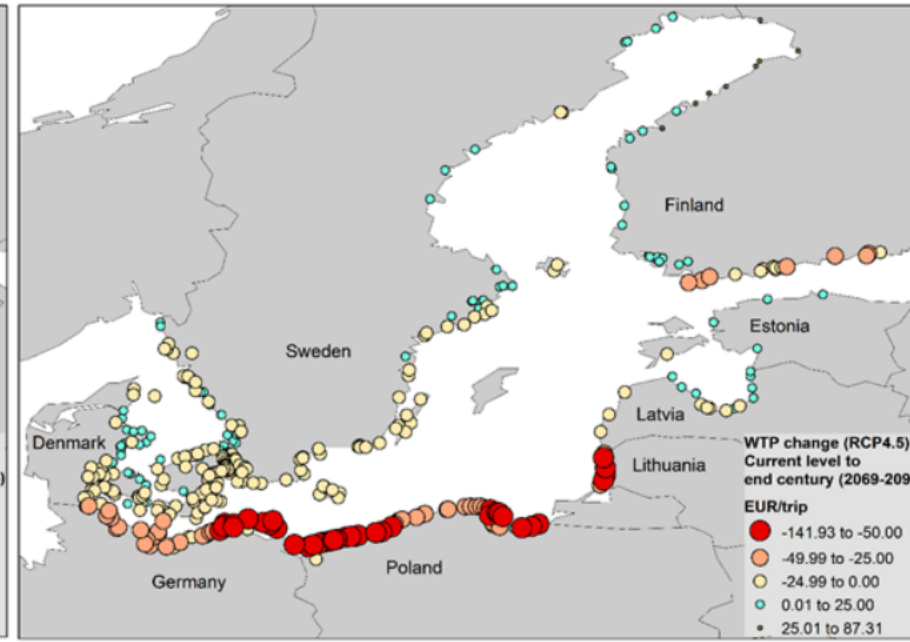
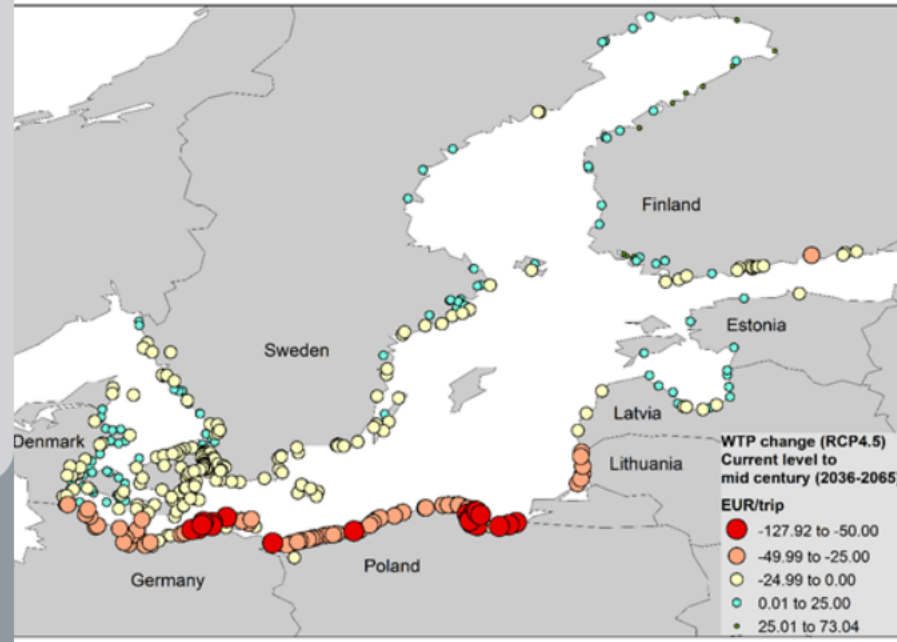
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Climate change will lead to changes in sea surface temperature and air temperature. Also, precipitation patterns will change along with primary production, which is a good indicator of eutrophication and risks of algal blooms.

In a moderate climate regime and with nutrient loads that are in compliance with the Baltic Sea Action Plan (BSAP), per trip values would decline for most sites. In particular the southern coast of the Baltic Sea would experience high value losses. Losses will become more pronounced by the end of the century, especially in the Finnish Archipelago.

Recreation sites in the Bothnian Bay would however experience increases in per trip values, increasing over the century.



Storymaps ecosystem services

Storymaps recreation