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COMMISSION STAFF WORKING DOCUMENT

Third River Basin Management Plans
Second Flood Hazard and Risk Maps and Second Flood Risk Management Plans
Member State: Sweden

Accompanying the document

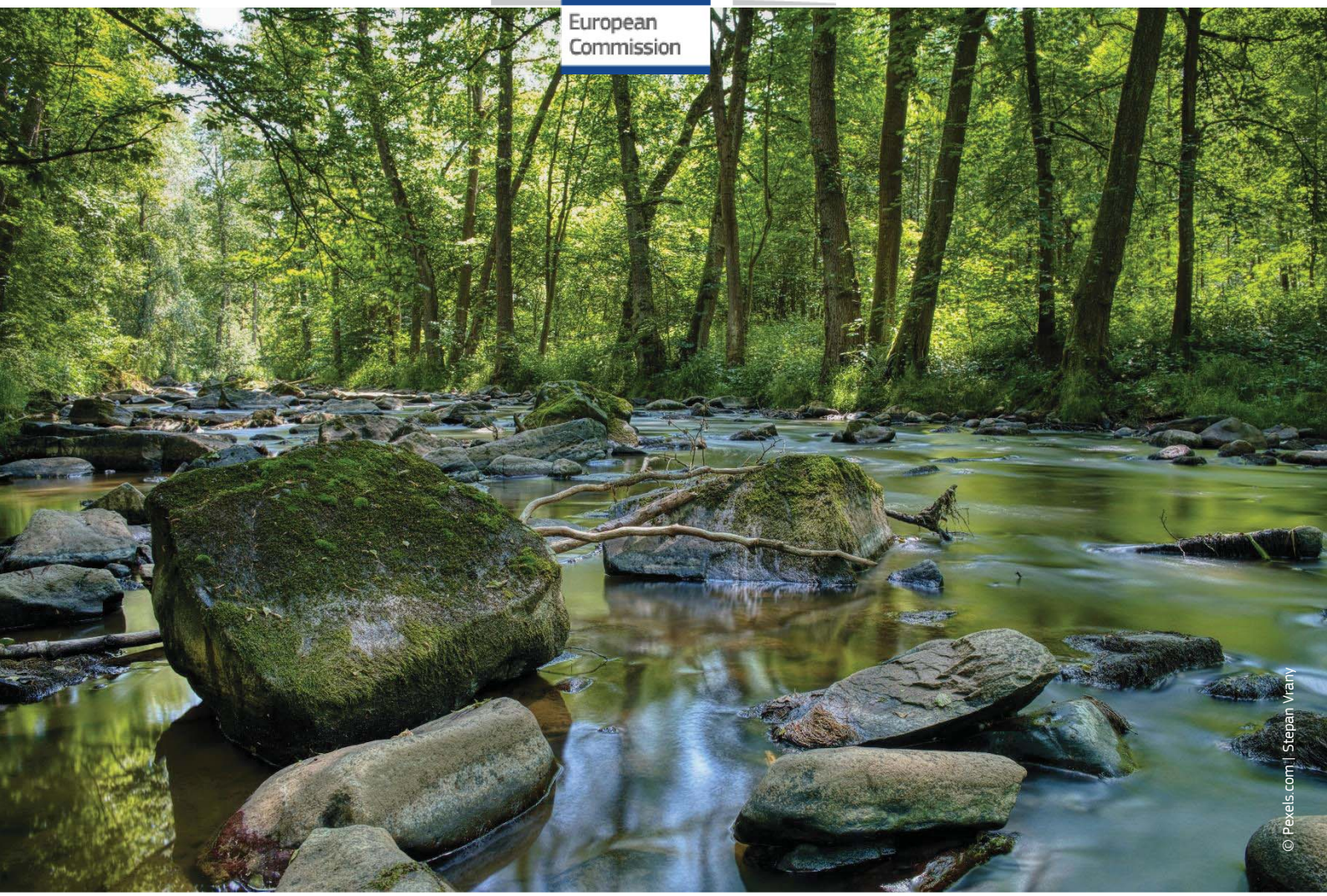
REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

on the implementation of the Water Framework Directive (2000/60/EC) and the Floods Directive (2007/60/EC)

