Baltic LINes

Coherent Linear Infrastructures in Baltic Maritime Spatial Plans

Hamburg Workshop results

MSP Challenge Baltic Sea edition

10 April 2019

Interreg Baltic Sea Region

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

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Introduction

On 15 February 2019 the NorthSEE and Baltic LINes projects came together to host two parallel sessions with the MSP Challenge Simulation Platform (or MSP Challenge for short). MSP Challenge is a multi-user digital MSP learning and training platform that is fast heading towards becoming an MSP support system. Users of MSP Challenge can analyse dozens of data layers imported from real-life GIS sources such as EMODnet and HELCOM, and collaboratively create plans for new or changed human activities and environmental protection measures, to finally evaluate the impacts of these plans on ship movements, energy production capacity, and the ecosystem status.

For the Baltic LINes project this was the first time we were able to use the Baltic Sea edition of MSP Challenge to its fullest extent. In previous sessions (specifically in Copenhagen and Riga in 2018) the ecosystem simulation had not been used yet, because it was still in development. By this Hamburg session this work had been completed, which allowed the MSP Challenge users to explore impacts of their plans on the Baltic Proper and Bothnian Sea ecosystems for the first time.

Also for the first time, we brought together real maritime spatial planners or their colleagues from almost the entire Baltic Sea region and asked them to work with several international experts on shipping, energy and marine ecology. In this Baltic Sea session a total of 14 participants from seven countries took part, i.e. from Germany, Poland, Estonia, Latvia, Finland, Sweden and Russia. None of them took part in any official capacity; they were *not* representing ‘their’ country. Instead they were there to provide ideas and insights based on their extensive expertise.

Our primary objective with this session was to further explore how MSP Challenge could be used to test the feasibility of reaching multiple competing national or transnational targets with which maritime spatial planners are often confronted. Pursuing this objective was a next step towards turning MSP Challenge into a MSP support system. In this case we presented the participants with the following three targets:

- *Develop a coherent network of effectively managed Marine Protected Areas of at least 300 km^2 each in the Eastern and Western Gotland Basins, Northern Baltic Proper, Åland Sea, Bothnian Sea and Bothnian Bay.*
  This target was derived from previous work conducted by HELCOM that assessed which particular marine areas would benefit from protection measures to reach BSR overall targets[1]. ‘Effectively managed’ refers to the implementation of more active protection measures, such as bans for certain fishing techniques or fleets or for certain shipping types, and was specifically *not* derived from the aforementioned HELCOM work. This was added to trigger participants to at least also consider more active protection measures.
- *Develop at least 100 GW renewable energy production capacity throughout the Baltic Sea.*
  This target was derived from a general push for more offshore renewable energy production by all sorts of transnational and national governments and non-governmental organisations. The specific number

[1] HELCOM 2016. Ecological coherence assessment of the Marine Protected Area network in the Baltic. Balt. Sea Environ. Proc. No. 148

of 100 GW was defined following the results of the previous MSP Challenge facilitated energy workshop held Aalborg University Copenhagen on 30 & 31 October 2018. Reaching this target would mean an incredible increase in production capacity (>1000%) for the BSR, but would according to a Baltic LINes study still be quite modest in ambition[2]. It proved to be reachable at the Copenhagen workshop, even though during that workshop other human activities and environmental protection measures were only considered to a limited extent.

- *Try to maintain or even improve the shipping route efficiency percentages of your country's ports.* This target was derived from a general push for ensuring accessibility of ports and maintaining as much as possible current shipping lines, despite the introduction of all sorts of new human activities and environmental protection measures. Shipping route efficiency percentages for 100+ BSR ports are calculated by MSP Challenge's shipping simulation. This means that every port in the simulation has an average route efficiency percentage for all ships leaving said port for any destination every simulated month. A port's shipping route efficiency of 100% would mean that all ships from that port would be able to go in straight lines to their destination of choice over the simulated month.

We considered this session as a first step towards introducing MSP Challenge as a MSP support system. For this reason we presented the software and session design a bit differently than we have previously done. We provided a bit more structure and guidance to the participants, offering a couple of handouts and some additional information on MSP, particularly step-by-step approaches to designate areas for ship corridors as well as areas for energy installations and electricity cables in MSP.

In this report, we first offer a bit more background on the MSP Challenge platform, notably its simulations with which we assess whether users are actually reaching the targets we set them. We subsequently offer a brief description of how the session was designed and what actually happened. Finally, through dozens of screenshots we offer insights into what spatial plans the participants developed, whether these plans actually reached the targets we set, and what the further consequences were on shipping, energy and the ecosystem. We conclude with a reflection on how MSP Challenge can in such a way, or a different way in the future, be used for MSP support.

Background

Energy simulation

MSP Challenge's energy simulation is a simulation of the energy production capacity of the implemented energy infrastructure. For the energy simulation to work, MSP Challenge users need to designate energy areas of any kind (notably wind, tidal, wave energy, and oil and gas installations) and subsequently connect them through appropriate infrastructure (notably electricity cables or pipelines) to landing stations of a particular country. In this session we focused solely on wind farms, and upheld the simple rule of thumb that any wind farm on the short and medium term has an average of 6 MW per km^2 energy production

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[2] Swedish Agency for Marine and Water Management (SwAM)/ RISE Research Institutes of Sweden: 2030 and 2050 Baltic Sea Energy Scenarios, 2019 (in preparation).

capacity. This specific metric is based on energy research conducted in the NorthSEE project[3]. If MSP Challenge users implement the appropriate infrastructure (cables, landing stations, and optionally converter stations) then that capacity is fully added to any of the connected countries' total energy capacity. If any part of the infrastructure (e.g. the electricity cables) cannot handle the full capacity of the attached wind farms, then the remaining wind farm capacity is simply lost. The energy simulation functions as the calculator of each country's total energy capacity. It calculates the countries' obtained energy capacity each month. More information about the design and functioning of the energy simulation can be read in the paper by Hutchinson et al[4].

Shipping simulation

MSP Challenge's shipping simulation is a simulation of the monthly movements of different types of ships throughout the entire BSR. For the shipping simulation to work, the amount of ships of each type that want to go from a particular port or gate to any other port or gate in the BSR need to be given or calculated for each simulated month. We used real historical AIS data to determine the amount of ships of different types going from specific ports to specific ports both within and beyond the Baltic Sea region. The simulation subsequently determines which routes all this ships are likely to take. For this path-finding, the simulation follows a number of basic rules of thumb. First, it follows the legal and economic principles that ships can actually go anywhere and prefer to take the shortest route possible (ideally they go in a straight line). Of course, going in a straight line is by far mostly not possible due to physical obstructions, notably shallow waters in the case of big tankers or cargo vessels, or other human activities at sea such as wind farms. Ships will also prefer priority shipping lanes as designated by IMO or national governments. More information about the design and functioning of the shipping simulation can be read in the paper by De Groot et al[5].

Ecosystem simulation

MSP Challenge's ecosystem simulation is actually taken care of by a separate, open-source software package called Ecopath-with-Ecosim (EwE; http://www.ecopath.org). Over the past half year, Breda University of Applied Sciences personnel have worked together with personnel from the Finnish environmental research agency SYKE, Stockholm University, and experts from the EwE community to extend and implement a BSR ecosystem model in EwE software and interconnect it with MSP Challenge. The result is an ecosystem simulation that covers the Baltic Proper and Bothnian Sea regions. This simulation takes all the human activities taking place in the BSR and derives area-specific ecosystem pressures from it, to subsequently feed those pressures into the EwE model (see Figure 1 below). Each pressure has a particular effect on particular species (e.g. scaring them away, disrupting certain behaviours,

[3] NorthSEE Interim Report: Status quo report on offshore energy planning provisions in the North Sea Region, 2018. https://northsearegion.eu/media/4930/northsee-offshore-energy-status-quo-main-report-final-version-120418.pdf

[4] Hutchinson, K., Warmelink, HJG., Boode, W., Pereira Santos, CA., & Mayer, IS. (2018). An offshore energy simulation through flow networks: CEL within the MSP Challenge 2050 simulation game platform. In D. Claeys, & V. Limere (Eds.), *ESM 2018 proceedings* (pp. 157-163). Eurosis. https://pure.buas.nl/en/publications/an-offshore-energy-simulation-through-flow-networks-cel-within-th

[5] de Groot, P., Boode, W., Santos, C., Warmelink, H., Mayer, I. (2019, submitted). A shipping simulation through pathfinding: SEL within the MSP Challenge Simulation Platform. Available upon request: warmelink.h@buas.nl

killing them). Since the EwE model also includes a rather comprehensive food web, any direct effect on one species could have an indirect effect on its prey or predators. The EwE model subsequently feeds back two kinds of outputs: different species' or species groups' biomasses and catches for the fished species groups (average biomass per km2 within the simulated area), and heat maps (color-coded spatial distributions within the simulated area). More information about the design and functioning of this kind of ecosystem simulation can be read in the paper by Steenbeek et al[6].

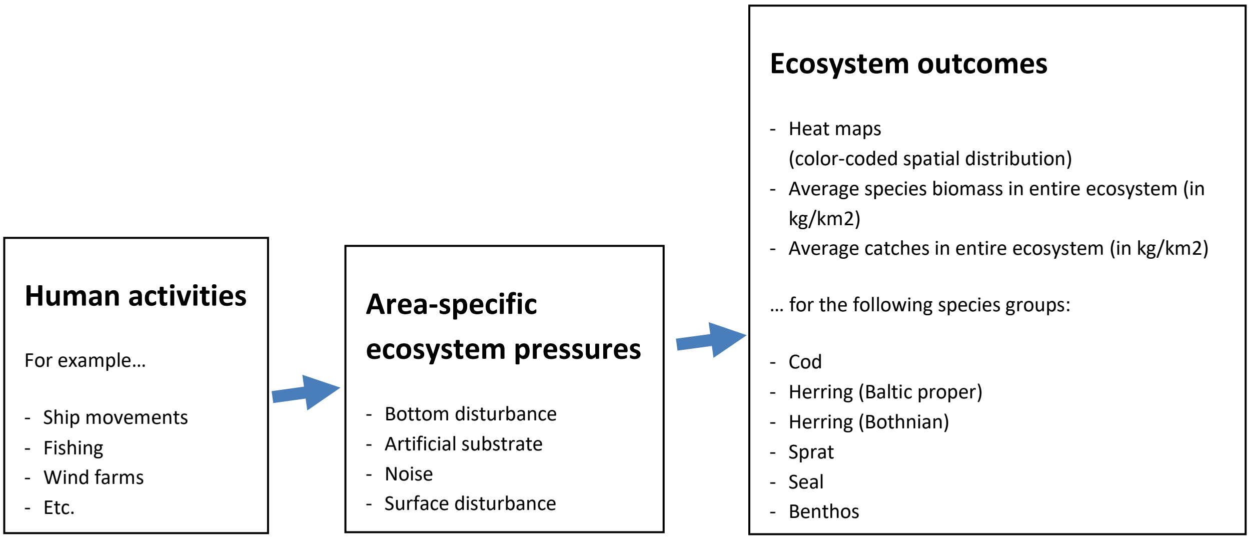

Figure 1: Basic design of the ecosystem simulation.

Practical planning guides

Both practical guides to the designation of ship corridors and the designation of areas for energy infrastructure have been developed within Baltic LINes as part of work package 4 "Coherent planning of linear infrastructures." Both guidance documents comprise step-by-step approaches aiming to avoid planning mismatches by using similar or at least comparable methods for the designation of ship corridors or areas for energy infrastructure (offshore wind farms and electricity cables). In general, coherency enhances safety at sea and contributes to better environmental conditions as well as lower economic costs. A common planning approach increases the comparability and mutual understanding of national decisions.

