Document title	Green infrastructure and MSP
Code	4-2
Category	CMNT
Agenda Item	4 - Ecosystem-based approach in MSP
Submission date	14.11.2016
Submitted by	Sweden

This document contains information on green infrastructure and MSP.

Action requested

The Meeting is invited to
- take note of the information and exchange experience on how to integrate the green infrastructure perspective in national MSP
- and also to discuss possible development of the concept of green infrastructure or similar approaches with a landscape perspective on regional level for MSP-purposes.

Green infrastructure and MSP

The concept of green infrastructure has the potential to add a landscape perspective to be used in marine spatial planning (MSP) which could serve a number of different needs. The concept of green infrastructure (or similar approaches) could be helpful in solving the challenge often faced within MSP on how to integrate environmental considerations with other aspects in the planning.

Using the green infrastructure concept supports the inclusion of ecological aspects in a broader sense in planning. Work on green infrastructure can contribute to aggregation of data regarding ecosystem components to be used by planners in MSP. Objectives for MSP can also link to green infrastructure.

One aspect of the Ecosystem Approach is to include ecosystem services in MSP. The green infrastructure concept has potential to include an ecosystem services perspective thereby creating a link between conservation and the benefits and welfare values provided by the green infrastructure.

Defining green infrastructure

Green infrastructure is the natural areas, biotopes, structures and other features in the landscape or seascape that support biological diversity. The marine green infrastructure is comprised of habitats for different species making up core areas as well as pathways for resettlement and migration, e.g. for birds, fish and other animal species.

The marine ecosystem components represented by the green infrastructure are physical features and associated biological communities that support the maintenance of marine biodiversity, and the delivery of ecosystem services.

Currently it is challenging to directly apply green infrastructure information in MSP as there is no unified and comprehensive knowledge on how important marine habitats and processes are linked temporally and spatially in the Baltic Sea. For example, the spatial distribution of biotopes has only been mapped in some areas, whereas for the majority of the seascape the distribution has only been modeled. The connectivity between the scattered patches of a biotope represented for example by the ability of a species to migrate between the patches is even less known at detail. There is however work in progress that will enhance the knowledge base and would support and facilitate the inclusion of the green infrastructure perspective in MSP. Such work includes the continued implementation of the EU Marine Strategy Framework Directive (MFSD) and the national MSP-processes.

MSP management of green infrastructure

Some of the green infrastructure is protected through the establishment of Marine Protected Areas, MPA:s. However within MSP not only MPA:s should be considered but the green infrastructure they exist in.

The MPA objective is to have an ecologically representative, coherent and well managed network of marine protected areas in place. MPAs are often a major focus when it comes to marine biodiversity management. But proper marine management and planning need a broader perspective, also including areas of lower ecological value which may be necessary for the large-scale functioning of the ecosystem as well as connectivity areas.

MSP can provide a means for management of green infrastructure through a combination of protection, restoration and sustainable use. Ensuring a management of all relevant ecological components that secures their integrity will prevent fragmentation of populations and habitats.

The linkages between MSP, Green infrastructure and MPAs are illustrated below including the Swedish example of green infrastructure maps/data in MSP.