Third River Basin Management Plans
Second Flood Risk Management Plans

{COM(2025) 2 final} - {SWD(2025) 13 final} - {SWD(2025) 14 final} - {SWD(2025) 15 final} - {SWD(2025) 16 final} - {SWD(2025) 17 final} - {SWD(2025) 18 final} - {SWD(2025) 19 final} - {SWD(2025) 20 final} - {SWD(2025) 21 final} - {SWD(2025) 23 final} - {SWD(2025) 24 final} - {SWD(2025) 25 final} - {SWD(2025) 26 final} - {SWD(2025) 27 final} - {SWD(2025) 28 final} - {SWD(2025) 29 final} - {SWD(2025) 30 final} - {SWD(2025) 31 final} - {SWD(2025) 32 final} - {SWD(2025) 33 final} - {SWD(2025) 34 final} - {SWD(2025) 35 final}

European Commission



Country specific staff working document

Sweden

ENVIRONMENT

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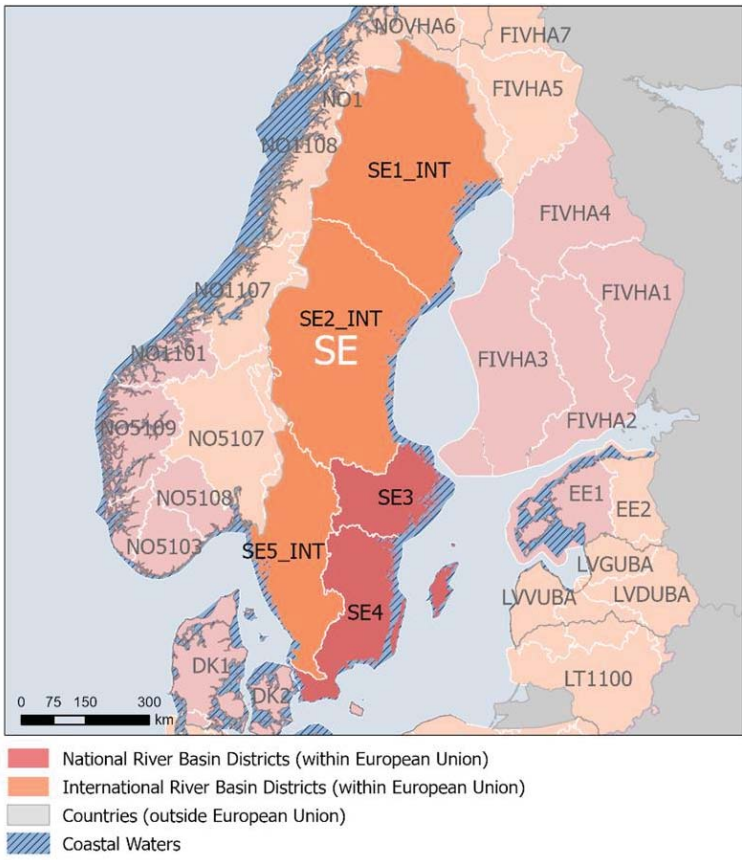
Content

SECTION A:

WATER FRAMEWORK DIRECTIVE

1. General info, member state characterisation

Sweden is one of the largest EU countries (447 thousand square kilometres)[1] with long coastline and thousands of lakes and rivers. Two third of its surface is covered by forests. The largest proportion of the 10.5 million inhabitants[2] is living in the south and this area has numerous economic activities such as industry and agriculture compared to the north. The coverage of utilised agricultural area is almost 3 million hectares (6.6% of total area)[3] out of which circa 20% is used for organic farming[4].