For the designation of ship corridors the step-by-step approach includes 6 main steps (see Annex 1), for the designation of areas for offshore renewable energy installations in MSP the following steps have been developed in Baltic LINes (compare Figure 2, more detailed information in Annex 2):

[6] Steenbeek, J., Romagnoni, G., Bentley, J., Heymans, J.J., Serpetti, N., Gonçalves, M., Santos, C., Warmelink, H., Mayer, I., Keijser, X., Fairgrieve, R., Abspoel, L. (2019, accepted) Combining ecosystem modelling and serious gaming to aid transnational management of marine space. Available upon request: warmelink.h@buas.nl

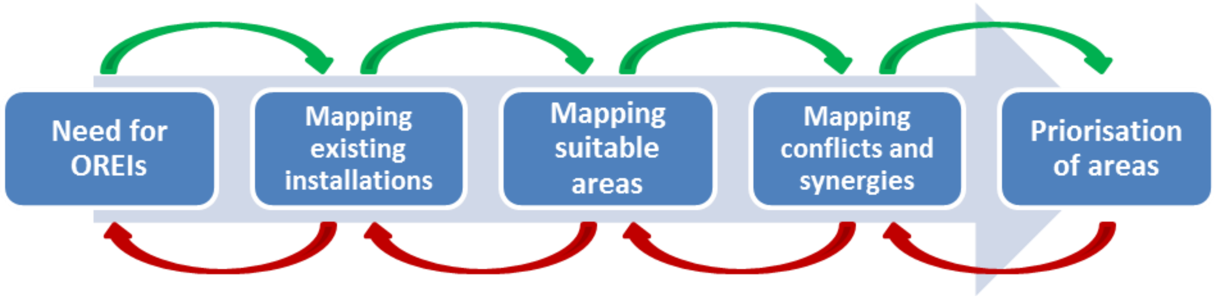

Figure 2. Main steps for the designation of offshore renewable energy installations in MSP.

Process

Setup of the day

We started at 9am and finished at 4pm, with two coffee breaks and a lunch break in-between. We started with a plenary introduction, explaining the objective and planning of the day, and allowing everyone to get an idea of who was taking part. We divided the participants over seven countries. Each country had two participants using one laptop. We ensured that the actual planners or planning colleagues were planning for their own country and were accompanied by an additional sectoral expert, who could be from any country. The Baltic LINes facilitation team consisted of Harald Warmelink, Phil de Groot, Carlos Santos, Magali Gonçalves, Riku Varjopuro, Erik Ooms and Liene Strazdiņa.

Pre-planning

Having explained the three aforementioned targets concerning shipping, energy and the environment, we asked the participants to develop preliminary plans on paper maps (so not yet in the software). A short version of both step-by-step practical guides for planning ship corridors and energy infrastructure has been distributed among the participants and the single steps have been shortly described. Having further studied all the available information (notably the targets, existing activities in the BSR), the participants formulated their intentions and drew them out in sketches on A3 printouts of their area. We then asked each country to briefly present these intentions to the other countries, thus expressing any need for coordination or collaboration.

Planning

We subsequently let the participants work within their own countries and between the different countries on drawing their specific plans in the MSP Challenge software, and getting them implemented by a certain future date, with other countries' approval if necessary. The participants were asked to consider the above mentioned step-by-step guides while planning in order to give feedback whether these guidance documents are useful or not or how they could be improved. After lunch we turned the simulations on, which means that the simulated time started to slowly progress, month by month. This way the participants saw some of their plans already being implemented, as well as how the different simulations responded to those plans, in order to make any changes if they felt the need to do so.

End results

In the following subsections we offer the end results of the MSP Challenge session in the form of 'before and after' screenshots of the BSR from the perspectives of shipping, energy and the environment.

Spatial plans

Shipping: transnational IMO lanes and national priority lanes

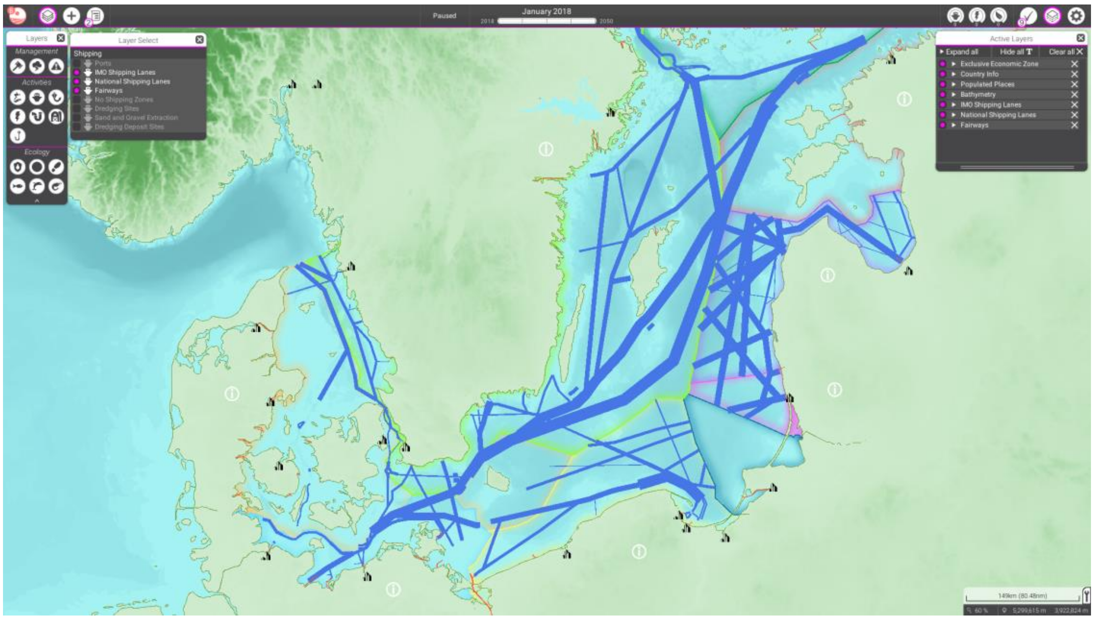

Figure 3: Before - IMO lanes and national priority lanes at the start of the session

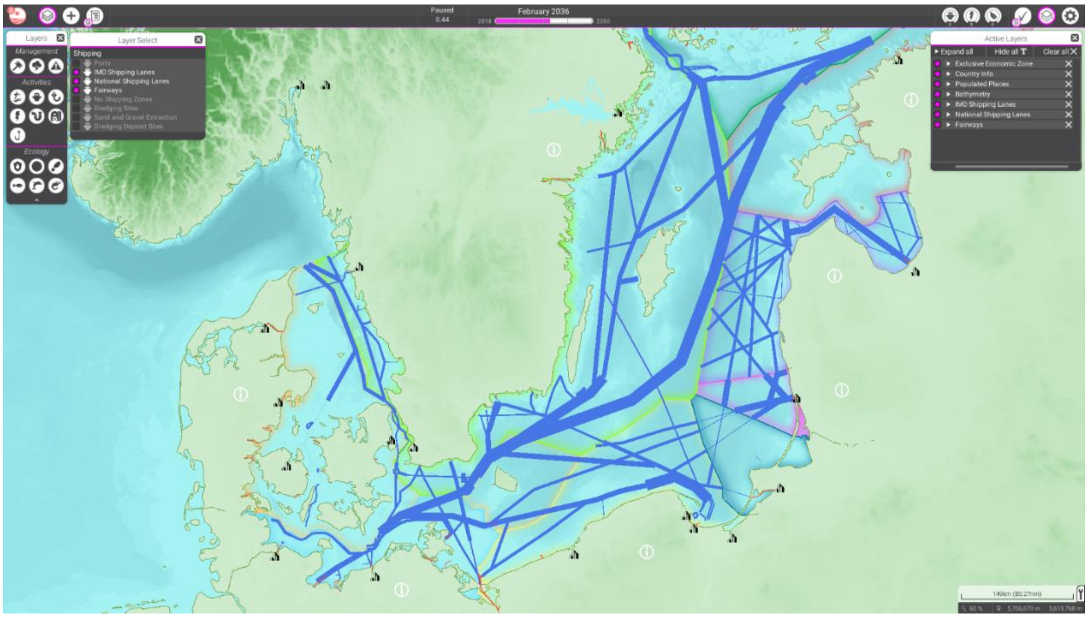

Figure 4: After - IMO lanes and national priority lanes by the end of the session

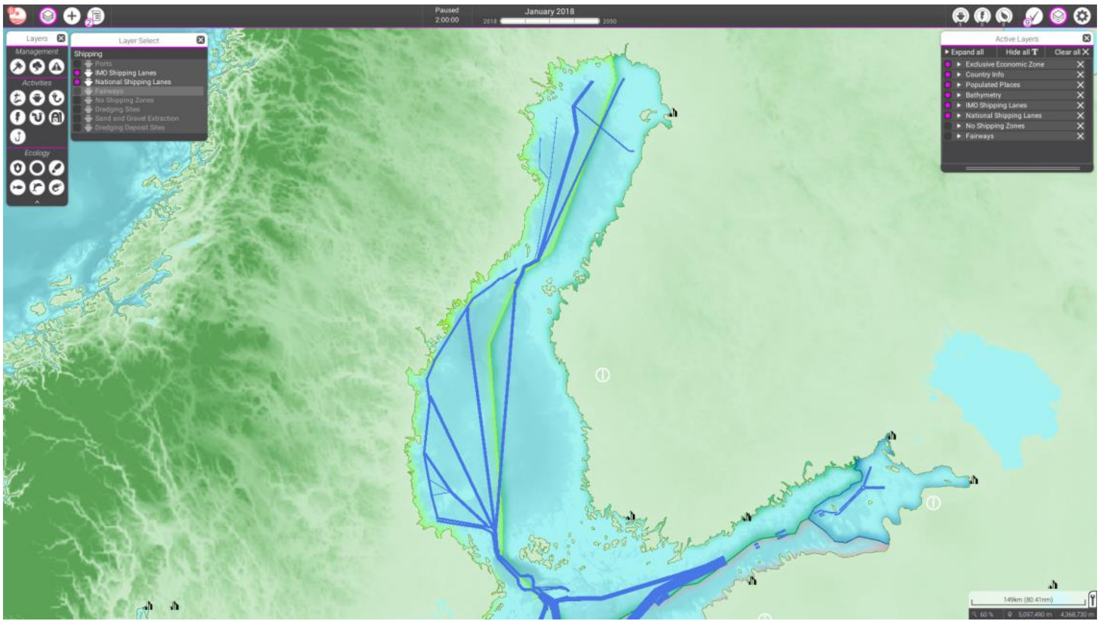

Figure 5: Before - IMO lanes and national priority lanes at the start of the session

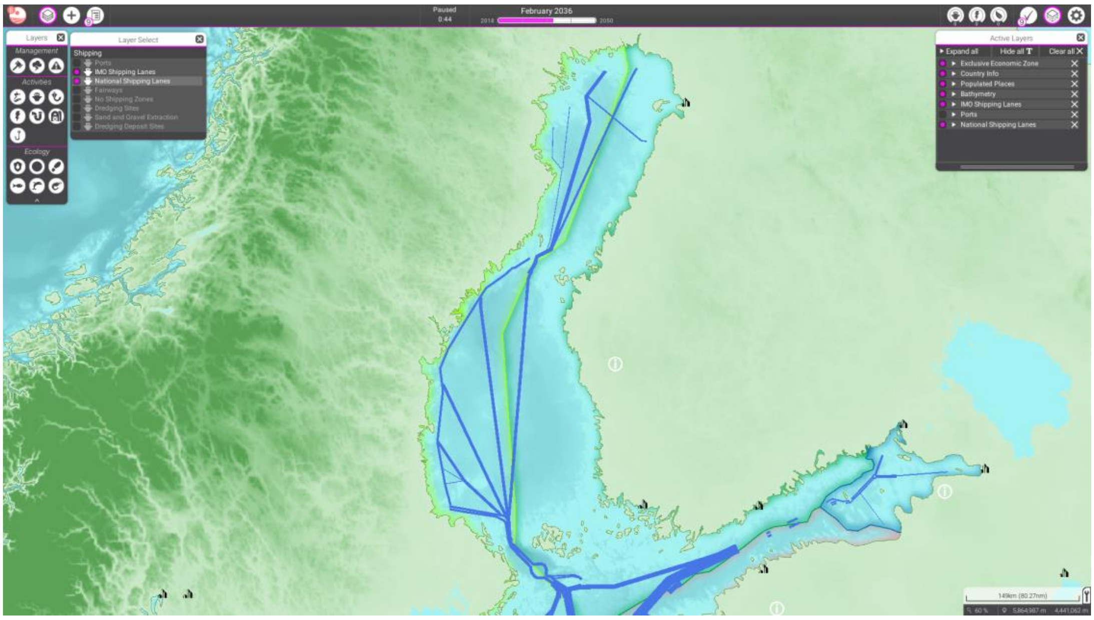

Figure 6: After - IMO lanes and national priority lanes by the end of the session

There are two notable differences upon examining all of the above four figures:

1. The removal of national priority lanes and an IMO traffic separation scheme to the south of Gotland (Figures 3 and 4). This was also accompanied by a no-shipping area. This was meant to decrease ecosystem pressures caused by heavy shipping in that area and beyond to the east of Gotland.
2. The extension of different national priority lanes to fill in some gaps, notably between Polish and German lanes, between Polish and Lithuanian lanes (going through the Russian Kalinigrad EEZ; Figures 3 and 4), and from the end of IMO routes to Russian ports in the Russian St. Petersburg EEZ (Figures 5 and 6).