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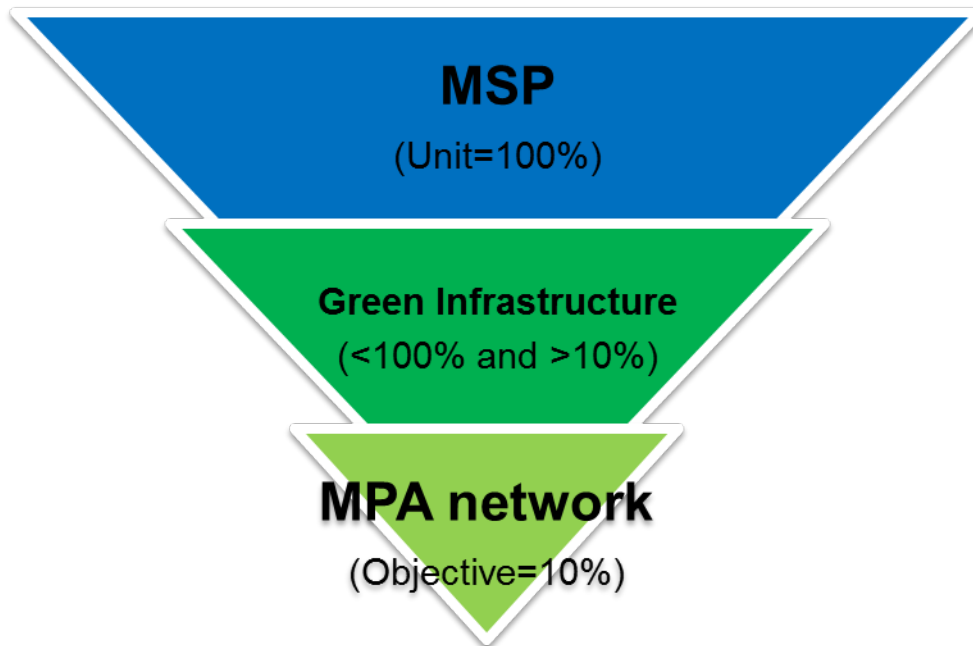

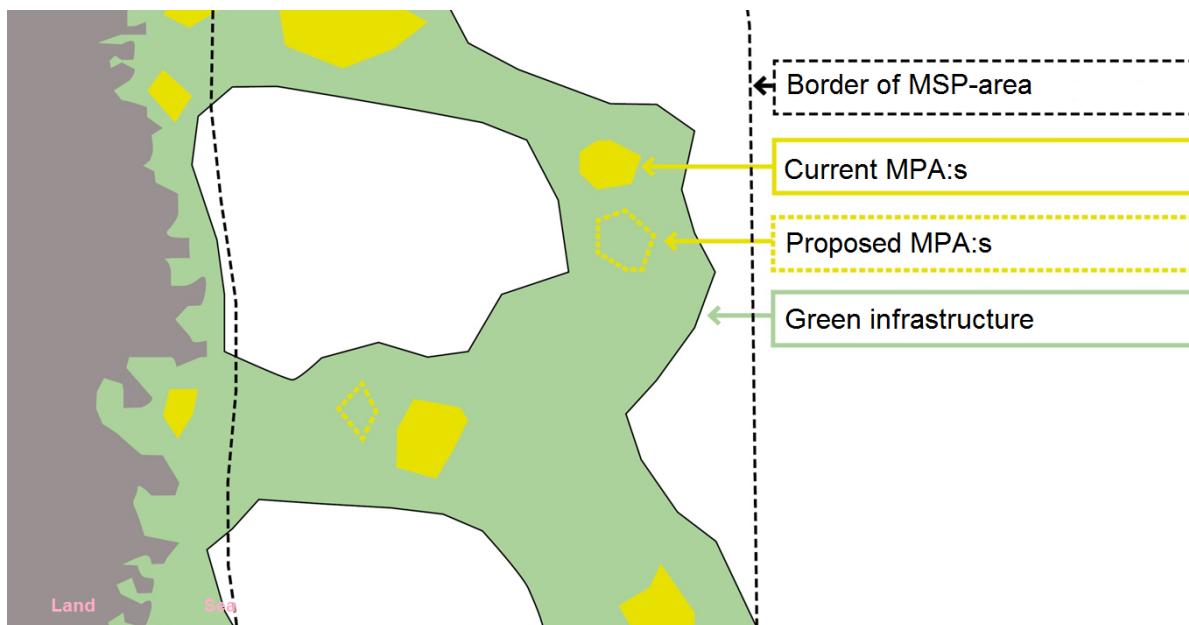**Figure 1 Principal illustration of how MPA:s are part of the green infrastructure which is part of the whole MSP-area**

