Swedish Agency for Marine and Water Management

Swedish efforts to reduce marine pollution

SUSTAINABLE DEVELOPMENT GOALS, TARGET 14.1:

By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.

EXECUTIVE SUMMARY

- Success factors for reducing marine pollution include strong political will, public awareness and a robust regulatory framework.
- Systematic environmental monitoring is an essential foundation for efficient, sustainable pollution management.
- Nutrient losses are resource losses. Efficient, targeted fertilizer use is both economically and environmentally beneficial.
- Sustainable and effective management of solid-waste and wastewater benefits human health and contributes towards protection of the environment.
- The principles of the Swedish environmental code provide a powerful basis for sustainable environmental use.
- National governments need to take active responsibility for remediation of sites where the 'polluter pays' principle cannot be implemented.
- Regional cooperation shares costs and improves implementation in monitoring, analysis, research and mitigation of marine pollution.
- Good governance, in terms of the rule of law, citizen's rights of access to justice and information, public participation, accountability issues etc., are the cornerstones for good environmental performance and sustainable development. Therefore, integration of key aspects of SDG 16 is needed to fulfill SDG 14.

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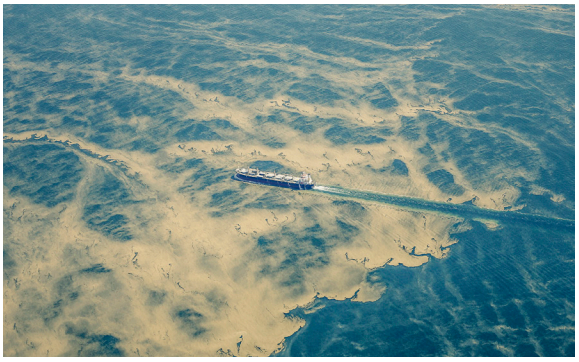
Introduction

A long history of industrial and agricultural practices have caused extensive pollution problems in Sweden's freshwater and marine environments. Eutrophication problems arose first around urban centres during the 1930s due to poor sewage systems and worsened after agrarian advances in the 1950s. While nutrient loads to the sea peaked in the 1980s, impacts are still acute, with agriculture now the major activity contributing to nutrient pollution.

Releases of hazardous substances from centuries of Swedish industrial activity cause severe effects in marine biota. Significant emission reductions in the last decades have allowed affected populations to recover, although contaminated soils remain as secondary pollution sources. Substantial run-off means that pollution problems in freshwater rapidly become pollution problems in the sea, with measures at source effective for protecting both freshwater and marine environments together. Emerging pollutants such as medicinal residues and marine litter also need managing, with



IMPACTS IN the marine environment due to nutrient pollution, for example algal blooms, are still acute in the Baltic Sea.

screening studies to identify new problems at an early stage. Pollution prevention at source is safer, quicker and cheaper than mitigation and restoration.

Baltic brackish water ecosystems have become home to invasive species from several continents due to both poor ballast water management and deliberate introduction since at least the 1800s. Managing existing and preventing further establishment of invasive species is a major challenge. As maritime activities intensify, pollution from shipping needs to be controlled, both at sea and in port. The impact of maritime activities on the natural underwater soundscape is becoming a concern: noise from pile-driving or seismic explosions can involve rapid pressure changes that injure or scare off marine creatures. Noise from shipping interferes with animals' ability to hear predators or locate prey. Understanding of this problem is at an early stage.

National efforts

Sweden was relatively early in addressing pollution problems. By the 1960s, eutrophication and pollution with hazardous substances were widespread and required a political response. The Swedish Environmental Protection Agency (SEPA) was founded in 1967 and the first environmental protection legislation in Sweden was introduced in 1969. It was amalgamated with several other environmental acts into the Environmental Code in 1999. This implements a strict precautionary approach, requiring users to demonstrate that activities are safe, with minimal impact and that users have responsibility for restoration should they cause environmental degradation. Activities are regulated through environmental courts, with government agencies responsible for protecting public interest. The Code requires use of the substitution principle, which greatly reduces loads of harmful substances to water treatment works. Environmental quality standards (EQS) make direct demands on the final result rather than only aiming at minimizing and alleviating environmental disturbances as defined in previous environmental legislation. Systematic environmental monitoring began in the 1960s and provides the basis for assessing the EQS. Long-term time-series of chemical contamination in water and biota have proved essential for decision-making and validation of measures taken, as well as for scientific research and raising public awareness. Industry and the regional administrations fund and manage most regional and local monitoring while most data are public and freely available.