Energy: offshore wind farms

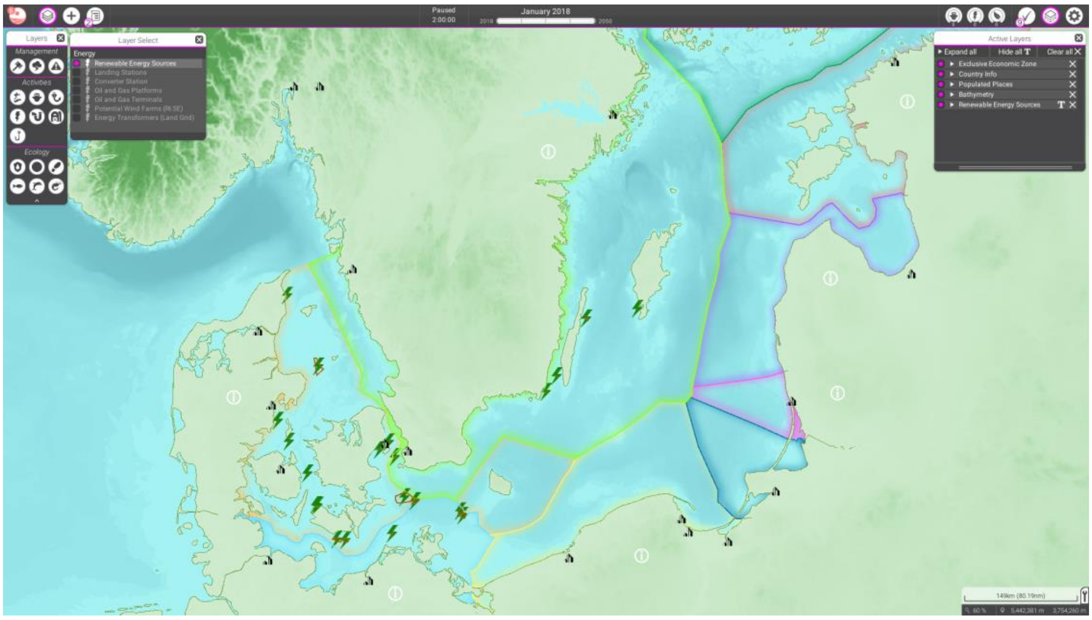

Figure 7: Before – offshore wind farms at the start of the session

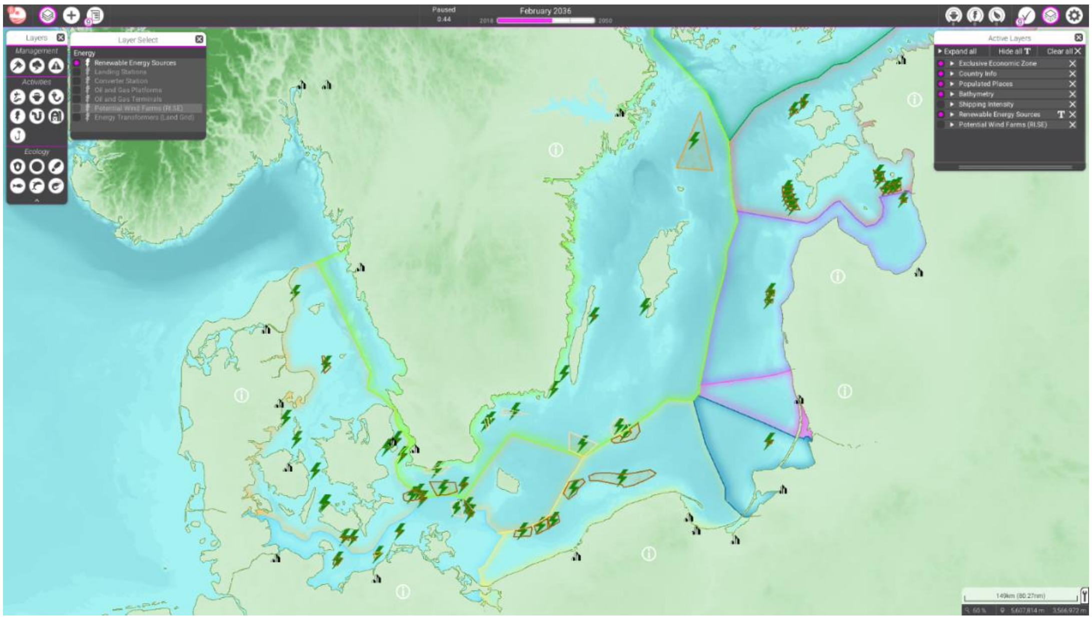

Figure 8: After – offshore wind farms by the end of the session

Notice additional wind farms throughout this part of the BSR, i.e., in Swedish, German, Polish, Russian, Estonian and Latvian areas.

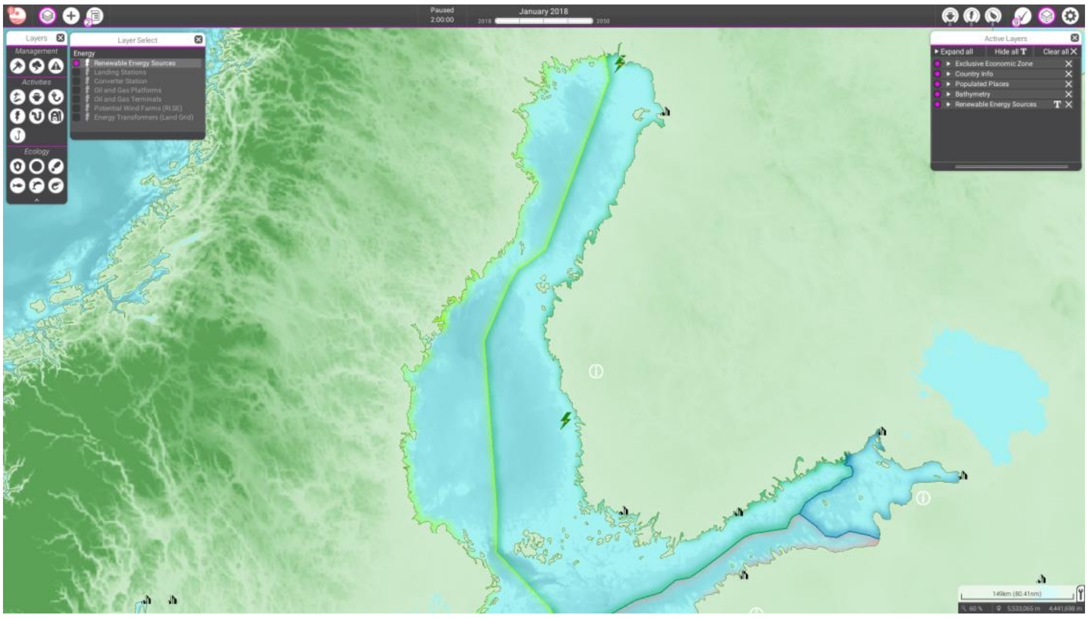

Figure 9: Before – offshore wind farms at the start of the session

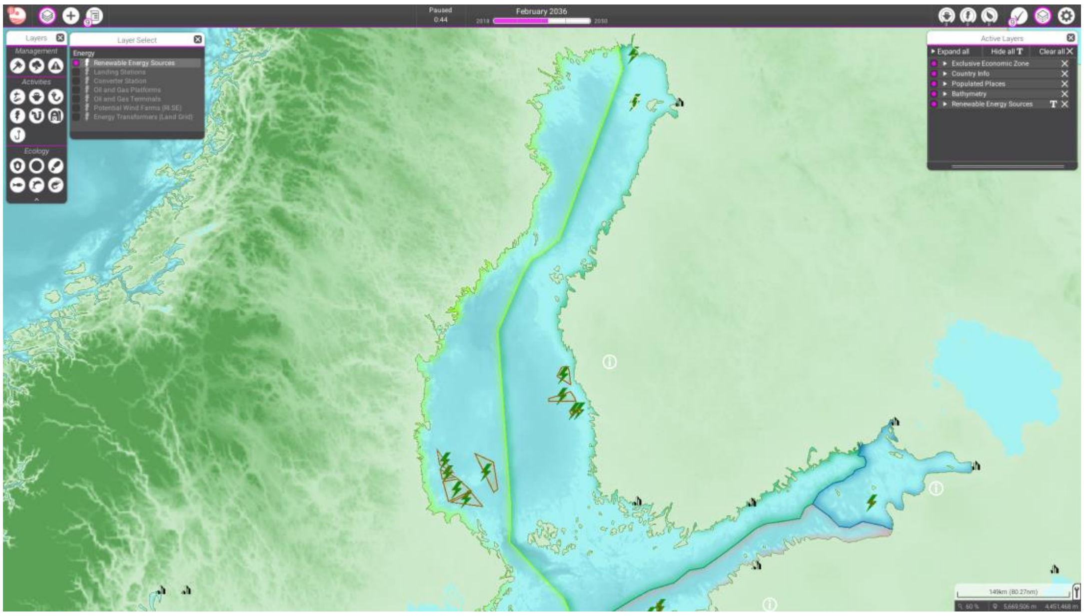

Figure 10: After – offshore wind farms by the end of the session

Notice additional wind farms in every country’s areas here, i.e. Swedish, Finnish, Russian and Estonian areas.

