

# Swedish efforts concerning ecosystem-based management

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## SUSTAINABLE DEVELOPMENT GOALS

### TARGET 14.2:

*By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans.*

### TARGET 14.5:

*By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information.*



# EXECUTIVE SUMMARY

- Sustainable management and protection of marine and coastal ecosystems to avoid significant adverse impacts by 2020 much depends on the implementation of all targets of SDG14, as well as the SDGs 2 (zero hunger), 3 (good health and well-being), 6 (clean water and sanitation), 8 (decent work and economic growth), 11 (sustainable cities and communities), 12 (sustainable consumption and production patterns) and 13 (climate action).
- Climate change is causing long-term rise in sea levels, melting of sea ice, ocean warming, and ocean acidification. Together these changes are shifting the ranges of organisms towards the poles or to greater depths, increasing extinction risk, and causing substantial changes in key marine ecosystems. Additional changes in ocean chemistry, such as a decrease in oxygen levels, will further influence the availability of suitable habitats and have negative impacts on marine life.
- Without appropriate knowledge and understanding of terrestrial, water and marine ecosystems – including cumulative human impacts on these – it is likely that managing biological, social and economic systems will fail.
- Sweden works actively towards implementing its global, regional and national commitments to manage natural resources using the ecosystem-based approach, realising the need to sufficiently support those countries with less means to mitigate and adapt to environmental challenges.
- Marine systems are challenging to manage on an ecosystem basis as a result of their complexity, high degree of connectivity and difficulties associated with observing ocean processes, flora and fauna. These challenges can make it difficult for researchers to know how to make best-use of available scientific information to inform policy makers about options for ecosystem management. Therefore, there is a clear need to develop a process that can assist governments and other decision makers to reduce the uncertainties in ecosystem-based management.
- To achieve SDG 14.2 there is a need to increase national, regional and international research and management efforts to support resilient oceans and coastal ecosystems that can provide essential ecosystem services. This, in turn, requires ecosystem-based management using the best science and TLK available to account for cumulative environmental impacts.



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## Introduction

Marine ecosystems are highly complex due to the many interacting biological and physical processes. Past failure to understand how to sustainably manage ecosystems, and the human impacts upon them – and especially how they change under anthropogenic impacts – is causing major ecosystem shifts across the globe. For example, climate change is expected to cause substantial biodiversity loss, which will reduce the resilience of ecosystems, and threaten the provision of key ecosystem services. Human population growth and growing competition for natural resources create additional pressures with around 60% of the world's population living within 100 km of the coast. Land based pollution contributes 80% of all marine pollution; 300 million people are directly dependant on fishing, and 90% of those are coastal small-scale fishers. Healthy coastal and marine ecosystems are crucial for poverty reduction, food security and economic development worldwide.

Ecosystem-based management is a method for integrated management of land, water and living resources (including humans). The aim is to conserve ecosystems, promote sustainable use of natural resources and at the same time consider economic and social interests. Marine protected areas (MPAs) can be a powerful tool to contribute to a Good Environmental Status of the world's oceans. There are now just under 15,000 marine protected areas (MPAs) spread across 18.5 million km<sup>2</sup> of ocean and sea. Up to 13% of territorial waters are now protected.

## National efforts

### One government agency manages fisheries, water and marine issues

In Sweden, the Swedish Agency for Marine and Water Management (SwAM) was established in 2011. The presence of all of these issues under one roof greatly facilitates ecosystem-based management.

### Sweden applies the ecosystem approach in marine spatial planning (MSP)

Sweden has developed a spatial assessment tool (Symphony) that facilitates direct consideration of cumulative environmental impacts in the MSP process (fig. 1). Symphony works with multiple data sets of key ecosystem components and anthropogenic stressors to identify ecological indicators required to reach Good Environmental Status (GES). The transparent method ensures sectorial integration and a source-to-sea perspective in MSP. Sweden collaborates with several European partners and the USA to further develop and implement Symphony.

### Sweden aims for efficient and well-designed monitoring

Implementing the Marine Strategy Framework Directive (MSFD), Sweden is to define and assess the environmental status of its waters, develop policies and monitoring programmes, and implement measures. After following up on the results, the process begins again.

