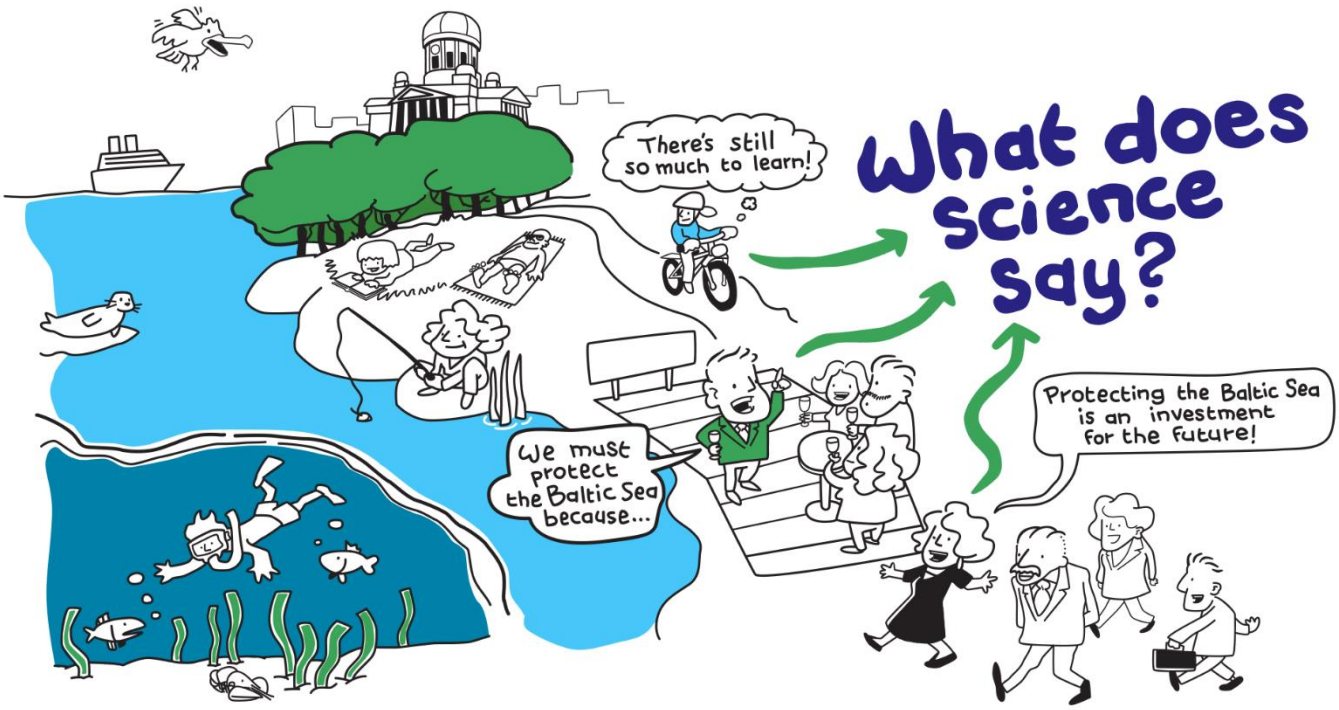
THE BONUS ROSEMARIE PROJECT | FINDING EVIDENCE FOR SMART DECISIONS: for the well-being of people and the Baltic Sea

BONUS – Science for a better future of the Baltic Sea region



See the BONUS ROSEMARIE animation on www.youtube.com/watch?v=Pd2Sp7SE3go

WHAT EVIDENCE EXISTS FOR THE IMPACT OF THE BALTIC SEA ECOSYSTEMS ON HUMAN HEALTH AND WELL-BEING?