During the 1970s, the Swedish state invested heavily in water treatment works. Industry invested in their own wastewater treatment. The separation of industrial waste from domestic sewage is vital to produce sewage sludge with lower levels of toxic substances. Sewage sludge re-use as fertilizer

THE MOST cost-effective mitigation work may be needed on the other side of the sea: Sweden has supported the construction of advanced water treatment works in the former USSR on the southern and eastern Baltic coasts.

remains challenging without risking soil – and food – contamination: further reductions in levels of microplastics and other pollutants are urgently needed. Sweden uses a variety of methods, from education to financial incentives to bans, to encourage identification and use of safer alternatives to hazardous substances.

By the 1970s it was also clear that fish, birds and marine mammals in Swedish seas were suffering from exposure to contaminants like mercury, PCBs and dioxins. With the adoption of the Environmental Act in 1969, emissions from industrial and other stationary plants were progressively regulated. Mercury, PCB and dioxin emissions from Swedish point sources are now more than 90% lower than in the 1970s. Mercury and PCBs in products were also identified as significant sources of emissions to the marine environment and due to targeted regulations, mercury use has been close to eliminated, while almost 85% of used PCBs have been phased out and destroyed. Many positive results have been observed in the environment, e.g. the recovery of the previously near extinct Swedish sea eagle population and reduced concentrations in other biota. The long history of industrial activities has also resulted in many thousands of contaminated soil and sediment sites. These provide a continuous source of contaminants to the environment. To address this, a national strategy and fund for remediation grants was adopted. The aim is to remediate the highest-risk sites (ca. 8000) by 2050.

Since 1999, Sweden's national environmental work has been coordinated through 16 different Environmental Objectives plus a "Generation Goal". These targets, adopted by the Swedish Parliament, aim to solve the environmental challenges facing Sweden within a generation, without exporting the problems to other countries.

Regional efforts

Sweden makes extensive use of the Regional Seas Conventions (RSCs) HELCOM (Baltic Sea) and OSPAR (North Sea) both to drive work but also to share management costs. The conventions work through a process of assessing pressures and impacts through thematic assessments and then using recommendations, action plans and agreements to develop and ensure best practice. Coordinating national monitoring programmes and jointly assessing results provides data for recommendations and planning of measures and follows-up their effectiveness. Recommendations cover a wide range of activities, from fish farming to plastics production to mercury use in dentistry. Significant agreements include a 1988 promise to reduce nutrient loads to the North Sea by 50%, which led to measures to reduce nutrient losses at source, and an agreement to stop discharging mercury when producing PVC. Within the Baltic, advanced numerical models have been used to determine sustainable nutrient loads, with countries agreeing to reduce their respective national loads to these levels.

The RSCs provide a platform to address issues of regional relevance that have not yet been included in EU legislation, or help contracting parties to approach to global actors

where the EU is not represented. HELCOM has identified environmental investment priorities that have guided regional Swedish aid partnerships, for example with projects improving wastewater treatment. Another recent example is HELCOM and OSPAR contracting parties approaching the International Maritime Organisation (IMO) to agree on nitrogen emission control areas (NECA) in the Baltic and North Seas.

The European Union has stimulated better environmental management through directives ensuring food and water safety and more recently by establishing a level playing field in environmental standards across member states. Early directives include those protecting bathing- and drinking water from 1975. These have been developed and coordinated through framework directives for surface, groundwater and marine waters, Water Framework Directive (WFD) and Marine Strategy Framework Directive (MSFD). Framework directives also regulate industrial releases to air and water and define legally binding Best Available Techniques. EU legislation also include mechanisms for controlling invasive alien species. EU directives were incorporated into Swedish law when Sweden joined the European Union in 1995. Some measures required under the nitrates directive, for example, had already commenced through work in the RSCs but were strengthened by EU legislation. The EU-Commission is itself a signatory to the RSCs and recognizes them as a platform for regional coordination of the MSFD.