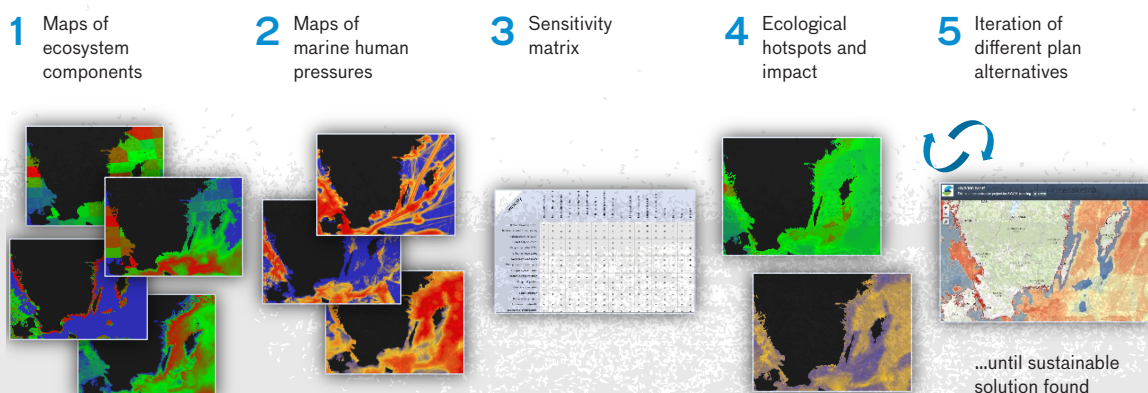


Fig. 1. Symphony is an ecosystem-based tool developed for Marine Spatial Planning.

### **Sweden emphasises the importance of ecosystem services and green infrastructure in ocean management**

The central value of marine ecosystem services and biodiversity is integrated in numerous Swedish policy documents, practices and decisions. These include environmental accounting, business models, and environmental impact assessments. Comprehensive marine habitat mapping in Sweden identifies ecological connections and biodiversity hotspots that underpin marine green infrastructure. This feeds into marine management, MPAs and MSP through a variety of local, regional and national programmes (e.g. MOSAIC, SeaGIS, Green Infrastructure). MOSAIC is a comprehensive method for assessing environmental status and ecological value, in support of marine conservation and the safeguarding of marine green infrastructure.

### **Swedish research into the functioning, governance and management of social and ecological variables**

The research includes ecosystem resilience as a key component. The underlying aim is to ensure the sustainable development of social and economic systems in order to enhance ecosystem health and human well-being. Research also addresses the government's strategic research initiatives by investigating the ecological consequences and projected responses – of climate change.

### **Sweden has already implemented the Aichi target of 10% MPA by 2020**

Sweden has designated new MPAs to reach this commitment, increasing the total marine area under protection from 6,6% at the beginning of 2016 to more than 10% by the end of 2016. However, more work remains to also meet the goals concerning connectivity and representativity.

### **Preserving, protecting and restoring over 400 marine areas with associated fishing conservation measures to promote fish stock recovery**

Sweden has introduced multiple measures to protect and restore degraded marine habitats and populations. For example: bottom-trawling has been banned within 3-4 nm of the Swedish coastline, and 400 areas are closed for fishing as they have been defined as important fish spawning and migration areas where only handheld fishing is allowed.

A Swedish programme of measures to address the MSFD was finalised in 2016 and additional specific measures have been developed for a further 16 threatened species and five habitat types. These measures incorporate the ecosystem-based approach by promoting biodiversity, for example protecting eelgrass and mussel-beds which play key roles in supporting coastal fauna and flora. Swedish researchers

have developed methodologies for the restoration (recovery) of eelgrass beds and musselbeds, and work is underway to develop a comprehensive toolkit of additional methods for ecological compensation and the restoration of other marine habitats.

### **Sweden is developing a strategy for ecosystem-based fisheries management (EBFM)**

A strategic plan for EBFM is being developed and will be presented at the end of 2017. Some practical tools, such as the "Scandinavian grid" – selective fishing gear that significantly decreases by-catch are already in use.

