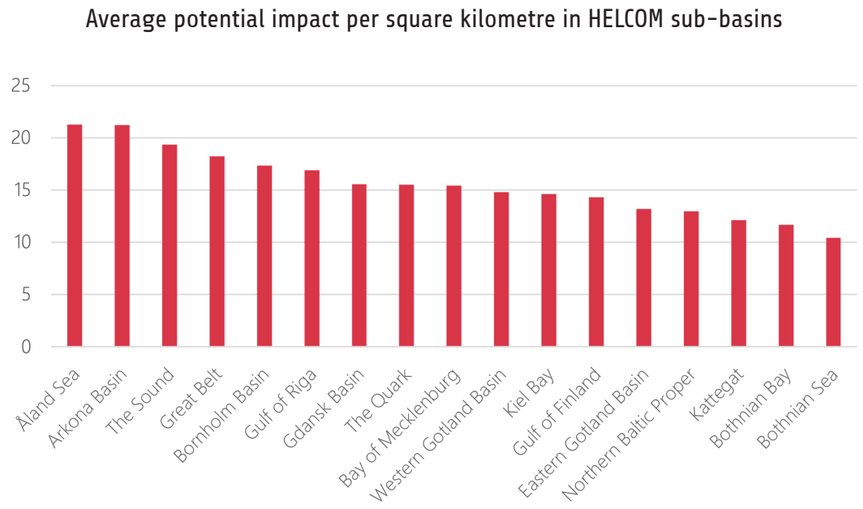

Figure 5.4. Average potential cumulative impact per square kilometre by HELCOM subbasin according to the Baltic Sea Impact Index 2016–2012. For details, see HELCOM (2023e).

BOX 5.2.

The SPIA tool

The increasing use of sea areas leads to complex patterns of interactions between human activities, pressures and ecosystem components. Tools to assess the spatial distribution of pressures and impacts are helpful for evaluating the spatial distribution of human activities and pressures and the combined and cumulative impact of human-induced pressures on the environment, as well as for identifying potential key areas of concern and in need of enhanced management efforts.

The HELCOM SPIA tool is an open-source tool which is free for everyone to use. Users can analyse the spatial distribution of pressures and impacts in the Baltic Sea using HELCOM datasets as the input. The SPIA tool is available as an ArcGIS Pro desktop toolbox and as a web-based online tool, with functionalities that can be used to present and explore the results in various ways The user can select which layers to explore and include in the calculation. The assessment can be run for the whole Baltic Sea or separately for an individual HELCOM subbasin. Results appear in the tool's map viewer, where it is possible to explore and download the map together with a statistics matrix of the result. In the interactive map viewer, the results can be compared with any pressure or ecosystem layer used in the calculation. The map viewer can also be used to explore the contribution of pressure and ecosystem layers to the total impact in a selected location.

5.3. Spatial analyses of ecosystem services

The status of the environment is directly linked to our use of the sea, which provides us with both direct and indirect benefits. Having a marine environment in good status offers several benefits that are currently not fully provided across the Baltic Sea, such as clear and oxygen-rich waters, healthy fish stocks, safe fish and seafood for human consumption, good quality coasts and beaches, and healthy marine biodiversity. Reaching good environmental status in national marine waters by 2040 is collectively estimated to be worth 5.6 billion euros per year to society (HELCOM 2023d). Not achieving good status of the marine environment affects different groups of society by, for example, decreasing the opportunities for fishing or causing impacts on human health, including for future generations (HELCOM 2023d).

Ecosystem services is a collective term for all the direct and indirect contributions that healthy ecosystems make to human well-being, as a result of functions and processes in the ecosystem (Potschin & Haines-Young 2016b). The ecosystem services