Analyses within the conventions are now targeted to assist member states in meeting European Union obligations. For example, HELCOM load assessments help in planning national Programmes of Measures for the Water Framework Directive, while thematic assessments contribute to national obligations under the MSFD. Activities under Programmes of Measures are part-financed through EU funds. Enforcement under both RSCs and EU is initially through examination of national reporting, to show progress towards agreed goals. Where progress is inadequate or rules poorly implemented, the EU has legal processes that can result in penalties for offending member states.

The EU Strategy for the Baltic Sea Region (EUSBSR) aims at reinforcing cooperation within the region to address common challenges, including the Baltic environment. It is a new structure for regional cooperation, supporting the implementation of regional policy decisions (by e.g. HELCOM) by aligning priorities and existing funding. The BONUS research programme created by the EU and the HELCOM Contracting Parties who are also EU members, funds large, transnational research projects with a focus on economic and ecological development in the region. It has produced results of immense value to regional marine pollution management.

Sweden is also active within the Arctic Council and the Barents Euro-Arctic Council, focusing e.g. on identification and mitigation of pollution hot spots. The Convention on Long-range Transboundary Air Pollution (CLRTAP) and its

OPEN CAGE fish farming can cause problems with nutrients loads, medicinal wastes, antifouling products and genetic disturbances from wild/caged fish interactions. New technologies like fish farming on land appear to be more ecologically sustainable. However, economically viable alternatives are proving difficult to implement while the cheaper, open cage solutions remain. Swedish entrepreneurs use disused agricultural buildings to grow perch for human production.

Protocols on Heavy Metals and Persistent Organic Pollutants (POPs) as well as the Gothenburg Protocol are of major importance to monitor and reduce atmospheric deposition of contaminants and to abate eutrophication in Sweden and globally. Sweden currently holds the chair of CLRTAP.

International efforts

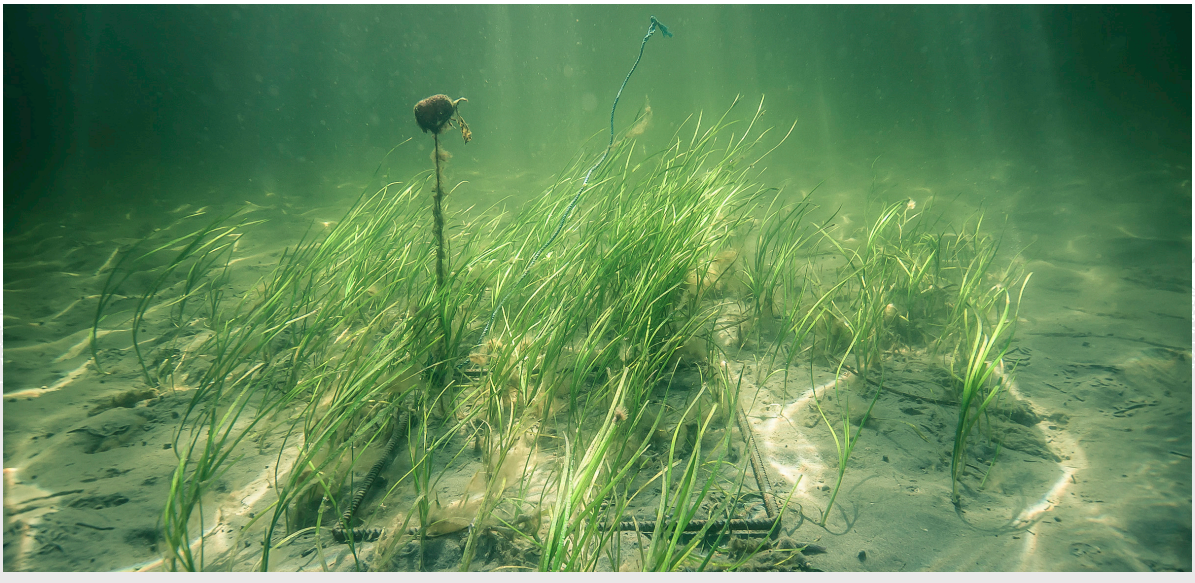
Sweden contributes actively to and drives the development of several international conventions and cooperations related to chemicals and hazardous substances. For example, Sweden acknowledges the Stockholm Convention on POPs as a central tool in pursuing the objective of a non-toxic environment and is fully committed to its effective implementation and further development, including necessary financial commitments to assist developing countries and countries with economies in transition. Sweden also actively supports the development of the Minamata Convention on Mercury and takes an active part in SAICM, the Strategic Approach to International Chemicals Management. In addition, Sweden is engaged in multiple bilateral cooperations to develop effective environmental governance, including prevention and control of industrial pollution, implementation of Best Available Technology, and waste and chemicals management. Sweden has a broad aid programme promoting sustainable management of marine resources particularly in eastern Africa and south-east Asia.