## **Regional efforts**

### **Multilateral collaboration enables regional agreements and holistic environmental assessment**

Sweden collaborates in regional partnerships and conventions (e.g. HELCOM, OSPAR). HELCOM and OSPAR are important in the promotion of a holistic marine policy in the Baltic Sea and the North East Atlantic. Sweden contributes regularly to the regional collection and synthesis of data and common assessment methods.

### **The EU's Common Fisheries Policy (CFP) aims to implement ecosystem-based fisheries management**

As a member of the EU, Sweden has been involved in developing the Common Fisheries Policy (CFP), which includes using an ecosystem-based fisheries management approach. One objective of the CFP is to set TACs leading to all stocks being managed above MSY levels. Also, the CFP provides the tools for conservation measures necessary for compliance with obligations under Union environmental legislation. In 2016 Sweden, together with Denmark and Germany, developed a joint recommendation for fisheries conservation measures in Bratten, an MPA in Skagerrak (North Sea). The conservation measures include no-take zones, and the mandatory use of an Automatic Identification System (AIS) and a Vessel Monitoring System (VMS) for compliance purposes. In Skagerrak, a transnational marine national park (Ytre Hvaler National Park and Kosterhavet National Park) was designated in 2009. Cooperation focused on a common inauguration of the national parks, joint communication and information, common strategies for management in the areas and the development of sustainable tourism.

### **Sweden engages in regional research for science-based management of ocean resources**

Sweden is active in several regional ocean research programmes, including the EU research platform Joint Programming Initiative, Healthy and Productive Seas and



Oceans (JPI Oceans), and the Joint Baltic Sea research and development programme (BONUS). Sweden and France are leading a JPI-Oceans initiative to establish a research network and agenda for ecosystem services-based assessments for MSP and MSFD. Within the Nordic Council of Ministers working group HAV, several activities and projects have developed tool-kits and best practices for science-based management.

Sweden is a member of the International Council for the Exploration of the Sea (ICES). Sweden participates in many ICES working groups addressing ecosystem-based management. Through our engagement in ICES, we are involved in the work of PISCES and the Northern Atlantic Alliance.

### **Sweden plays a progressive role for environmental protection within the International Maritime Organization (IMO)**

Recent achievements that will substantially reduce the eutrophication and acidification of regional seas include the Ballast Water Management Convention (active September 2017), the Sulphur Emission Control Area (SECA), and progress on a Nitrogen Emission Control Area (NECA) and the Polar Code, to be implemented in the near future (IMO 2017).

### **Monitoring fisheries to support healthy ecosystems**

The EU Data Collection Framework (DCF) provides a common framework for the collection, management, and sharing of fisheries data. Annual surveys and stock assessment within The EU Data Collection Framework (DCF) data form the basis for scientific advice on the CFP, which aims to achieve sustainable, scientifically-based fishing.

### **Sweden collaborates within the EU Baltic SCOPE project**

Sweden is supporting coordination of MPA processes and marine spatial planning (MSP) through the development of a methodology for producing maps in order to increase the understanding of biodiversity and protection needed in the Baltic Sea.

### **Collaboration between intergovernmental organisations should be strengthened**

Collaboration among sectorial bodies responsible for fisheries and for biodiversity is of key importance to achieve an ecosystem approach to fisheries management. One such example is the collaboration between OSPAR and NEAFC (Northeast Atlantic Fisheries Commission).

## **International efforts**

### **Sweden strives to increase regional and international collaboration**

Sweden is an active participant in Regional Seas Conventions (such as OSPAR and HELCOM) and other international fora including FAO, OECD, UNEP, UNDP, UNCLOS, CBD, CITES, the Arctic Council, CCAMLR, IMO, and Regional Fisheries Bodies.

### **Sweden supports multilateral cooperation on coastal ecosystems**

Sweden's long-term commitment to international ecosystem-based management includes: 1) programmes in Asia and the Pacific - Mangroves for the Future (Southeast Asia) and Southeast Asian Fisheries Development Center, 2) research cooperation in Tanzania and Mozambique, 3) the Western Indian Ocean Marine Science Association, and 4) several marine regional programmes in Africa to support the Nairobi and Abidjan regional seas conventions.

### **The Source-to-Sea Platform**

The Source-to-Sea Management Platform (S2S) is a Swedish initiative with diverse international stakeholder participation. S2S encourages global collaborations among freshwater, coastal and marine experts in land - sea interconnections, and provides on-demand knowledge, support, and guidance for policy development and implementation.