Environment: MPAs and Natura 2000 sites

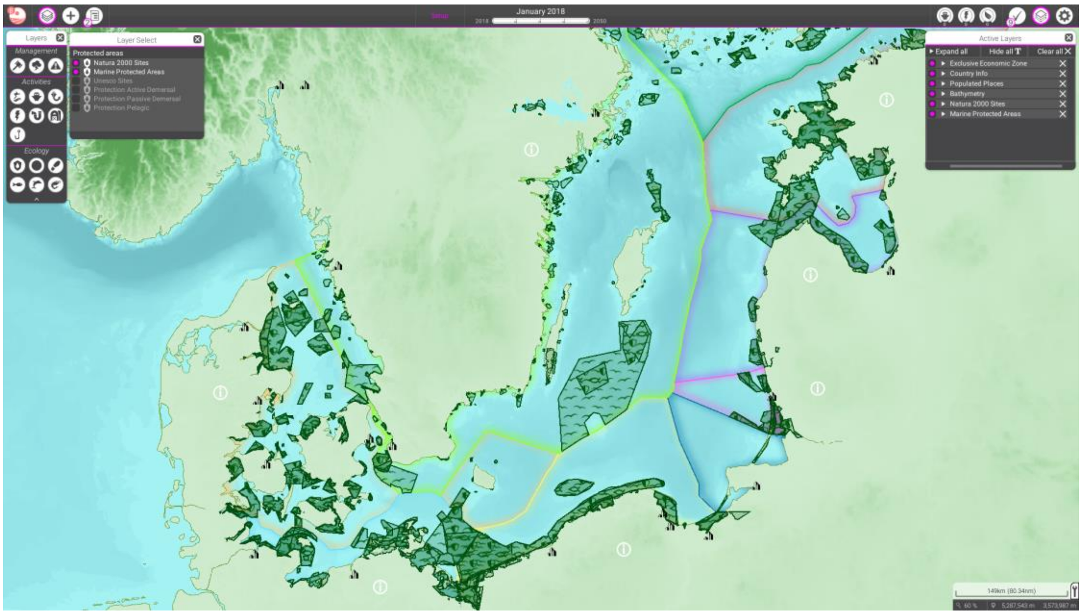

Figure 11: Before – MPAs &Natura 2000 areas at the start of the session

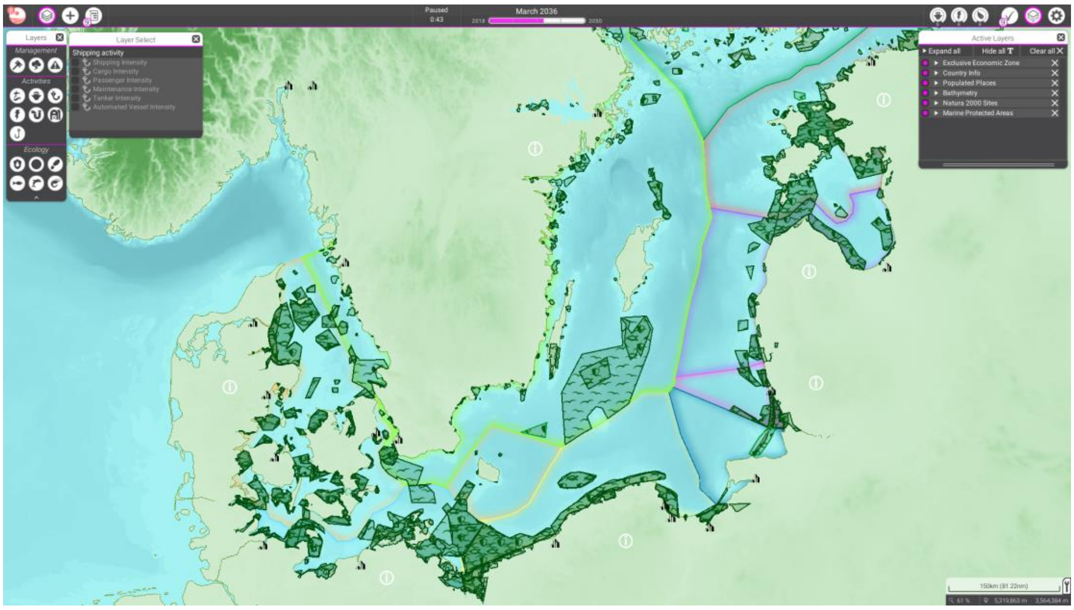

Figure 12: After – MPAs &Natura 2000 areas by the end of the session

Notice small additional areas in particularly the German, Swedish, Russian and Latvian EEZs. Shipping protection measures were implemented in the most northern parts of the Swedish areas to the south of Gotland.

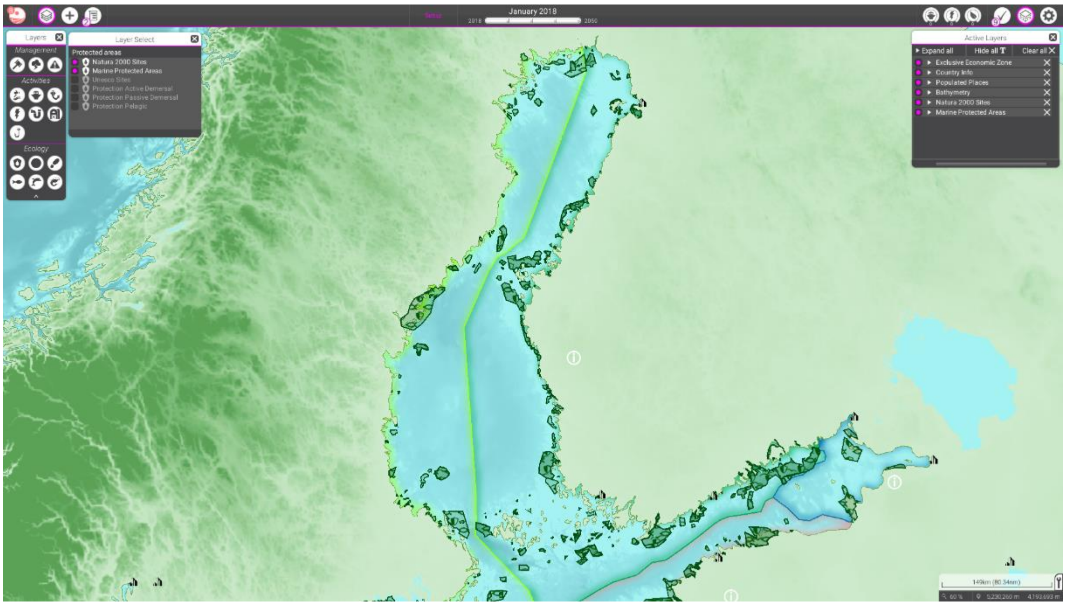

Figure 13: Before – MPAs &Natura 2000 areas at the start of the session

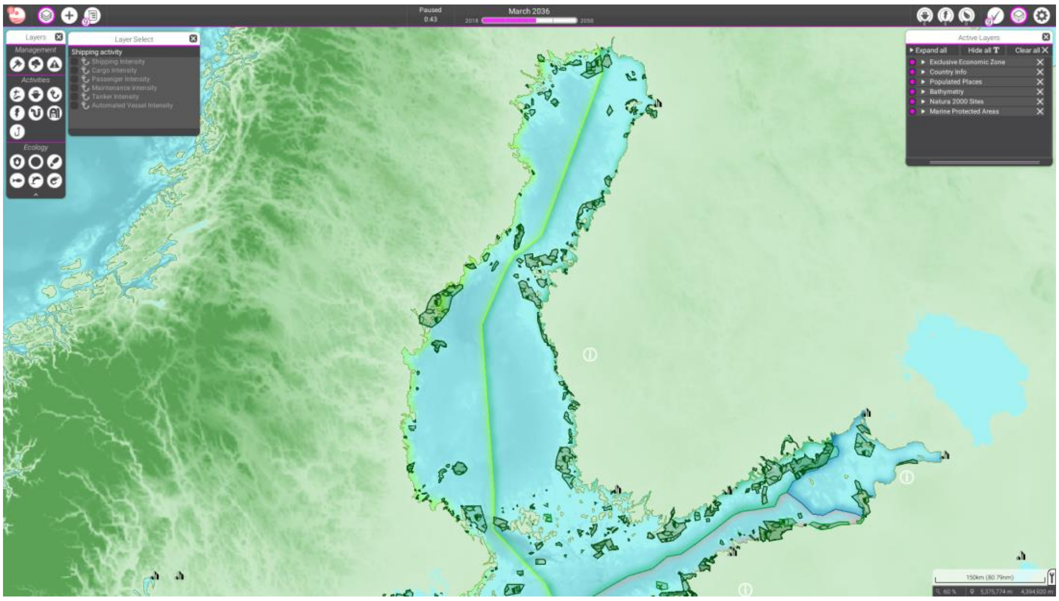

Figure 14: After – MPAs &Natura 2000 areas by the end of the session

In this area there were no changes, as can be deduced from the above two screenshots.

Shipping outcomes

Following the implementation of all participants' plans, the overall shipping route efficiency for all BSR ports and gates included in our shipping simulation dropped by only 0.82%. This average was the result of roughly a dozen ports seeing a decrease of around 1% in their shipping route efficiency. The efficiency of the remaining several dozens of ports remained roughly constant. The changes in spatial distribution of ship traffic become apparent when comparing the following screenshots.

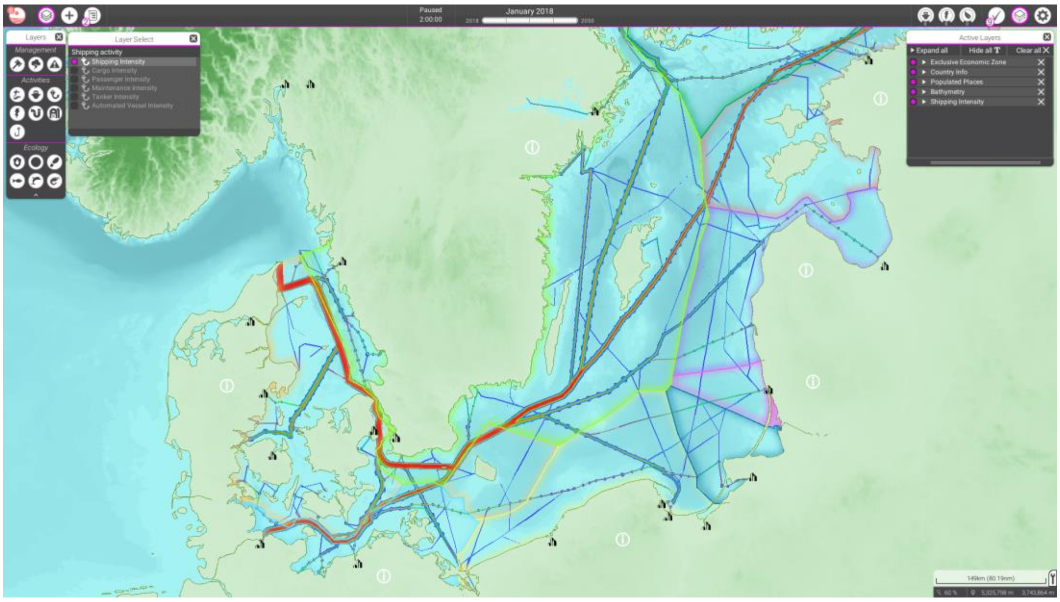

Figure 15: Before – total shipping intensity at the start of the session

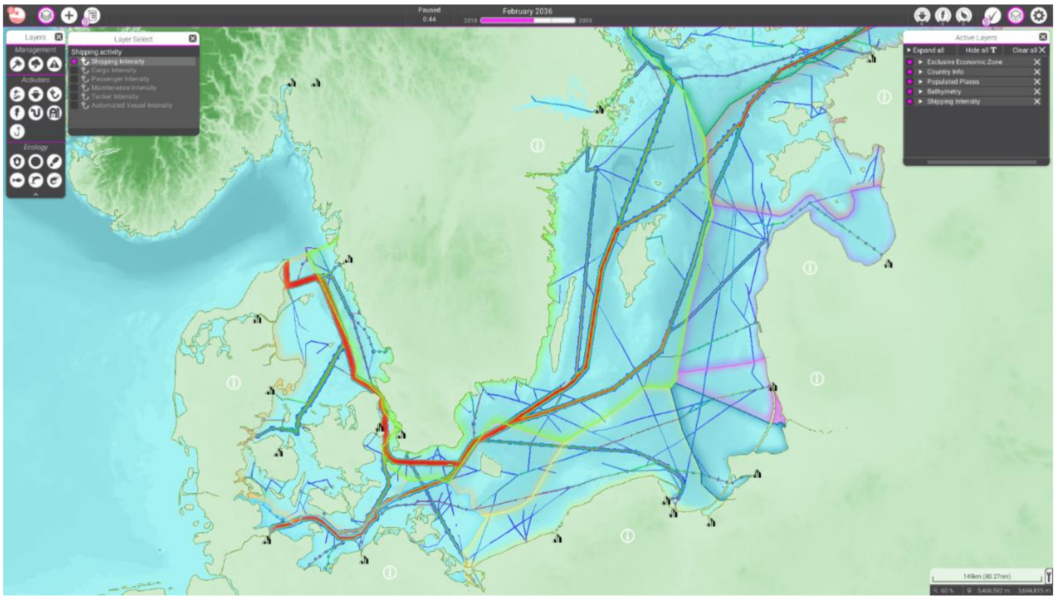

Figure 16: After – total shipping intensity by the end of the session

Notice the big, not unrealistic shift in traffic from the south and east of Gotland to the west and north of Gotland, as a direct result from the implemented change in shipping measures (see Figures 2 and 3).

Figure 17: Before – total shipping intensity at the start of the session

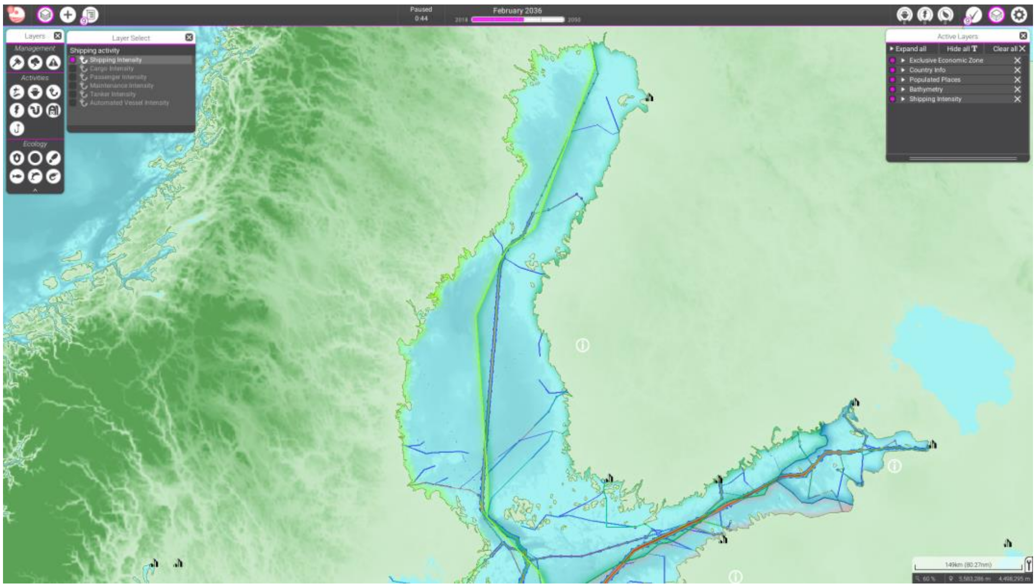

Figure 18: After – total shipping intensity by the end of the session

In this region there are only minor changes to be observed in ship movements, i.e., in the Russian St. Petersburg area. These changes are clearly the result of an unrealistic calculation of the shipping simulation in that specific area and therefore have a more questionable validity.