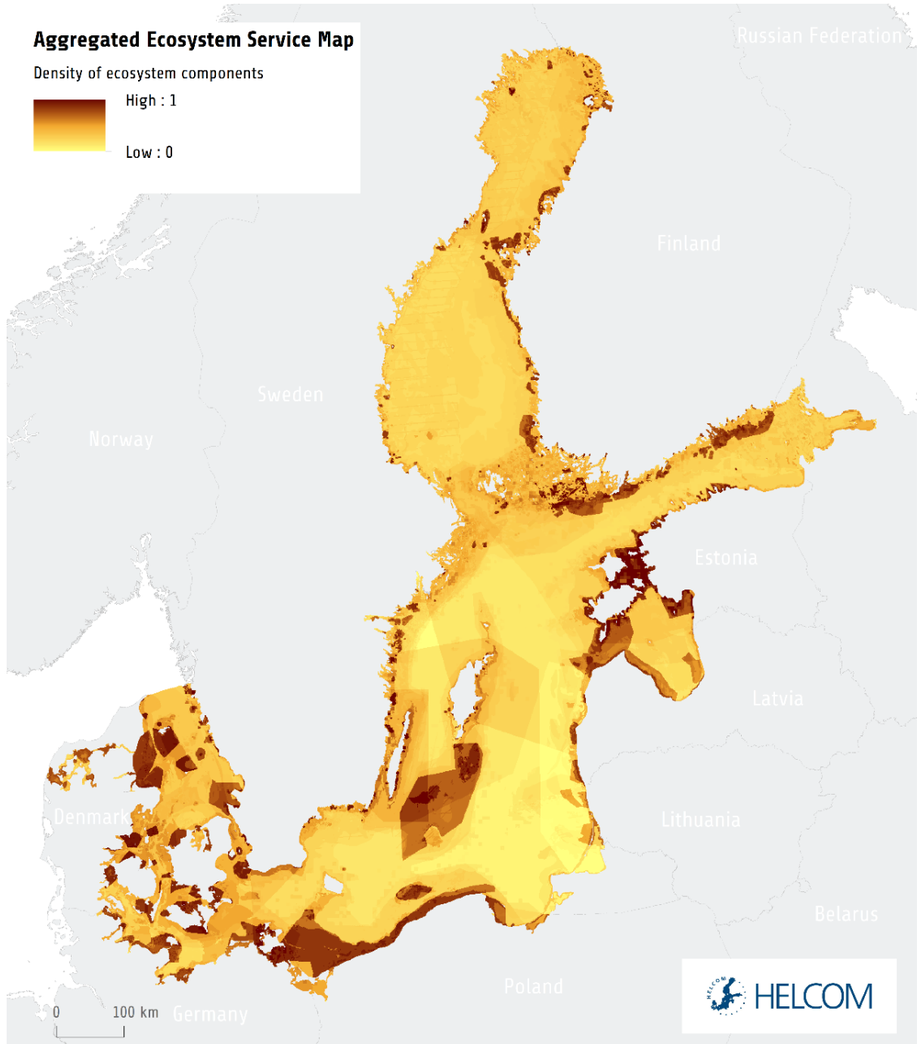

Figure 5.5. Illustration of areas with high potential to contribute to ecosystem services in the Baltic Sea. The map is made from 54 different ecosystem component layers based on their respective contribution to specific ecosystem services. For a more detailed description of the data and analyses, see HELCOM (2013d–e) and Ruskule *et al.* (2023).

concept covers aspects of the environment that are fundamental to human survival. The ecosystem produces goods that we value, such as wild fish and algae for nutrition. It also contributes to the regulation and maintenance of the ecosystem that we live in, through processes like carbon sequestration. Interacting with nature also provides non-material benefits, like recreation and cultural values. Analysing the environment using an ecosystem services approach is helpful for understanding and clarifying the connections between ecosystems and human well-being. The ecosystem services approach can thus support decisions and policy-making to ensure the sustainable use of resources (Martin-Ortega *et al.* 2015). Analyses of ecosystem services can help clarify potentially complex relationships between nature and society. As ecosystem services link the state of the ecosystem with societal well-being, such analyses are an effective tool for evaluating the trade-offs between alternative sea uses, and between different management and protection options. However, both the ecosystem services approach and its branch, ecosystem accounting, are fairly new concepts in comparison established environmental assessment tools. Further development of their knowledge base, information base and appropriate application is needed.

A mapping approach building on the data layers developed for use in the assessment of the spatial distribution of pressures and impacts demonstrates the potential contribution of ecosystem services in the Baltic Sea region (Figure 5.5). An aggregated map of ecosystem service potential was created using an extension of the Baltic Sea Impact Index calculation tool (Ruskule *et al.* 2023). This updated evaluation used 54 different ecosystem component layers, including benthic habitats, pelagic species, habitat-building species, mobile species and their key habitats. The tool aggregates the spatial extent of the ecosystem components contributing to the provision of a particular ecosystem service and combines the results for all the layers. The precision of the resulting map is still comparatively low because it only considers the presence or absence of ecosystem components, not their quantity or quality, and it only reflects the ecosystem services that were included in the exercise. Nevertheless, it provides a rough illustration of potential key areas for ecosystem services in the Baltic Sea, thus supporting key management actions, such as protection and the determination of acceptable levels or locations of pressures to achieve good environmental status.

5.4. How can maritime spatial planning support the Baltic Sea environment?

Maritime spatial planning (MSP) is the spatial planning of activities at sea. The processes used in MSP involve a holistic, multisectoral effort at national scales and can serve as a key component in the implementation of several shared environmental objectives for the Baltic Sea. Maritime spatial planning is thus becoming an increasingly important instrument for the development of ecosystem-based management, facilitating or enabling work towards reaching a good environmental status of the Baltic Sea environment (Box 5.3).

BOX 5.3.