Good ecological status of the Baltic marine environment is good for human health and wellbeing. Models suggest that careful policies aimed at improving public health can improve ecological status

KEY MESSAGES

1. The Baltic Sea ecosystem provides many benefits to human health and well-being. The sea is a place of relaxation, healing, a place to be in touch with the marine environment and benefit from its products. Conversely, the Baltic Sea ecosystem can cause harm to human health. For instance, people may become sick from the pollutants and infectious organisms in the water and seafood.
2. The evidence in the academic literature regarding the Baltic Sea benefits and harm to human health and well-being are not well-connected to the ecosystem service concept. This makes it difficult to provide solutions that integrate human welfare with the ecosystems in which they live.
3. The updating of the Baltic Sea Action Plan (BSAP) and the Marine Strategy Framework Directive (MSFD) call for a comprehensive evidence base. However, the evidence is scattered across multiple disciplines and rarely integrated with research on those ecosystem processes that can either amplify or mitigate the harm to humans.

HUMAN HEALTH DEPEND UPON HEALTHY ENVIRONMENT

Human health and well-being is a complex concept that goes beyond a lack of disease and infirmity (see Table 1). The benefits from the sea contribute to the health and well-being of individuals and communities through provisioning ecosystem services such as food, medicines, fertilisers; regulatory ecosystem services such as the biological processes that removes harmful substances or provides clean water; and finally, cultural ecosystem services such as the traditional activities like ice-sea fishing, and the spiritual beliefs associated with the Baltic Sea maritime and coastal ecosystems.

The Baltic Sea ecosystem services depend upon a healthy environment. The Baltic Sea countries have worked towards an integration of marine policies to ensure the health of the Baltic Sea ecosystem. Until recently, however, these policies have not considered the impact of the ecosystem services on human health.

461 ARTICLES ON HUMAN HEALTH AND WELL-BEING EFFECTS OF THE BALTIC SEA

A systematic map is a method to synthesize the evidence base on a specific question, identifying research gaps and knowledge clusters for knowledge users. In a systematic search (see Figure 2), 6756 articles were downloaded and reviewed leading to 461 scientific articles which were found relating to human health and well-being impacts from exposure to the Baltic Sea. Only 67 articles, however, explicitly mentioned the term "ecosystem services".

Worrying trends were observed in the medical literature showing increasing levels of pathogenic organisms in bathing water due to climate change in the Baltic Sea, particularly in antibiotic resistant bacteria. Harmful algal blooms were also documented with their impacts on human health and negative impact on the enjoyment of the marine environment and consequent impact on tourism. Seafood may be contaminated with endocrine disruptors, resistant infectious organisms, harmful chemicals, pharmaceuticals or heavy metals.

Various impacts were documented regarding the consumption of contaminated fatty fish from the Baltic Sea. Of note, 91 articles documented instances of cancer in seamen or their wives who consumed fish of Baltic Sea origin, but only 6 of those articles mentioned ecosystem services

Table 1: Health and Well-being definitions (Mckinnon et al. 2016)

Domain	**Code definition**
Economic living standards	Income, employment, employment opportunities, wealth, poverty, savings, payments, loans
Material living standards	Assets owned, access and availability of food, fibre and fuel basic infrastructure (electricity, water, telecommunications and transportation), shelter
Health	Physical health, nutrition, longevity/life expectancy, maternal health, child health, access to health care, occurrence of diseases, mental health
Education	Education infrastructure (access to school, access to training, quality of education); informal education (transfer of knowledge and skills includes livelihood skills, traditional knowledge and skills); formal education (degrees awarded, students enrolled)
Social relations	Interactions between individuals, within and/or between groups (communities, stakeholders, ethnic groups, gen- der); conflict, relationships, connectedness, ability to work together, ability to help others, and trust
Security and safety	Physical security (personal safety and security), resource security; tenure security; human rights; vulnerability, resilience and adaptive capacity
Governance (and empowerment)	Structures and processes for decision making including both formal and informal rules; includes participation and control in decision making, accountability, justice, transparency and governance skills
Subjective well-being	Measures of happiness, quality of life, satisfactions supported by some value of ecosystem(s) and/or resources
Culture and spirituality	Cultural, societal and traditional values of natural resources and nature to the community; sense of home; cultural identity and heritage; spiritual or religious beliefs and/or values
Freedom of choice and action	Ability to pursue what you value doing and being

Some articles did note, however, that whilst there was an increase in cancers, overall there was an improvement in health due to the benefits of eating fatty fish.