Fishing outcomes

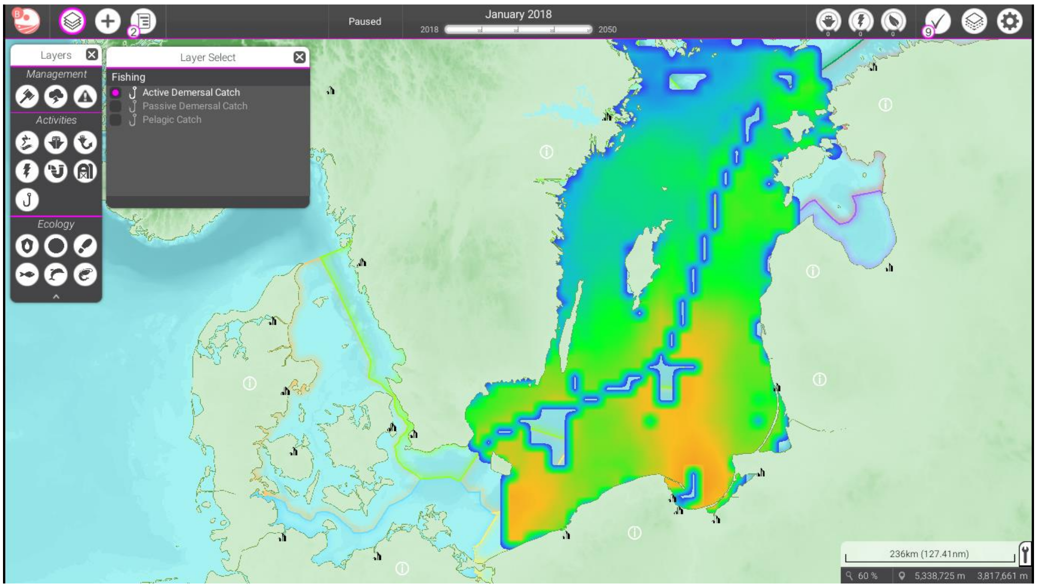

Figure 19: Before – active demersal fishing fleet catches at the start of the session

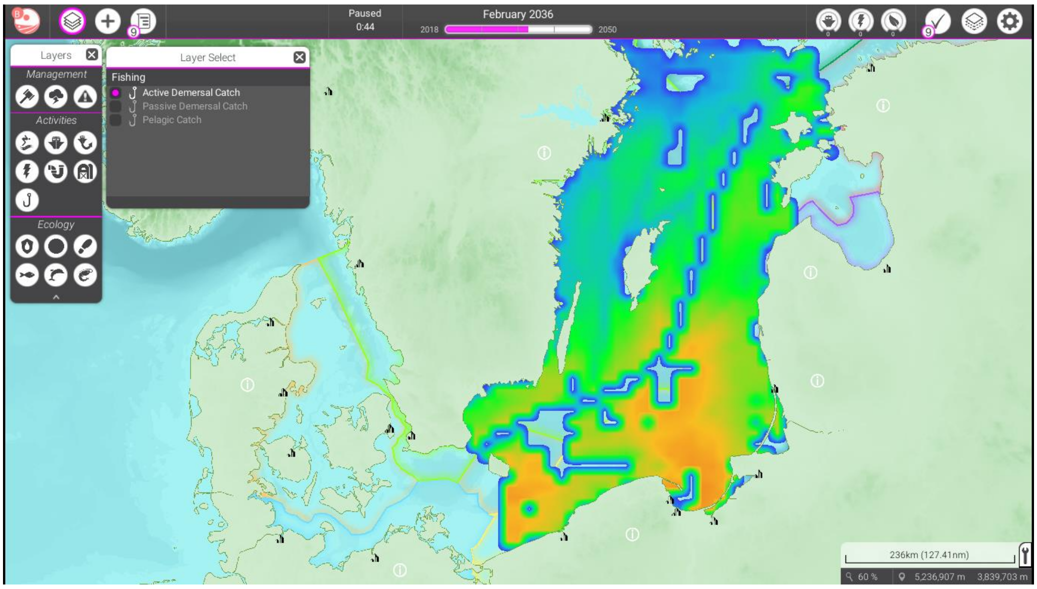

Figure 20: After – active demersal fishing fleet catches by the end of the session

Notice the cessation of active demersal fleet catches in areas where new wind farms were planned by the participants. Also notice the decrease of active demersal fleet catches in areas where shipping increased, e.g. to the west of Gotland. Finally, notice also a shift of catches towards areas that are still available or indeed already popular. This is the result of unchanged total fishing efforts in the entire BSR.

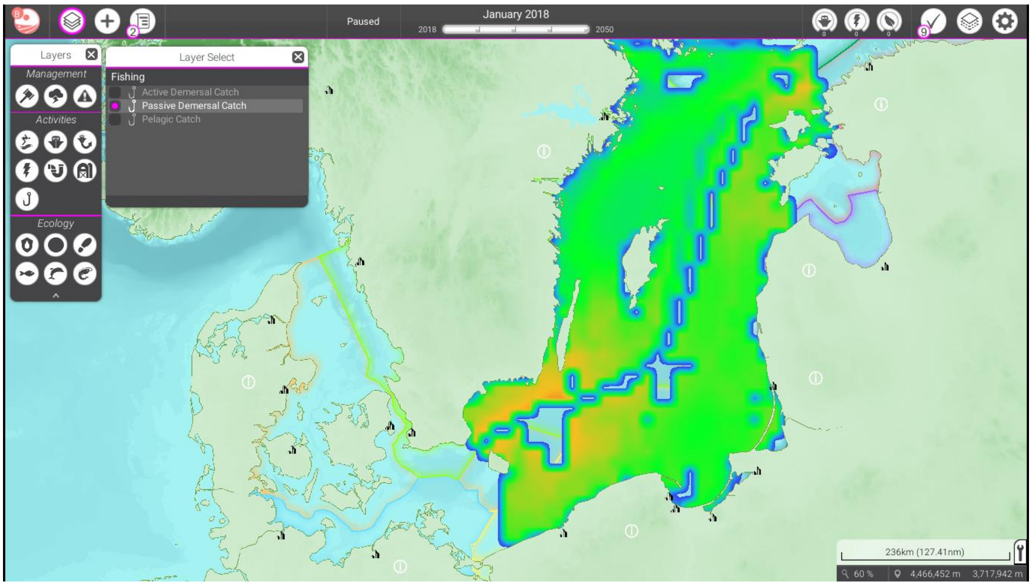

Figure 21: Before – passive demersal fishing fleet catches at the start of the session

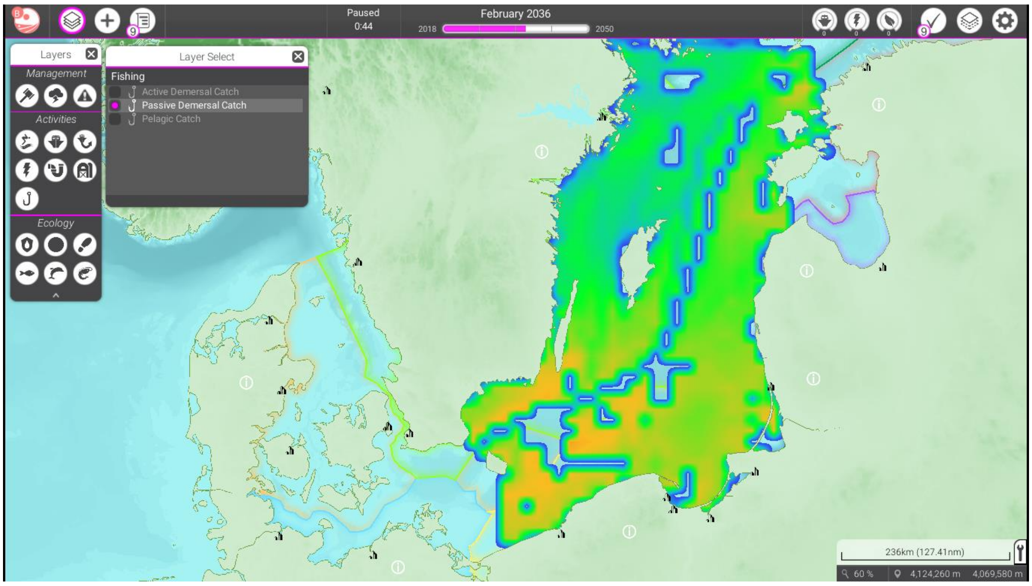

Figure 22: After – passive demersal fishing fleet catches by the end of the session

Again, notice the cessation of also the passive demersal fleet catches in areas where new wind farms were planned by the participants, as well as in areas where shipping increased, e.g. to the west of Gotland. Finally, notice also a shift of catches towards areas that are still available or indeed already popular, particularly between Sweden and Poland. This is the result of unchanged total fishing efforts in the entire BSR.

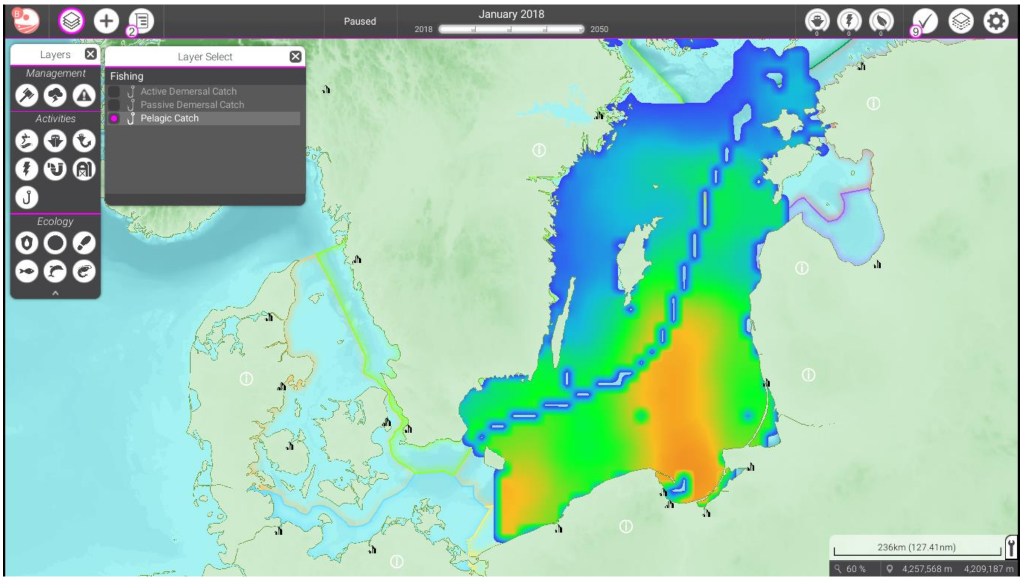

Figure 23: Before – pelagic fishing fleet catches at the start of the session

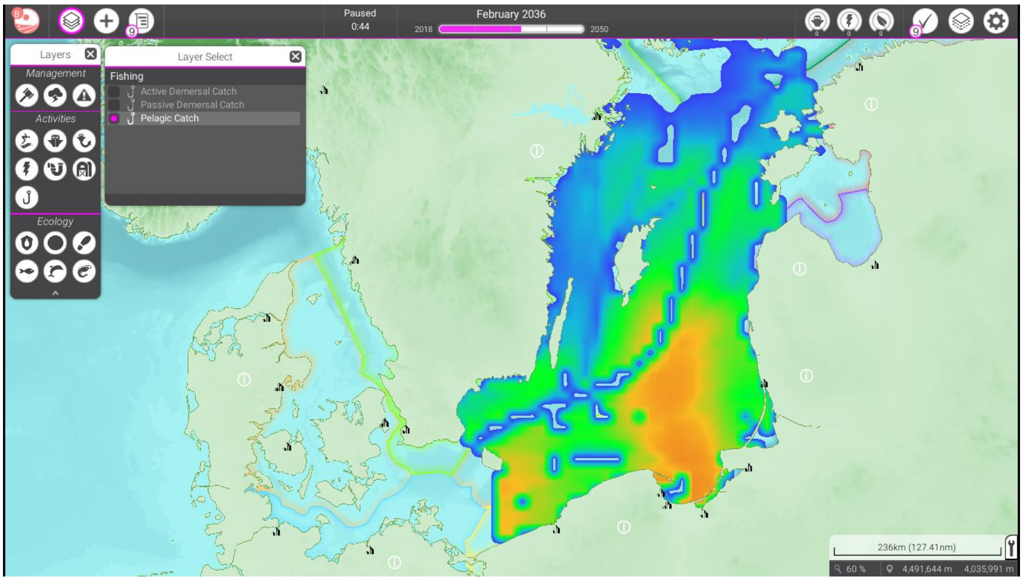

Figure 24: After – pelagic fishing fleet catches by the end of the session

Again, notice the cessation of also the pelagic fleet catches in areas where new wind farms were planned by the participants, as well as in areas where shipping increased, e.g. to the west of Gotland. Finally, notice also a shift of catches towards areas that are still available or indeed already popular, particularly in the Poland-Kalinigrad-Lithuania area. This is the result of unchanged total fishing efforts in the entire BSR.