**PAST FAILURE** to understand how to sustainably manage ecosystems is causing major ecosystem shifts across the globe. Therefore there is a clear need to develop a process that can assist governments and other decision makers to reduce the uncertainties in ecosystem-based management.



### UNCLOS increases protection of the high seas

Sweden is playing an active part in negotiating an Agreement on Biodiversity Beyond Areas of National Jurisdiction (BBNJ) to protect biodiversity on the high seas.

### Sweden works toward mainstreaming biodiversity and ecosystem services in sectoral policies

It is important to strongly emphasise the CBD decision on mainstreaming biodiversity across sectors including fisheries and aquaculture. This process requires that these sectors seek to reduce, avoid and mitigate any negative impacts, and promote positive effects on biodiversity and ecosystem services.

### Sweden engages in bilateral marine environmental, climate, and fisheries collaborations

Sweden has developed multiple partnerships with many nations, such as Brazil, China, Russia, South Africa and Vietnam to increase capacity-building and knowledge-exchange to better understand how to govern for resilient marine ecosystems and rights-based fishing practices.

### The Arctic – Sweden engages in ecosystem-based management, marine protected areas and marine litter

- Sweden is strengthening its environmental commitment to the High Seas of the Arctic: in January 2016 Sweden launched its environmental policy for the Arctic, and in November 2016 Sweden and the US released a research report on the interactions of biological and socioeconomic processes of the Arctic and the need for sustainable management to increase ecosystem resilience;

- Sweden's commitments in the Arctic include: 1) focusing on area-based conservation in the Arctic (e.g. commitment to establishing MPAs, and co-arranging an MPA workshop with Finland, September 2017); 2) co-leading Marine Litter in the Arctic project with Norway, Iceland and the Aleut International Association; 3) monitoring and assessing acidification in the Arctic; and 4) participation in several Arctic Council expert groups (e.g. MPA Expert Group, Ecosystem Expert Group, and CAFF Marine Biodiversity Expert Group);
- Sweden annually conducts collaborative research in the region with countries such as Canada, the USA, Norway (Svalbard), Russia, Finland and Germany;
- Sweden actively participated in the Arctic Biodiversity Assessment Project, which resulted in multiple reports and a summary for policy makers containing 17 recommendations agreed by the Arctic Council Ministers.

### Swedish engagement in Antarctica

In 2016, the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) (including Sweden) agreed on a 1.5 million km<sup>2</sup> MPA in the Ross Sea, with an almost 1.2 million km<sup>2</sup> no-take zone. Sweden has actively supported this MPA proposal by the USA and New Zealand, and continues to support the MPA proposals in East Antarctica and in the Weddell Sea. Sweden is also committed to progress within the protocol on environmental protection of the Antarctic Treaty.

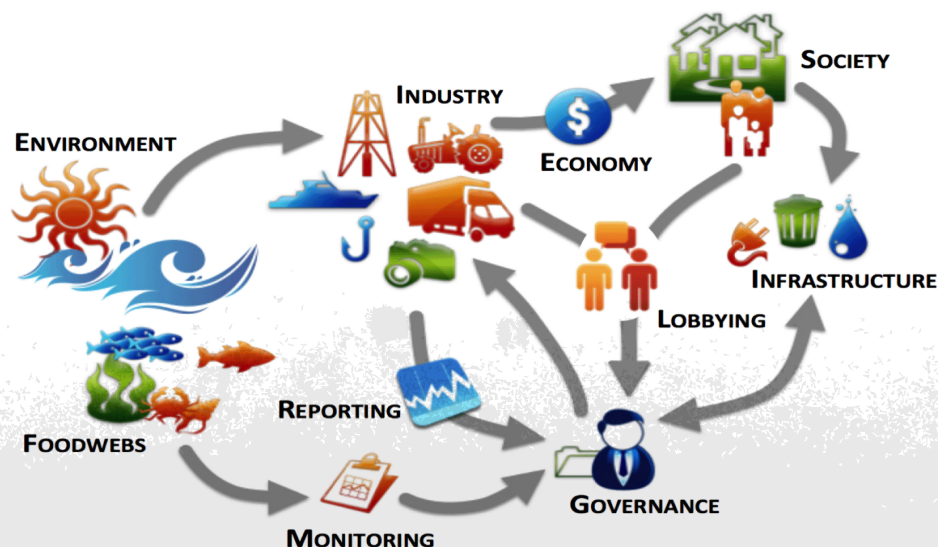


Fig. 2. Ecosystem-based management model visualising the connections between biological, management, social and economic variables (Atlantis conceptual model, CSIRO, Australia).