Figure 2 Schematic illustration of how the MPA-network is part of the green infrastructure
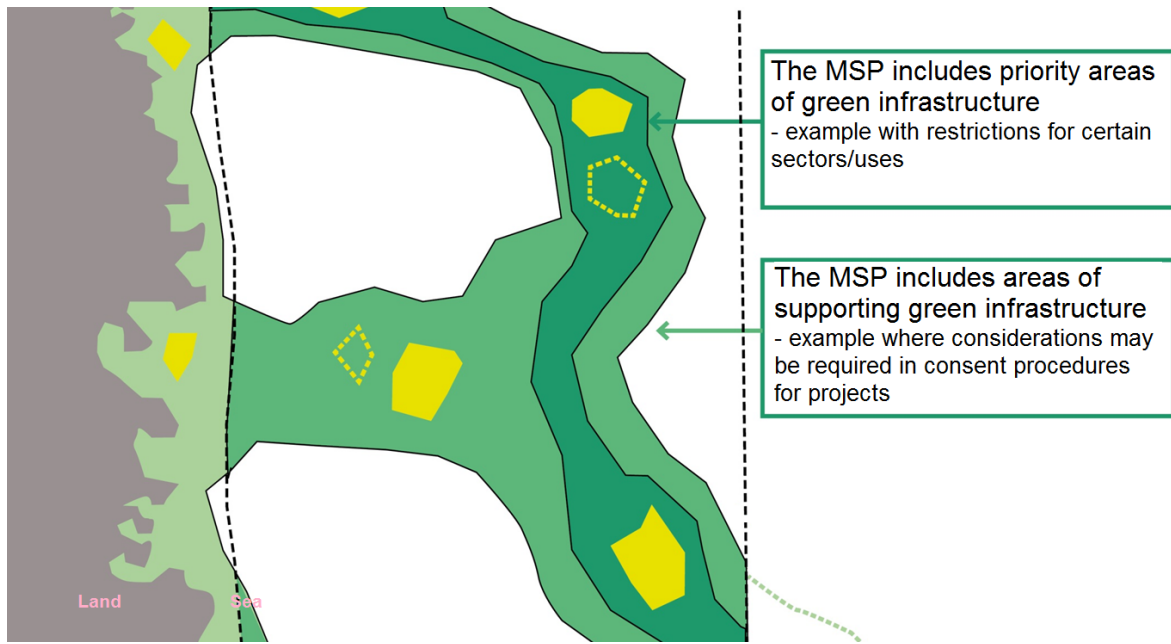
Figure 3 Schematic illustration of how green infrastructure can be considered in MSP
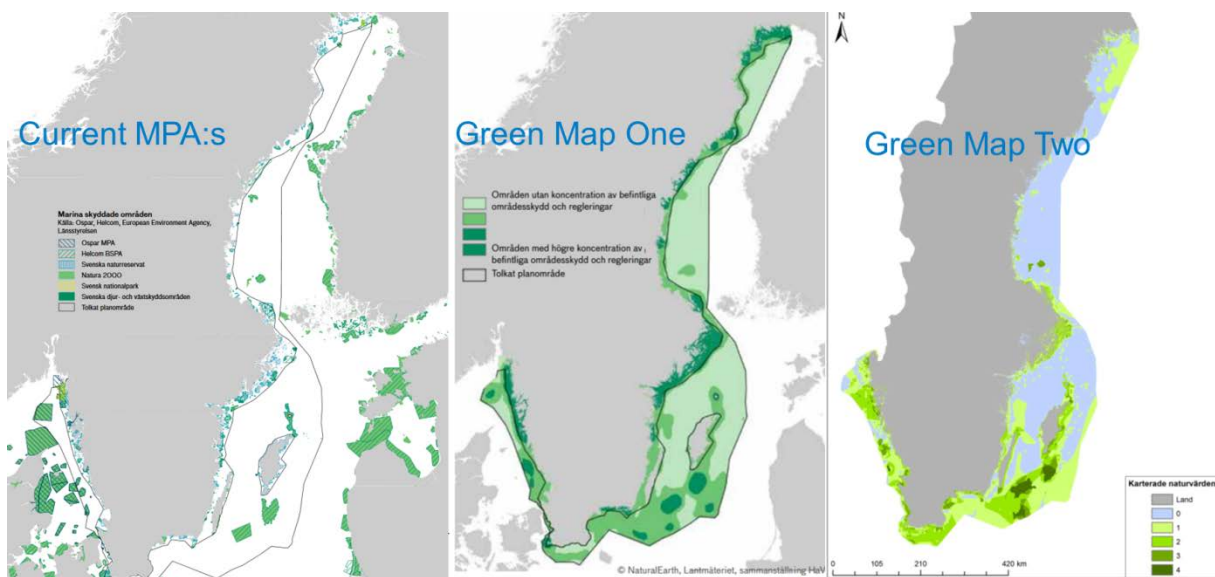