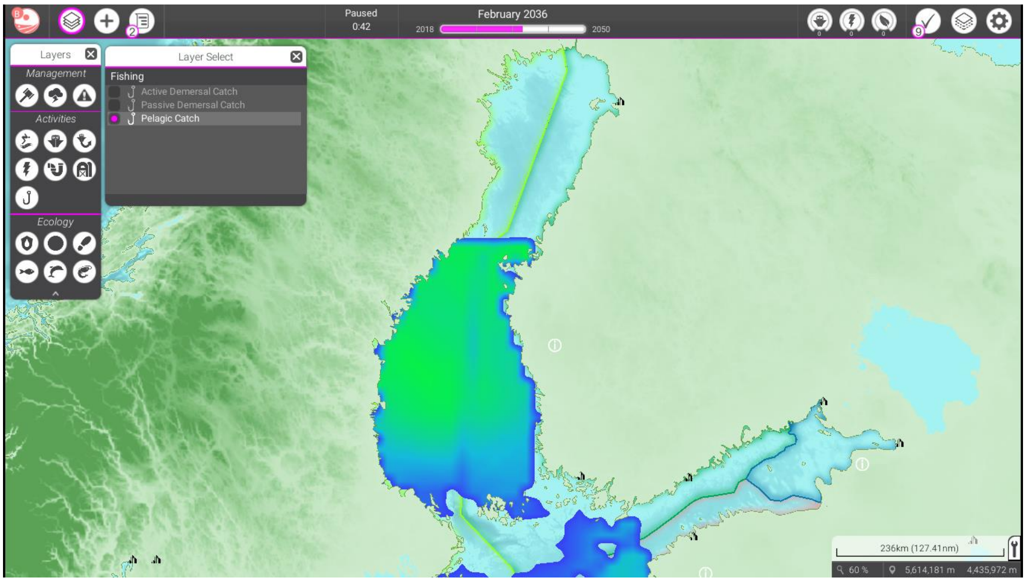

Figure 25: Before – pelagic fishing fleet catches at the start of the session

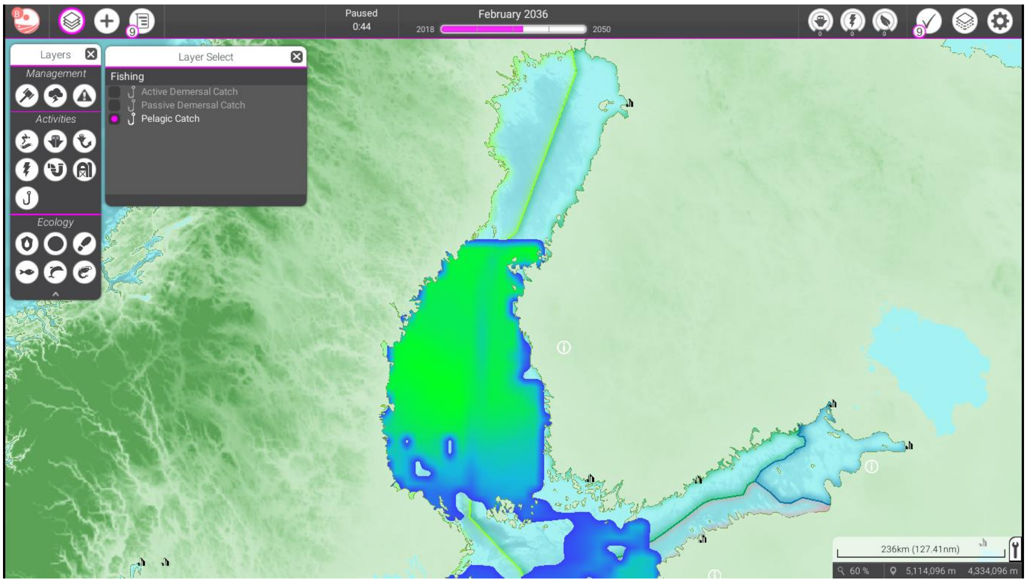

Figure 26: After – pelagic fishing fleet catches by the end of the session

In the Bothnian area the ecosystem simulation only includes pelagic fleets. Here we notice again the cessation of pelagic fleet catches in areas where new wind farms were planned by the participants.

Energy outcomes

Country	Offshore renewable energy production capacity at start	Hamburg offshore renewable energy production capacity outcome
Sweden	88.51 MW	40.04 GW (>+1000%)
Germany	649.7 MW	1.38 GW (+112%)
Poland	0 W	14.25 GW
Russia	0 W	154.6 MW
Latvia	0 W	956.3 MW
Estonia	0 W	5.56 GW
Finland	27.82 MW	4.54 GW (>+1000%)
Total	**766.03 MW**	**66.88 GW (>+1000%)**

Note: Denmark (2.51 GW at the start) and Lithuania (0 W at the start) were not part of this session.

Table 1: 'Before and after' figures on energy production capacity per country.

As can be deduced from Table 1, the total offshore renewable energy production capacity reached by the end of the session was over 66 GW. Again, this followed the basic rule of thumb of 6 MW per km^2 wind farm area defined. We did not take into account whether the entire energy infrastructure (i.e. electricity cables, landing stations) had the required capacity to transport the wind farms' capacity to the national electricity grids.

Ecosystem outcomes

Country	MPAs at start	Hamburg MPAs outcome
Without any protection	53.100 km2	54.300 km2
With protection against active demersal fishing fleet	0 km2	1598 km2
With protection against passive demersal fishing fleet	0 km2	637 km2
With protection against pelagic fishing fleet	0 km2	637 km2
Total area	**53.100 km2**	**57.200 km2 (+7.69%)**

Table 2: 'Before and after' figures on MPAs per country, divided over different optional fishing protection measures.

As can be deduced from Table 2, the participants added over 4.000 km^2 in MPAs. This total amount of space was divided over roughly a dozen areas, most of which were positioned to the south of Gotland and in the Baltic Proper area close to the coastline.

The following screenshots show any spatial effects of these protection measures as well as the shift in pressures due to new and changes human activities (notably changes in ship movements and the addition of new wind farms) on key species groups included in the ecosystem simulation.

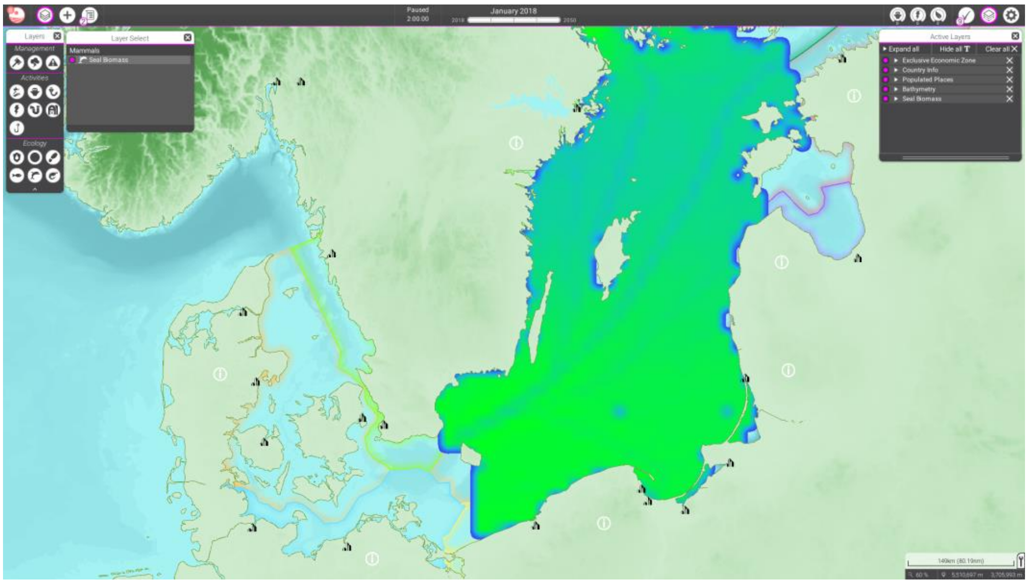

Figure 27: Before – Seal distribution at the start of the session

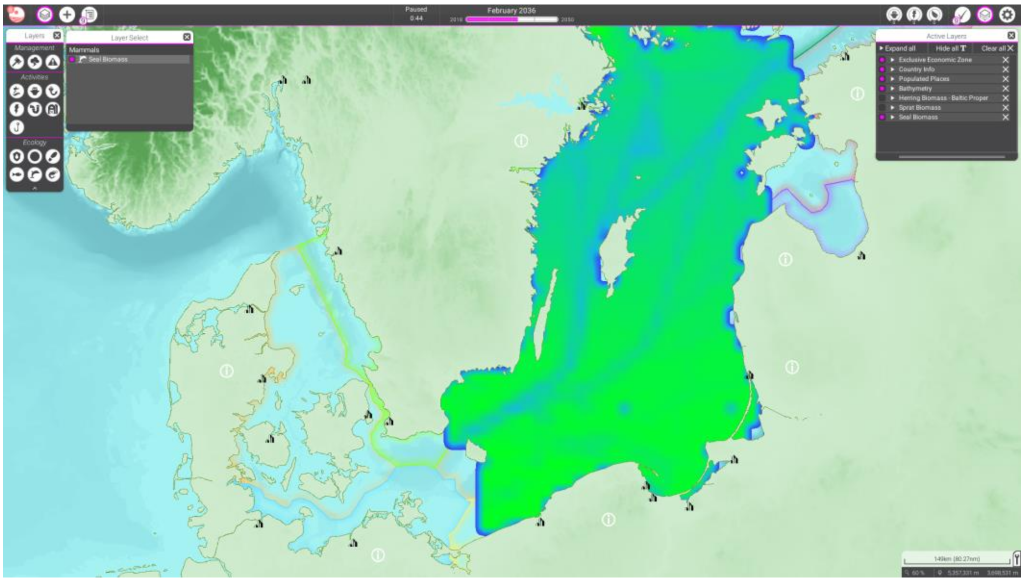

Figure 28: After – Seal distribution by the end of the session

Note the difference in Seal distribution mostly as a result of the shifts in ship movement. Seals are affected by the noise caused by heavy ship traffic.