The Baltic Sea also brings great benefits to people. Some articles reviewed documented a positive Baltic Sea identity, an aesthetic appreciation of the Baltic Sea landscapes and an appreciation for the recreational benefits (beach holidays, recreational fishing, observing nature). Evidence also exists documenting the potential for wetlands to protect the coastline and purify water, and the Baltic Sea as a source for novel medical products and nutrition.

Are there linkages between the self-reported health benefits and recreation frequency in marine environment?

The linkages between perceived health, life satisfaction and marine recreation among the population of Finland was assessed using an unpublished survey data (N=1374) to study the monetary benefits of reaching good environmental status in the Finnish marine areas. Neither life satisfaction nor health seem to depend on the distance of the respondents from the sea. However, taking part in marine recreational activities may increase life satisfaction regardless of the health of the respondent. This suggests that marine recreational activities can increase the quality of life for people regardless of their health status. A more elaborate study on these linkages is being conducted to validate the findings. The majority of the survey respondents also reported that spending leisure time in the Baltic Sea and its environment improved their health and reduced stress levels, even if the direct effect on perceived health could not be identified. The link between perceived health, life satisfaction and the existence or quality of marine environment has not been widely studied especially for the Baltic Sea. However, these linkages likely exist and require more attention and scientific evidence in order to be considered in policy decisions.

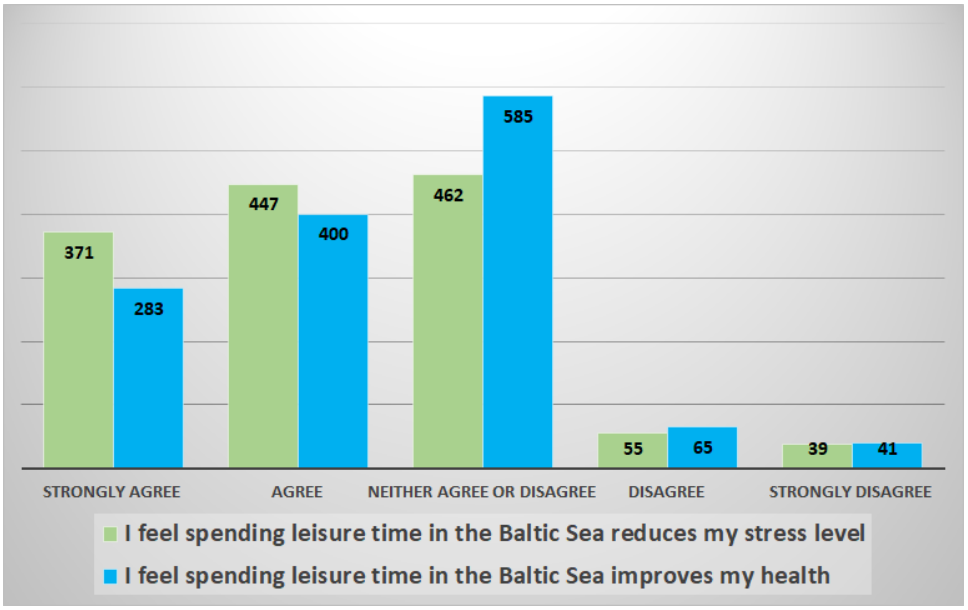


Figure 1 Stated connection of leisure time spent in the Baltic Sea and reduced stress level and improved health (N=1374)

THE HEALTH BENEFITS FROM THE BALTIC SEA ECOSYSTEM SERVICES ARE ONLY JUST BEGINNING TO BE APPRECIATED

Since the health benefits from the Baltic Sea ecosystem services are only just beginning to be appreciated, the evidence in the literature is limited; However, there is evidence for the impacts of the Baltic Sea on health and well-being scattered across multiple disciplines. In-depth reviews are therefore needed to explore these linkages, including coastal and marine ecosystem services to draw them together.