Interaction and links to other analysis areas

Recent research indicates that fisheries affect eutrophication symptoms: removal of predator fish leads to an excess of planktivores that in turn overconsume zooplankton and grazers, leading to increases in blooms of both phytoplankton and filamentous seaweed. In Swedish waters, predatory fish such as cod, pike and perch have declined through overfishing and habitat loss. It is possible even that loss of bottom fauna due to anoxia (resulting from eutrophication) has hindered juvenile cod development. Pollution loads, fisheries and coastal and marine habitats need integrated, coordinated management.

- Increased extreme run-off events resulting from climate change flush pollutants off the land (including from towns and cities). Green infrastructure, in the form of water retention measures such as wetlands, swales and tree pits delay run-off, reduce maximum flows (and thus erosion) and reduce the risk of untreated sewage overflow into the water treatment network. These climate adaptation measures are classical nutrient retention approaches that even reduce flows of litter and hazardous substances.
- Effective sewage treatment is vital to protect the marine environment, but also to achieve SDG Goals 3, 6, and 11 (at the very least).
- Marine plants are an effective carbon sink, but excess nutrient loads damage seagrasses and perennial macroalgae.
- Climate change causes ocean acidification, but while scrubbers on ships and coal-fired power stations are effective ways to reduce heavy metal and NOx emissions to the air, the scrubbing water is often seawater which is discharged directly back into the sea together with the pollutants. Part of the BONUS SHEBA project looks at ship scrubbers and acidification.

EELGRASS MEADOWS are important habitats but also effective carbon and nutrient sinks. Eelgrass restoration has the potential to be a cost effective downstream mitigation technique.



CHALLENGES AND GAPS

- Pollution prevention at source is safer, quicker and cheaper than mitigation and restoration.

- The environmental and health impact of Swedish consumption and production in other countries is growing. Action is needed to reduce the global Swedish environmental footprint.

- Over-consumption and food waste are a double eutrophication problem: excessive food production has an environmental cost, but there is then an additional cost in treating an excessive amount of human waste.

- In Sweden, agricultural measures are a mix of obligatory and voluntary actions, often financed through grants to farmers. Ensuring that the right measure is implemented in the right place is particularly challenging, especially at a local level.

- Research questions remain: variable soil types and data shortages make modelling nutrient flows and retention problematic at the national scale, despite advances in computer power. Despite this, nutrient modelling is arguably more advanced than modelling the transport and fate of organic pollutants and microplastics. The description of ecosystem components in marine environment models is still rudimentary.

- Consumer products contain a multitude of chemicals that can reach the marine environment through diffuse emission and transport via e.g. sewage treatment plants. The knowledge and regulation of chemicals in products needs to be improved.

- Implementation of SDG 14 (and other SDGs) in Sweden requires a translation of the SDG targets to national policies and targets. Stronger coherence between SDG targets and national targets (e.g. Environmental Objectives, Generation target, PGU etc) is needed.

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Compilations made by SwAM for SDG 14, Life below water

- 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.

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