What is maritime spatial planning?

Maritime spatial planning (MSP) is spatial planning at sea using a holistic, multisectoral effort. A key aim of MSP is to delineate human uses in such a way that sensitive environmental areas are not significantly negatively affected. Furthermore, the MSP process should serve as a platform for the involvement of all relevant stakeholders in determining how society should use the sea.

The Baltic Sea Action Plan includes MSP as a horizontal topic. Through the Baltic Sea Action Plan, HELCOM countries have agreed to:

— **Utilize maritime spatial planning (MSP) applying an ecosystem-based approach to support BSAP objectives and targets and contributing to sustainable sea-based activities**

The maritime spatial plans are implemented nationally. Thus, the inclusion of coastal areas or related sectors, and the formal status of the plans, varies between countries in HELCOM.International cooperation between neighbouring countries and within regional seas is of high importance in MSP and is a cornerstone of the formation of a coherent framework. In HELCOM, the HELCOM-VASAB MSP working group addresses a number of joint challenges for MSP in the Baltic Sea with its regional MSP roadmap for 2021-2030, including knowledge development, regional collaboration, environmental considerations, a sustainable blue economy and climate change (EC 2022).

How can MSP make a difference for ecosystems and societies?

Maritime spatial planning can potentially have positive or negative effects on the marine environment, depending on where and how space is allocated for different uses. It is essential that knowledge about how different human activities may affect both the local and the broader ecosystem are included in the planning process in order to ensure long term sustainability.

Because planning considers social, economic, cultural and other relevant aspects while also aiming to enhance marine nature values, it can help countries integrate key environmental considerations into their planning in a holistic way. When applied optimally, MSP can make a difference for Baltic Sea ecosystems and society by guiding or directing the locations of different types of human uses of the sea in a way that maximizes the possibility for a positive sustainable future. For example, planning efforts can enhance nature conservation by facilitating a Baltic Sea network of marine protected areas or can improve marine ecosystem services by securing space for different sea uses in a manner that protects and improves long-lasting ecosystem functions and the provisioning of key ecosystem services.

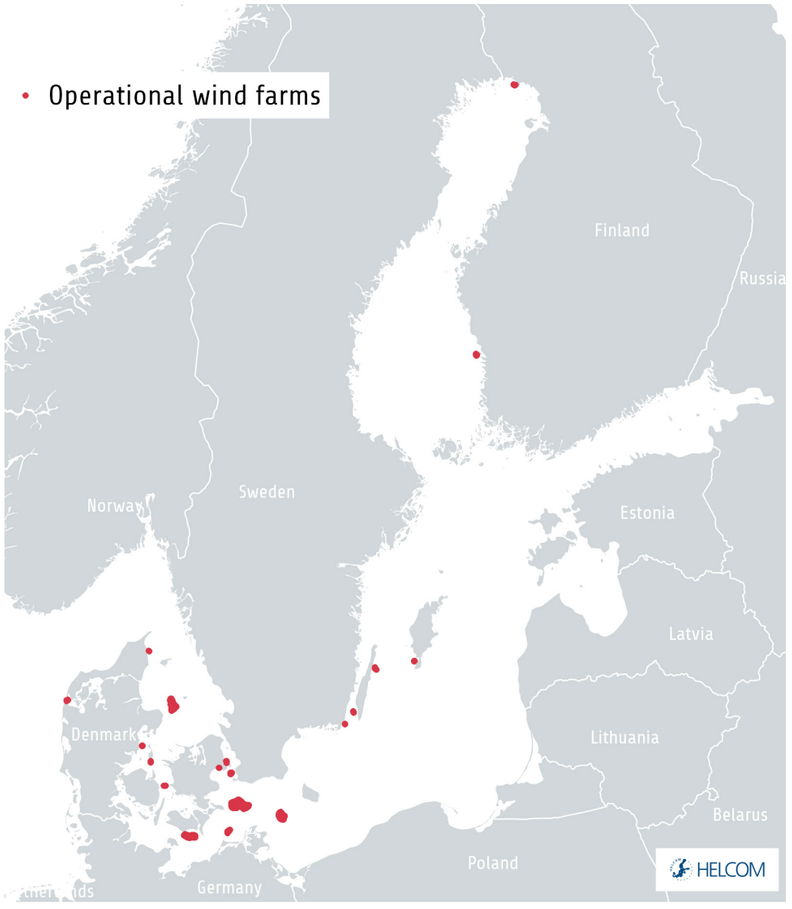

Figure 5.6. Operational wind farms in the Baltic Sea during 2016–2021. Several more offshore wind farms are currently in planning. The expansion of offshore wind is a key topic for sustainable environmental management, in which MSP plays a central role. Please note that the symbols in the map are enlarged to make them visible at this scale. Source: HELCOM 2023e.