Sweden is the EU Member State with the second highest amount of renewable freshwater resources up to almost 200 000 million cubic metres annually[5]. Sweden has five large river basin districts out of which two are merely national and three are transboundary. But one of the most notable features in the country is the large number of water bodies, namely 3 704 groundwater bodies and 23 813 surface water bodies. Groundwater bodies are typically post-glacial small and confined aquifers which are limited in depth[6]. Sweden is a country very rich in inland waters with numbers reaching 7 454 lake water bodies and 15 695 river water bodies. There are also 654 coastal and 19 territorial

[1] Eurostat – Area by NUTS 3 region: https://ec.europa.eu/eurostat/databrowser/bookmark/fabcfca6-4abb-4a84-ac1c-7bb335af436a?lang=en
[2] Eurostat – Population change – Demographic balance and crude rates at national level: https://ec.europa.eu/eurostat/databrowser/view/DEMO_GIND__custom_7127262/default/table
[3] Eurostat - Utilised agricultural area in 2022: https://ec.europa.eu/eurostat/databrowser/view/tag00025/default/table
[4] Eurostat - Developments in organic farming in 2021: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Developments_in_organic_farming
[5] Eurostat – Water statistics: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Water_statistics
[6] Fredén CE. 2002. The Swedish national atlas - Geology.

water bodies, comprising eastern parts of the North Sea and subsequently western parts of the Baltic Sea which is roughly divided into the Baltic Proper in the south and the Gulf of Bothnia in the north.

Given Sweden's population number and distribution, the level of human intervention in the water system is limited which explains that for lakes and rivers, only 2.9% and 0.2% are heavily modified and artificial water bodies, respectively. On the other hand, the role of hydropower in the energy mix is important resulting to significant hydromorphological pressures on waters where it exists.

Sweden is a top performer on many of the UN's Sustainable Development Goals (SDGs): for instance, Sweden's green transition is relatively well advanced with the lowest greenhouse gas emissions per capita, as most of the electricity supply comes from hydropower and nuclear energy, along with a growing contribution from wind power. However, it seems that the Swedish government spends a lower proportion of its expenditure on environmental protection than the average for the EU[7].

The household water use has steadily been decreasing compared to the 1990 and counting 132 litres / inhabitant / day in 2020[8].

Reporting

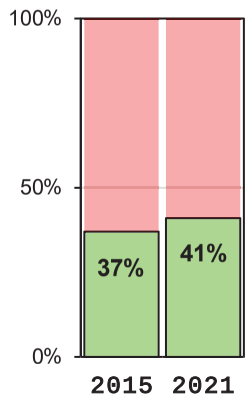
The deadline for reporting the 3rd RBMPs was in March 2022. The Commission and the EEA together with Member States developed an electronic reporting system in WISE (Water Information System for Europe). Its use was voluntary. Some Member States used it to fulfil their obligations, others reported the plans in pdf format. The cut-off date for the WISE e-reporting was September 2023 and the MS were assessed based on the datasets available by this date.

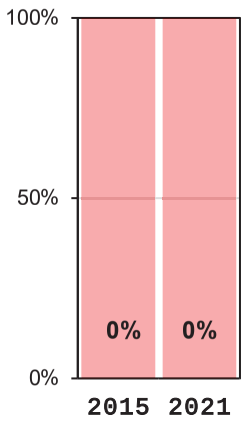
By September 2023, Sweden has not submitted full electronic reporting. Therefore, the assessment is mainly based on the data mining of the pdf RBMPs.

Despite the cut off dates for the production of this report, reporting continued, and, for the State of Water report, the EEA aggregated the results available by July 2024 in their products and dashboards available at WISE Freshwater web portal.