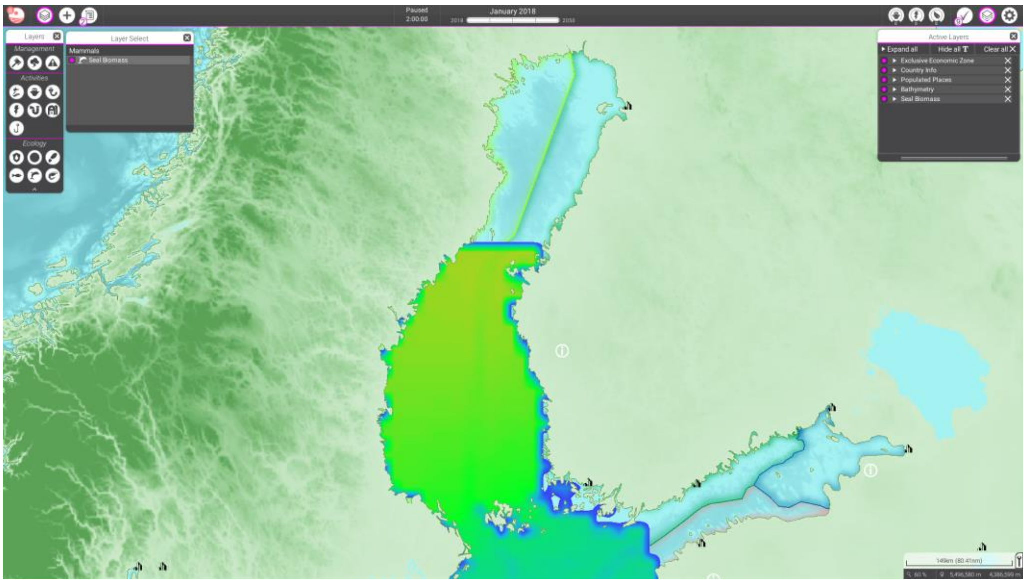

Figure 29: Before – Seal distribution at the start of the session

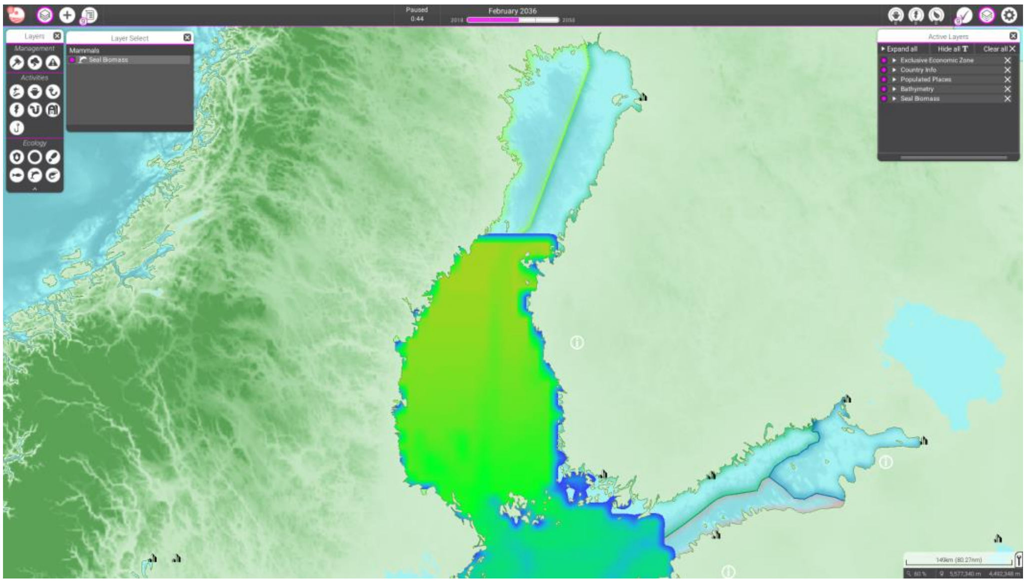

Figure 30: After – Seal distribution by the end of the session

In this area of the BSR you can see a slight decrease of seals in the areas where wind farms were implemented, due to residual noise and surface disturbance pressures.

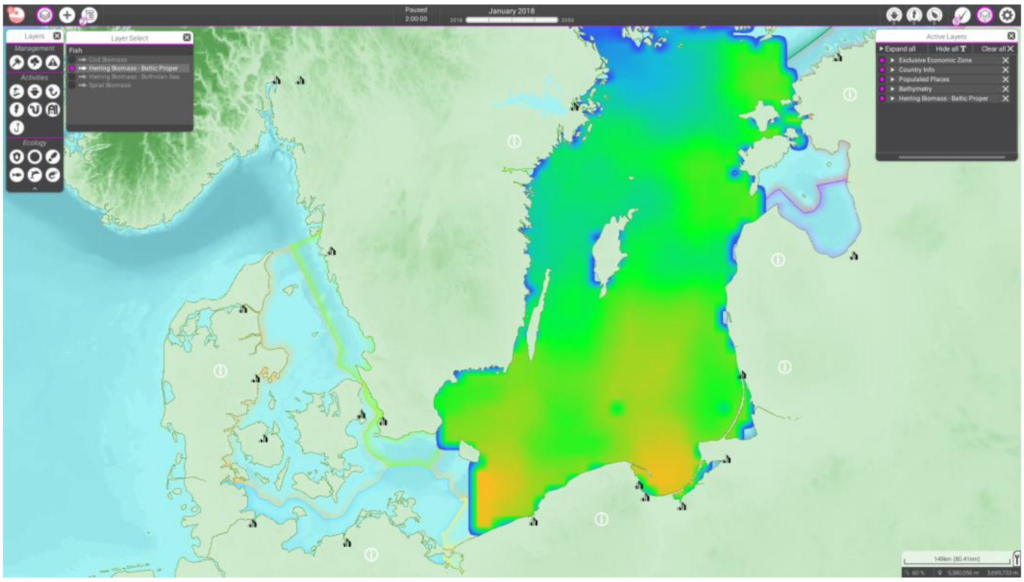

Figure 31: Before – Herring distribution at the start of the session

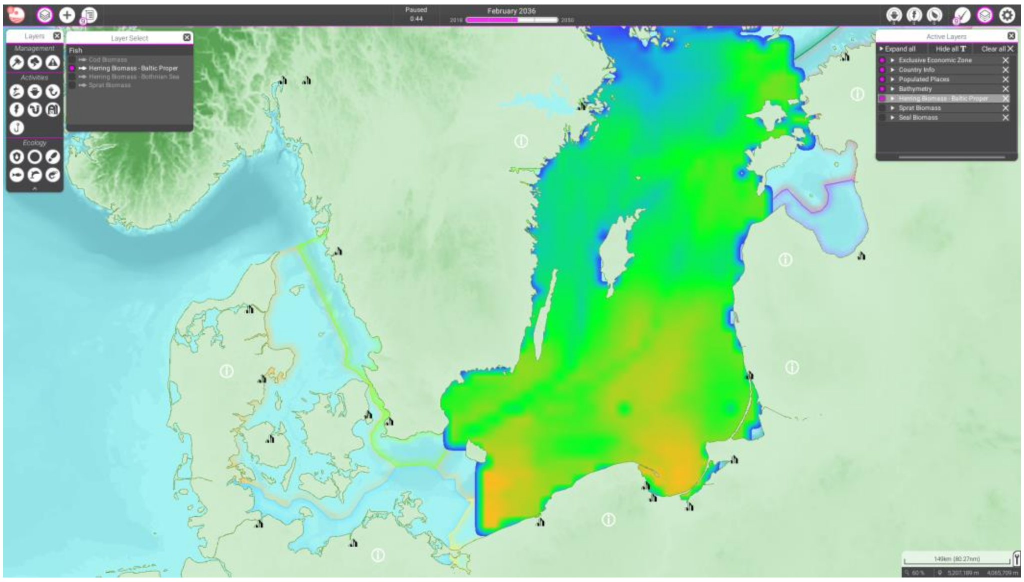

Figure 32: After – Herring distribution by the end of the session

Again, note the difference in Herring distribution mostly as a result of the shifts in ship movement. Herring are also affected by the noise caused by heavy ship traffic.

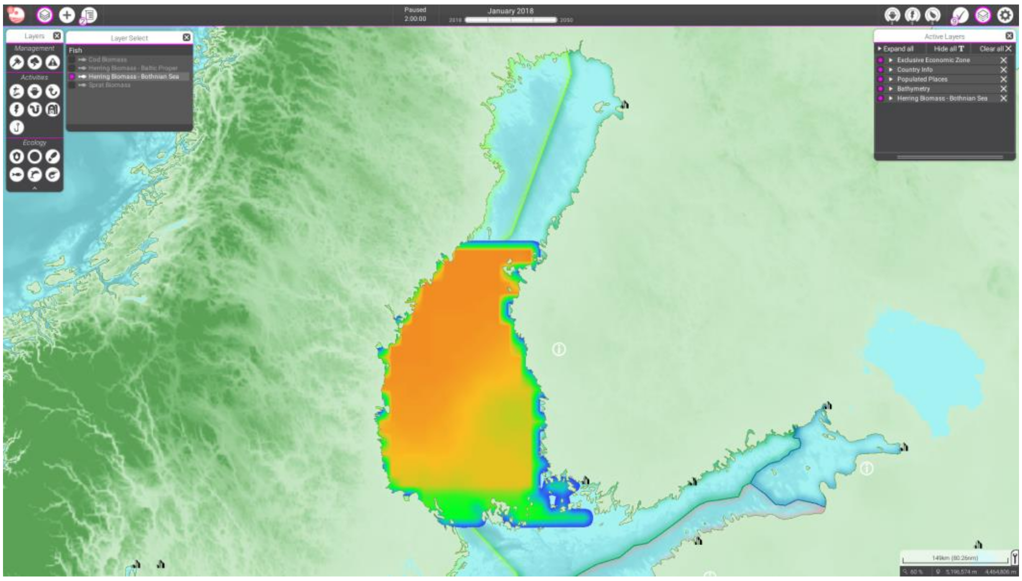

Figure 33: Before – Herring distribution at the start of the session

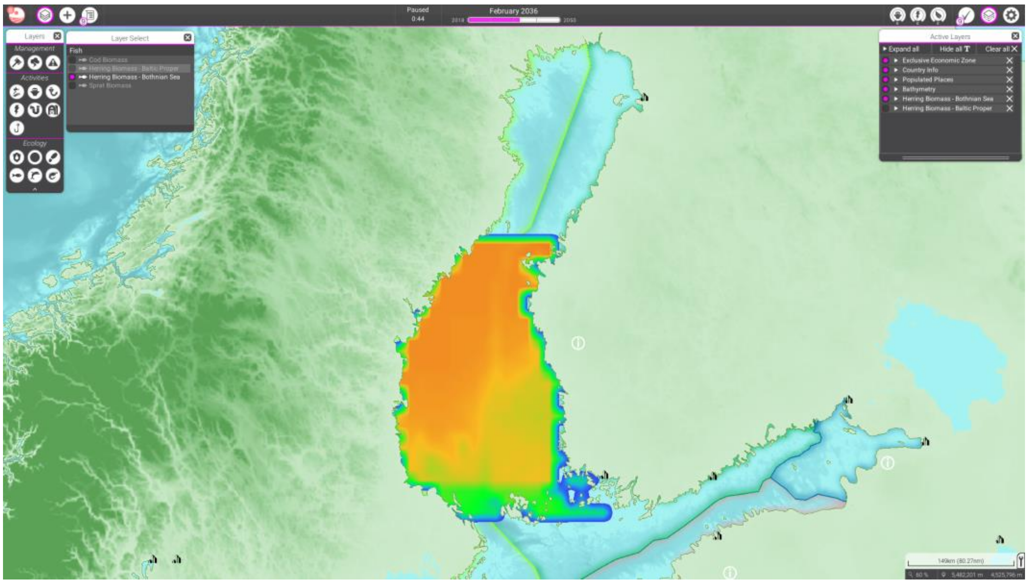

Figure 34: After – Herring distribution by the end of the session

Again, in this area of the BSR notice a slight decrease in herring distributions due to the implementation of wind farms.