If the Baltic Sea is to be protected, society must be able to appreciate the benefits, as well as the harm that the Baltic Sea can provide. From the less well-known benefits of the reed wetlands' ability to purify water, to the more well-known benefits of a marine landscape that offers recreation and a sense of well-being.

THE BONUS ROSEMARIE PROJECT

This policy brief was provided by the BONUS ROSEMARIE project. The BONUS ROSEMARIE project followed a systematic review approach and guidance from The Collaboration for Environmental Evidence in collecting the evidence base for this policy brief. The literature was retrieved from 17 databases and returned 6756 research articles, which were screened at title and abstract level according to a predetermined protocol using CADIMA software for the recording, followed by screening 2141 of the articles in Eppi-reviewer for full-text screening and data extraction. The search equation and the references for the 6756 articles are provided for future use. Iterative stakeholder dialogue with HELCOM GEAR group was an essential part of the project. BONUS ROSEMARIE research group is sincerely grateful for this science-policy dialogue. The project partners were the Finnish Environment Institute, Kungliga Tekniska Högskolan, the Estonian University of Life Sciences and Gottfried Wilhelm Leibniz Universität Hannover. The project received funding from BONUS (Art. 185), which is funded jointly by the EU, the Swedish Research Council Formas and the Estonian Research Council.

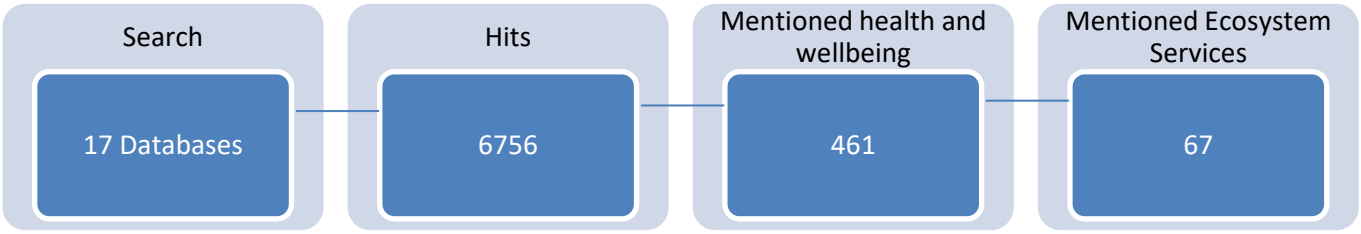


Figure 2 BONUS ROSEMARIE found 6756 research articles of which 461 contained references to health and well-being impacts from exposure to the Baltic Sea marine environment. 67 of the 461 implicitly referred to ecosystem services.

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FURTHER READING

A compilation of the reviewed articles can be found in: http://hdl.handle.net/10138/316226

Mckinnon, Madeleine C., Samantha H. Cheng, Samuel Dupre, Janet Edmond, Ruth Garside, Louise Glew, Margaret B. Holland, Eliot Levine, Yuta J. Masuda, Daniel C. Miller, and Isabella Oliveira. 2016. "What Are the Effects of Nature Conservation on Human Well-Being ? A Systematic Map of Empirical Evidence from Developing Countries." *Environmental Evidence* 1–25.

Storie, Joanna, Monika Suškevičs, Mart Külvik, Virpi Lehtoranta, Suvi Vikström, Simo Riikonen, Harri Kuosa, Kristin Kuhn & Soile Oinonen. 2020 What evidence exists for the impact of Baltic Sea ecosystems on human health and well-being? A systematic map protocol. Environmental Evidence 9, 5.