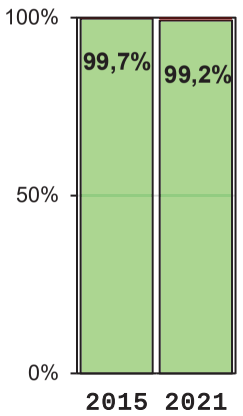
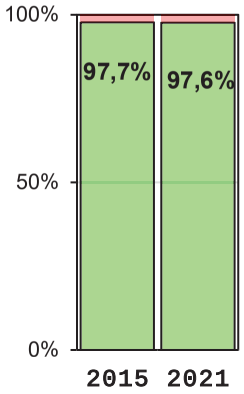
[7] European Commission – 2022 European Semester, Country reports - Sweden: https://commission.europa.eu/publications/2022-european-semester-country-reports_en
[8] Eurostat – Water statistics: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Water_statistics

Changes in Status, Pressures, Exemptions & Measures

Surface Water Bodies	Trend (% good status/potential)	Main Pressures & Changes & Exemptions
The total number of SWBs has increased by 8% since the 2nd RBMPs, from 21 987 to 23 813.		
ECOLOGICAL STATUS		The monitoring extent has reduced, so that now only 21% of SWBs are monitored to assess ecological status, and especially rivers are insufficiently covered. Despite of improvement of status, 59% of SWBs fail to achieve good ecological status / potential. Especially coastal water bodies are under pressure, with 79% in less than good. Furthermore, only 2% of HMWBs and AWBs are in good ecological potential. By 2027, less than 50% of SWBs are expected to be in good ecological status. For ecological status / potential, Article 4(4) was applied to 13 607 (57%) SWBs and Article 4(5) to 588 SWBs (2.3%). Article 4(7) was applied to 3 SWBs.

CHEMICAL STATUS		In total 9% of the water bodies (2 151) are monitored for chemical status covering all three matrices: water, sediments, and biota. Nevertheless, all 45 priority substances are monitored with a network set at a risk-based approach. Sweden expects 100% of SWBs to fail good chemical status in 2027, which has been the case since the first RBMPs. The graph shows chemical status including ubiquitous substances. When excluding Mercury and PBDE, 96% to 99% of SWBs are in good chemical status. Exemptions under Article 4(4) have been applied to 3.6% of SWBs, and under 4(5) to all SWBs with the justification of "technical infeasibility" of measures against the uPBT pollution.

Ground Water Bodies	Trend (% good status/potential)	Main Pressures & Changes & Exemptions
The number of groundwater bodies has increased by 12% since the 2nd RBMPs from 3 311 to 3 704.		

QUANTITATIVE STATUS		The number of GWBs in less than good quantitative status has increased by 19 and totalling 28 GWBs (0.8%). Subsequently, 115 GWBs are at risk failing to achieve good quantitative status. Parallelly, the total number of GWBs has increased by 12%, due to redelineation which provides better information. Furthermore, 3.1% of GWBs are at risk of failing to achieve good quantitative status by 2027. Exemptions under the Article 4(4) have been applied to 0.9% of GWBs for quantitative status, and Article 4(7) to two GWBs. Exemptions under the Article 4(5) have not been applied.
CHEMICAL STATUS		The chemical status of 44 GWBs has fallen from good to poor. Currently, 3 615 out of 3 704 GWBs (97.6%) are in good chemical status and 89 GWBs (2.4%) are in poor chemical status. Furthermore, 150 GWBs (4%) are at risk of failing to remain in good chemical status by 2027. Exemptions are applied under Article 4(4) to 3.7% of GWBs for chemical status. Exemptions under the Article 4(5) have not been applied.

2. Horizontal aspects

2.1 Governance

Sweden has organised the implementation of the Water Framework Directive (WFD) through different layers of management: the main implementation is executed by five River Basin District (RBD) Authorities and 21 County Administrative Boards. In addition, the Swedish Agency for Marine and Water Management is issuing regulations and preparing national guidance. The River Basin Management Plans (RBMPs) describe in more detail the role of all relevant Swedish authorities.