# CHALLENGES AND GAPS

- Marine systems are challenging to manage on an ecosystem basis as a result of their complexity, high degree of connectivity and difficulties associated with observing ocean processes, flora and fauna. These challenges can make it difficult for researchers to know how to make best-use of available scientific information to inform policy makers about options for ecosystem management. Therefore, there is a clear need to develop a process that can assist governments and other decision makers to reduce the uncertainties in ecosystem-based management.
- The failure of some nations to ratify UNCLOS and other internationally binding agreements, threatens protection of the high seas (i.e. 64% of the ocean's surface).
- The lack of full implementation of international legal instruments targeting unsustainable fishing and pollution exacerbates habitat degradation and climate change.
- Inadequate data and valuation of marine resources and ecosystem services limit our capacity to sustainably manage marine ecosystems. It may also challenge the quality of, for example, MPAs in terms of understanding ecological representativity, connectivity and functionality.
- The content of MPAs, i.e. how effective the protection is, is another challenge where some MPAs may include several restrictions whereas other MPAs do not yet have relevant regulations attached to them.
- Management tools, such as MPAs, may not protect the biodiversity as intended, as external factors such as climate change, ocean acidification and pollution may hinder the protection.
- Monitoring is often lacking in MPAs. It is important to apply an adaptive management approach to marine protected areas to ensure effective management plans.
- A lack of understanding of the impacts of multiple stressors and how to successfully integrate cumulative impact assessments in marine policy limits our capacity to move from sectoral to holistic ocean management.
- There is insufficient interdisciplinary and international collaboration to understand and sustainably manage key ecosystem properties and functions: biodiversity, resilience, and connectivity.
- Sustainable management and protection of marine and coastal ecosystems to avoid significant adverse impacts by 2020 much depends on the implementation of all targets of SDG14, as well as all other SDGs, in particular the SDGs 1 (no poverty), 2 (zero hunger), 3 (good health and well-being), 6 (clean water and sanitation), 7 (affordable and clean energy) 8 (decent work and economic growth), 11 (sustainable cities and communities), 12 (sustainable consumption and production patterns), and 13 (climate action).



This document represents one out of nine compilations made by the Swedish Agency for Marine and Water Management (SwAM) to highlight Sweden's key efforts and initiatives for Sustainable Development Goal 14 of the 2030 Agenda for Sustainable Development. It has been developed as a part of Sweden's work in support of The Ocean Conference in New York, June 5–9, 2017.

- Several other Swedish agencies and institutions have contributed to the content in these compilations: the Swedish Environmental Protection Agency, the Swedish International Development Cooperation Agency (Sida), the Swedish Meteorological and Hydrological Institute (SMHI), the Swedish Board of Agriculture, the Swedish Chemicals Agency, the Swedish Transport Agency, and the Swedish Institute for the Marine Environment (SIME).
- The documentation focuses on a situation assessment and does not constitute a complete picture of Sweden's initiatives being carried out in order to achieve the goal and targets. A starting point for the content is operational areas within national authorities, but the content has also been expanded to include other significant aspects based upon existing contacts and knowledge.
- Furthermore, the Swedish Environmental Research Institute (IVL) has been commissioned by SwAM to compile initiatives and examples from Sweden's industry and blue growth sector. The Sustainable Development Solutions Network (SDSN) Northern Europe has also composed a complementary compilation of efforts from innovative blue growth initiatives. The result of this work is presented in separate reports.
- The Swedish Institute for the Marine Environment has been commissioned by SwAM to produce two syntheses in support of the conference. One concerns mitigating marine eutrophication in the presence of strong societal driving forces, with a focus on impacts and measures, and the other concerns impacts and measures regarding marine litter in small island developing states.