Figure 4 Swedish example of current MPA:s in relation to the first two maps of green infrastructure at a national level (Green Map One 2013 and Green Map 2 2015)

Swedish example of green infrastructure maps/data in MSP

Sweden (SwAM) has sequentially developed three different national maps/data sets on green infrastructure to use in MSP. The first map (Green Map One 2013) was based on protected areas and regulations, as well as other data relating to marine natural values. The map, which was published in the report Current status 2014, gives an indication of areas of particularly high nature value, but the picture it shows is not complete, see figure 4.

The second map (Green Map Two 2015) was based on the four ecosystem component layers: benthic environment, fish, marine mammals and birds, see figure 4. The map is based on national data on mapped

nature values. Rough spatial modeling and prediction was carried out for environmental values where such national data were lacking. The map has a grid size of 500 meters. Even though the Green Map Two has its limitations it was used and played an important role in developing the first draft Swedish marine spatial plans.

The latest map/datasets on green infrastructure are developed in the Swedish Symphony project, see figure 5. The aim is to link activities and pressures to the green infrastructure. Symphony is an analytical tool used for estimating cumulative environmental impacts in MSP. It allows early identification of areas of concern so mitigative planning options can be considered. The tool is based on international methods for cumulative assessments. Planning evidence for the environment is gathered as input to Symphony. Data is synthesized by 9 collaborating partners for: 24 pressures, 25 ecosystem components and background data (depth, coastline, water parameters). Symphony is set up in 2016 and will be used in Swedish MSP from 2017. Symphony will allow for both a better presentation of green infrastructure as well as a tool for analyzing impacts on green infrastructure.
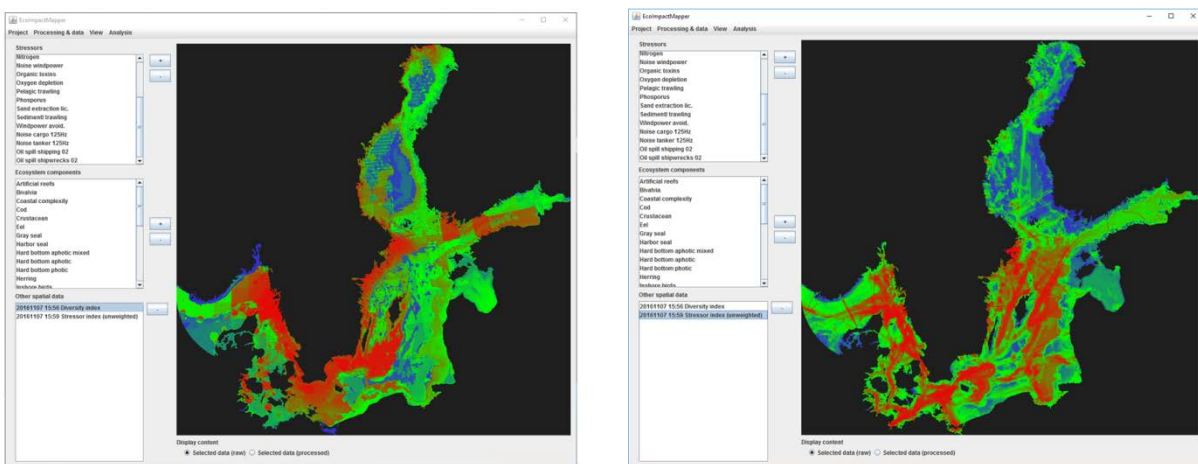

Figure 5 Illustrative example of how green infrastructure (left) and cumulative pressures (right) may be presented in the Swedish Symphony project (2016). These are very draft examples mainly giving an idea of the scale and level of detail compared to the two green infrastructure maps (Green Map One and Green Map Two). Only a few ecosystem components and pressures were used.