Sweden has five large River Basin Districts (RBDs) from which two are merely national: North Baltic RBD (SE3), South Baltic RBD (SE4); and three are transboundary: Bothnian Bay RBD (SE1) (shared with Finland and Norway), Bothnian Sea RBD (SE2) (shared only with Norway) and Skagerrak and Kattegat RBD (SE5) (shared only with Norway). Additionally, in the mountainous area bounded to Norway, five small RBDs including 30 catchment areas are shared between these two countries, most of them having only a small part in the upstream country. These RBDs are managed by the competent authorities of the nearby large RBDs (see more detail in Table 2).

There is an international agreement and a permanent cooperation body set up for the Bothnian Bay (SE1) with Finland and Norway. The only cooperation on joint Programme of Measures is conducted for the Torne River catchment area (part of the Bothnian Bay RBD, SE1). For other RBDs, Sweden and Norway have jointly developed a strategy for implementing the WFD. Furthermore, Sweden is a contracting party of the Cooperation for the Protection of the Marine Environment of the Baltic Sea (HELCOM)[9].

The timetable, work programme, consultation plan, overview of significant water management issues and the draft RBMPs were subject to public consultation for six months. Approximately 800 entities submitted their comments during the consultation period. Sweden also exploited water councils and advisory groups to promote active involvement of stakeholder groups.

A total of five RBMPs for Sweden (Bothnian Bay, Bothnian Sea, North Baltic, South Baltic, Skagerrak, and Kattegat) were adopted in August 2022 and submitted to the Commission in September 2022. The reporting was delayed by 5 months compared to the provisions of the WFD and the electronic reporting was accomplished in May 2024.

In the 3rd RBMPs, the Programmes of Measures (PoMs) are coordinated with PoMs of the Marine Strategy Framework Directive (MSFD) as well as the Flood Risk Management Plans. No information is provided on cooperation in the consultation of the three directives.

2.2 Characterization of River Basin District

Sweden has delineated a very large number of water bodies (Table 2): 23 813 surface water bodies and 3 704 groundwater bodies (7 types). The surface waters include lakes (27 types), rivers (22 types), and coastal waters (25 types), while there are no transitional waters. As the WFD requires Member States to set reference conditions to different types (type-specific reference conditions), Sweden uses a different approach, namely an object-specific reference condition. In this approach, the reference conditions are set for individual water bodies and not for the whole type of waters which provide more accurate and water body specific reference. According to the latest update of

[9] Cooperation for the protection of the marine environment of the Baltic Sea: https://helcom.fi/

intercalibration exercise in 2024[10], there are no known gaps in the intercalibration exercise for Sweden.

Table 1. Overview of Sweden's River Basin Districts (RBDs)

RBD	Name	Size (km²)	Countries sharing RBD
SE1	Bothnian Bay (Bottenviken)	120 900 (128 100)	FI, NO
SE1T0	Bothnian Bay (international catchment area Torne River) (managed as part of SE1)	25 420 (25 500)	FI, NO
SE2	Bothnian Sea (Bottenhavet)	140 200 (145 200)	NO
SE3	North Baltic Sea (Norra Östersjön)	36 980 (44 200)	-
SE4	South Baltic Sea (Södra Östersjön)	54 920 (64 980)	-
SE5	Skagerrak and Kattegat (Västerhavet)	68 580 (71 690)	NO
SE1102	Bothnian Sea (international RBD Trondelagsfylkene) (managed as part of SE2)	450	NO
SE1103	Bothnian Bay (international RBD Nordland) (managed as part of SE1)	1 319	NO
SE1104	Bothnian Bay (international RBD Troms) (managed as part of SE1)	192	NO
SE5101	Skagerrak and Kattegat (international RBD Glomma) (managed as part of SE2 and SE5)	992	NO

Note: For the size of the RBD area, the surface area including coastal waters is indicated in brackets.

Source: WISE electronic reporting

Table 2. Number of river and lake water bodies, transitional and coastal water bodies, and groundwater bodies.