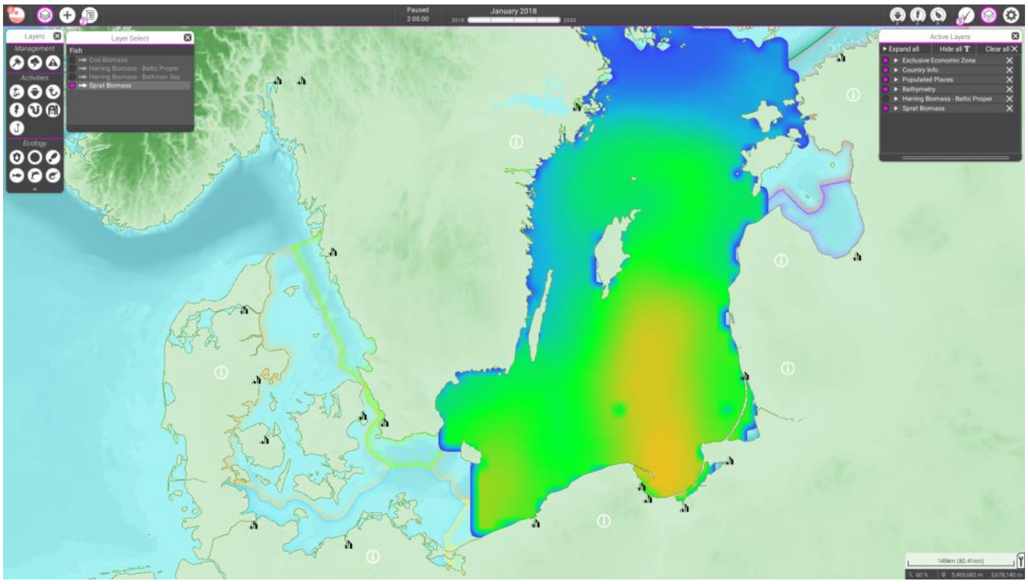

Figure 35: Before – Sprat distribution at the start of the session

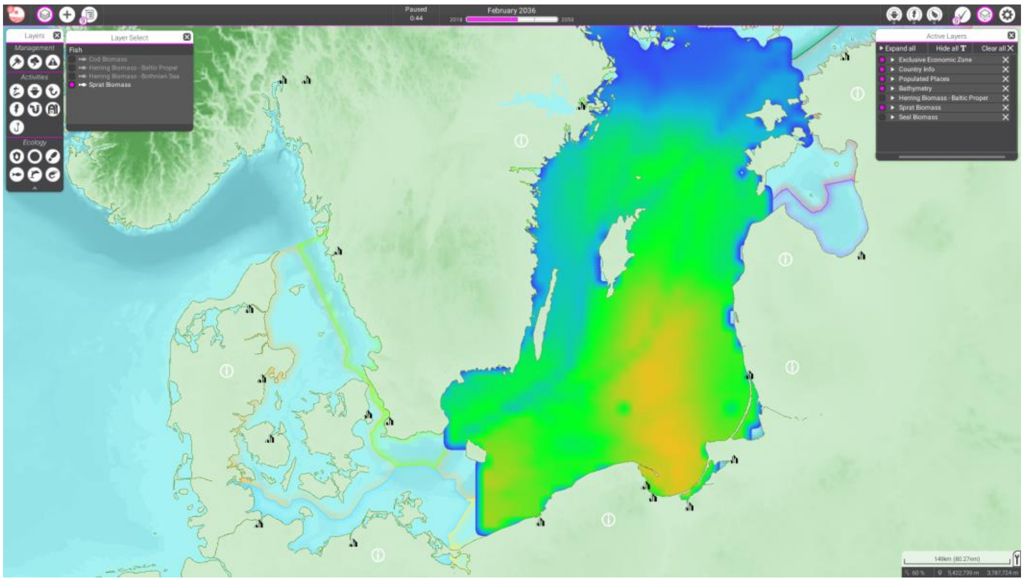

Figure 36: After – Sprat distribution by the end of the session

Again, note the difference in Sprat distribution mostly as a result of the shifts in ship movement. Sprat are also affected by the noise caused by heavy ship traffic.

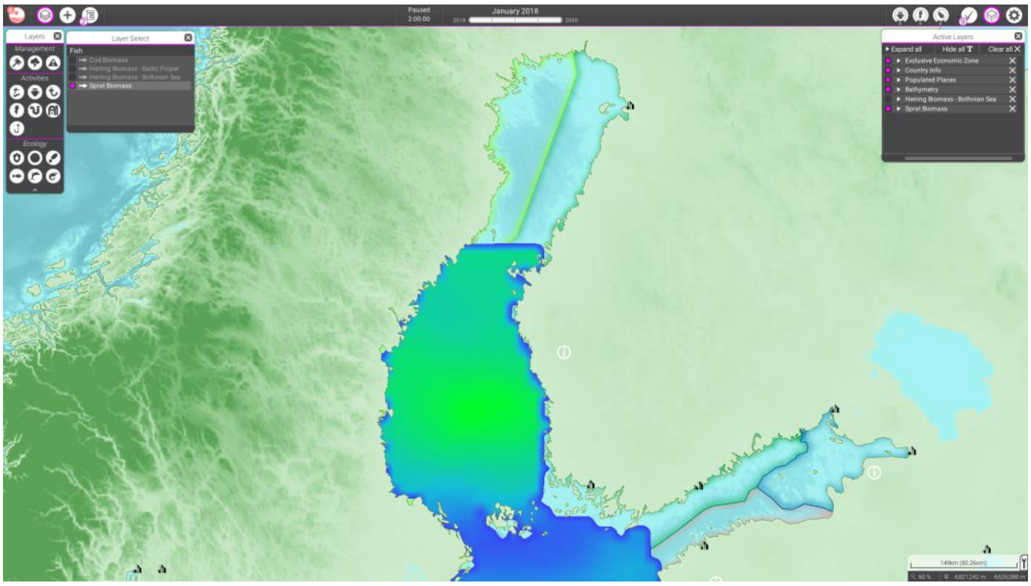

Figure 37: Before – Sprat distribution at the start of the session

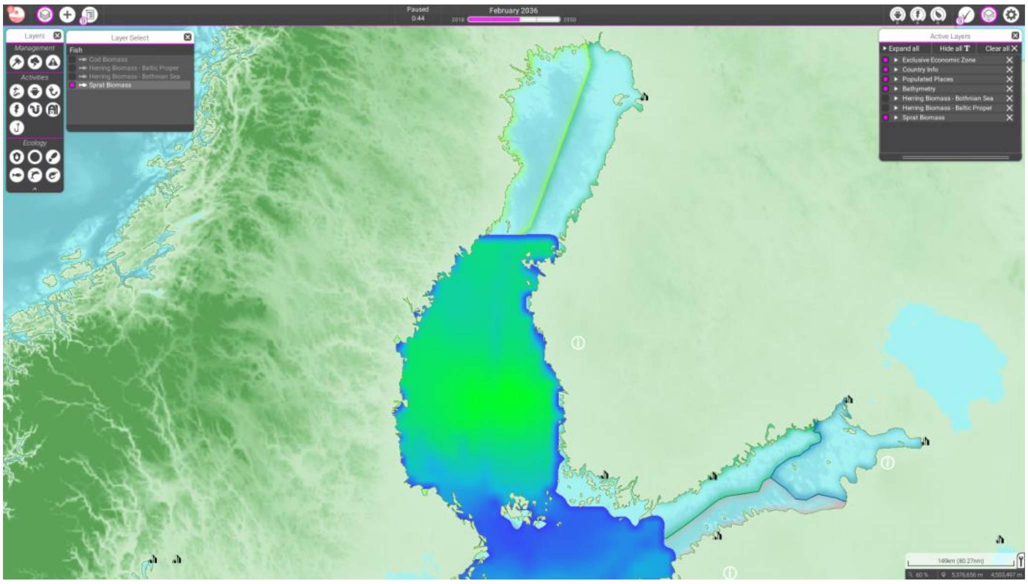

Figure 38: After – Sprat distribution by the end of the session

Again, notice no clear differences in Sprat distributions in this area of the BSR. There was a general decrease in the population of Sprat in this particular region.

The overall decrease and redistribution in the aforementioned key species could mean a slight *increase* and redistribution of their prey. However, by the end of the session we observed no significant disruption or imbalance in the overall EwE ecosystem model.

Unfortunately, the local effects of the MPAs created were not visible due to their individual area being too small to be taken into account in the ecosystem model's grid of 15*15 km.

Conclusion

While it is clear that the 14 participants of the session did not fully reach all of the targets we gave them concerning shipping, energy and the environment, they came a long way. Only a dozen ports were negatively affected by the introduction of new and changed human activities, and then only by less than 1% in route efficiency on average. The participants may not have reached the full 100 GW energy production capacity, but they did reach two-thirds of it. Finally, concerning the environment, around half of the set target was reached; particularly the Åland and Bothnian sea regions further up north the BSR were not catered to yet. So, overall, it is clear that within the short amount of time the participants had, and with the high amount of complexity introduced in the session, the participants worked hard to try to reach one or more of the targets, and almost managed to do so. Indeed, during the debriefing the participants agreed that they could have perhaps reached the targets if the other two countries (Lithuania and Denmark) had been contributed their part during the session, or if they had a bit more time.

This shows that at present MSP Challenge is already quite a useful tool for a group workshop with international maritime spatial planners to start exploring to what extent and with what spatial plans certain national and transnational targets might be reached.

We note a couple of limitations. While the shipping simulation is currently useful and insightful enough, it alas does not yet simulate the spatial distribution of ship traffic in the Oresund, Great Belt and Little Belt areas between Denmark and Sweden. This is something that we would like to look into in the future. We expect catering to this use of space will actually require a rather radical redesign of the shipping simulation, which we as Breda University of Applied Sciences are nonetheless eager to explore should there be interest and funding for it.

With regard to the practical planning guides and their benefit for the workshop the feedback was rather modest. This might be a result of the fact that some suggested steps are already part of the MSP Challenge, like IMO measures or AIS data for the designation of ship corridors. Furthermore, every country in the workshop was represented by an experienced planner, so these experts might have internalized the main steps of designating areas for shipping and energy in MSP already. For training sessions on MSP with non-experts the planning guides are probably more useful.

Given the interesting ecosystem outcomes particularly of the changed shipping infrastructure, we recommend further exploration of the ecosystem and any ecosystem protection measures all around the island of Gotland. This session has shown that any changes in shipping infrastructure measures meant to protect one area around the island (i.e., to the south and east), might actually create new problems in other areas around the island (i.e., to the west and north). The question remains how ecosystem risks around this island as a result of heavy ship traffic around it might best be mitigated?

We thank the 14 participants and Baltic LINes partners for respectively taking part in and facilitating this session. We look forward to further exploring the usefulness of MSP Challenge for MSP support.

Annex 1: Step-by-step approach to the designation of ship corridors in MSP

Step 1: Transfer of different types of IMO routing schemes to the MSP

- *Data acquisition of IMO measures in national sea area*
- *Transfer of existent IMO routeing (or updated IMO-routeing before plan adoption) and fixed uses as basis for first plan draft*
- *Assessment of future plans for potential spatial regulation of ship traffic*

Step 2: Analysis of AIS data and draft of continuous ship corridors

- *Data acquisition and preparation of Automatic Identification System (AIS) data*
- *Assessment of current ship traffic patterns for first draft of ship corridor designations*
- *Consideration of safety issues*

Step 3: Assessment of future developments and related spatial demands

- *Assessment of political goals and policies that impact the shipping sector*
- *Assessment of economic development and industrial developments in the shipping sector*
- *Assessment of changing natural conditions impacting the shipping sector*
- *Indication of area with changing spatial needs for shipping in future*

Step 4: Assessment of spatial demands across sectors

- *Assessment of spatial demands across sectors*
- *Identification of potential conflicts between different uses*
- *Development of planning solutions*

Step 5: Transnational exchange between planners

- *Assessment of transnational ship traffic*
- *Analysis of designated ship corridors along borders*
- *Alignment of ship corridors across borders*

Step 6: First draft open for consultation

- *Categorization of areas for shipping*
- *Designation of shipping corridors*

Annex 2: Step-by-step approach to the designation of offshore renewable energy installations

Step 1: define the need for development (wind)

- *Analyse political goals*
- *Identify priorities of development*
- *Check priorities of neighbouring countries*
- *Analyse future trends*

Step 2: Mapping the existing designations and installations (wind)

- *Take existing energy sector plans as a starting point*
    - *Swedish example*
        1. *Take the existing national energy plan*
        2. *Analyse applicability of old areas and identify new ones (with the sectors)*
        3. *Include them into your MSP*
- *Other uses (hard constraints)*

Step 3: Mapping suitable areas (general planning criteria) (wind)

- *Physical conditions*
- *Demand for energy in the area*
- *Grid connections*

Step 4: Mapping conflicts and synergies with other uses (wind)

- Organise cross-sectoral discussions

Step 5: Define priority areas for offshore wind energy (wind)

→ the plan

Lead partner

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