RBD Index	Rivers	Lakes	Coastal Waters	Territorial Waters	Groundwater Bodies
SE1	4 904	1 997	113	-	783
SE1T0	-	442	10	-	-
SE2	6 962	3 690	85	-	976

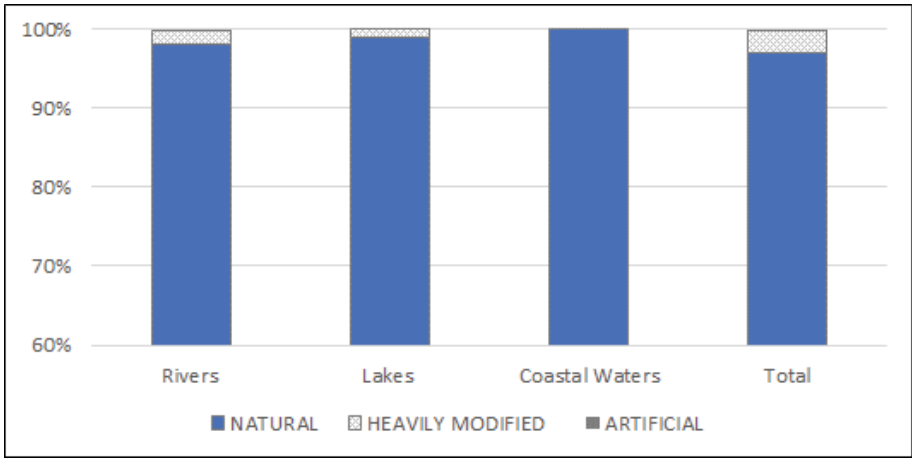
[10] Intercalibration gaps, update March 2024: https://circabc.europa.eu/ui/group/9ab5926d-bed4-4322-9aa7-9964bbe8312d/library/588d243a-a12f-4d1f-9bf5-f5e31d352f37/details

SE3	731	428	167	-	642
SE4	1 189	506	178	-	702
SE5	1 909	833	111	-	598
SE1102	-	-	-	-	-
SE1103	-	-	-	-	-
SE1104	-	-	-	-	-
SE5101	32	23	0	-	3
Total	15 727	7 919	664	19	3 704

Source: Data mining of the 3rd RBMPs

As mentioned earlier, the level of human intervention on hydromorphological conditions seems quite limited as the numbers of heavily modified and artificial water bodies are 2.9% of total water bodies (668 water bodies) and 0.2% (38 water bodies), respectively (Figure 1). Sweden has not designated any heavily modified or artificial coastal waters.

Figure 1. The proportion of natural, heavily modified, and artificial water bodies by water category and total.



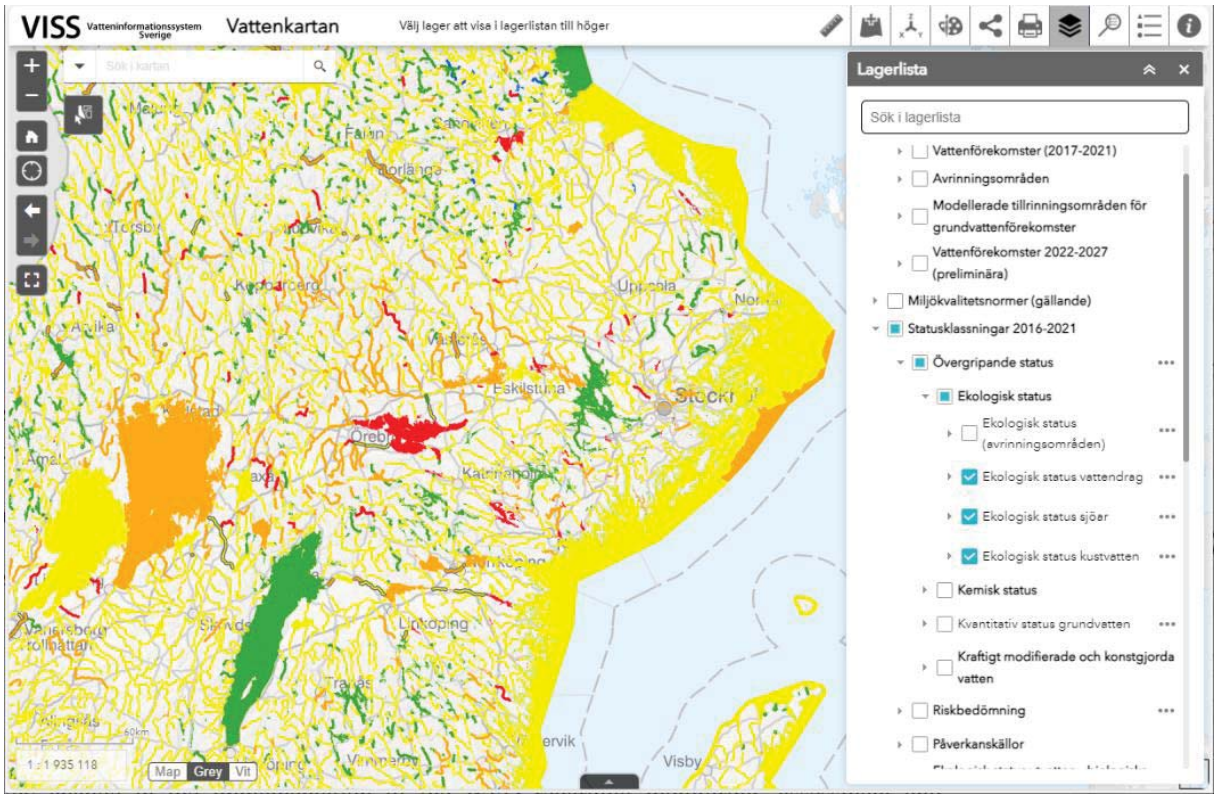
Source: Data mining of the 3rd RBMPs

In the 3rd RBMPs, the total water use is estimated around 2 400 million cubic metres, with industry being the major user (74%), followed by households and services (23%) and agriculture (3%).

Sweden provides well-advanced information of its water bodies.

The Water Information System of Sweden (VISS[11]) is a well-advanced map-based system providing all assessments at water body level and data related to the implementation of the Water Framework Directive. This system is a window to the information which can be used by public and experts. Figure 2 shows a screenshot of the 'Vattenkartan' (Water map) in VISS.

Figure 2. The Water Information System of Sweden (VISS) provides a variety of data for public and experts (screenshot of the Water Map).



Source: VISS Water Information System of Sweden

Pressures on surface waters

Significant impacts on surface waters are eutrophication from nutrient pollution, physical changes in the water bodies, as well as impacts from chemical pollution and acidification. The main pressures are atmospheric deposition, dams and other barriers, agriculture, industry, transport, and forestry. One of the main pressures on inland surface waters is caused by hydromorphological alteration very largely caused by hydropower production and water regulation as well as mill dams, remnants of timber rafting, canals, and bridges. Changes in the morphology, e.g., straightening and deepening of rivers, can cause changes in flow velocity and thus in the hydrological conditions. Regarding coastal waters, the activities altering morphology are waterborne transport and recreational boating.

Hydropower is currently Sweden's largest source of renewable energy and accounts for approximately 45% of Swedish electricity generation on an average water year[12]. The main river basins for hydropower are Luleälven, Indalsälven, and Umeälven[13]. According to the Swedish Agency of Marine and Water Management, hydropower is the most extensive pressure on lake and river water bodies

[11] Water Information System of Sweden: https://viss.lansstyrelsen.se/
[12] Energimyndigheten – Vattenkraft: https://www.energimyndigheten.se/energisystem-och-analys/elproduktion/vattenkraft/
[13] Info om Svensk vattenkraft: https://vattenkraft.info/?page=5

in Sweden[14]. Almost 4 000 river water bodies and 1 000 lake water bodies are affected by water regulation or lack of connectivity.

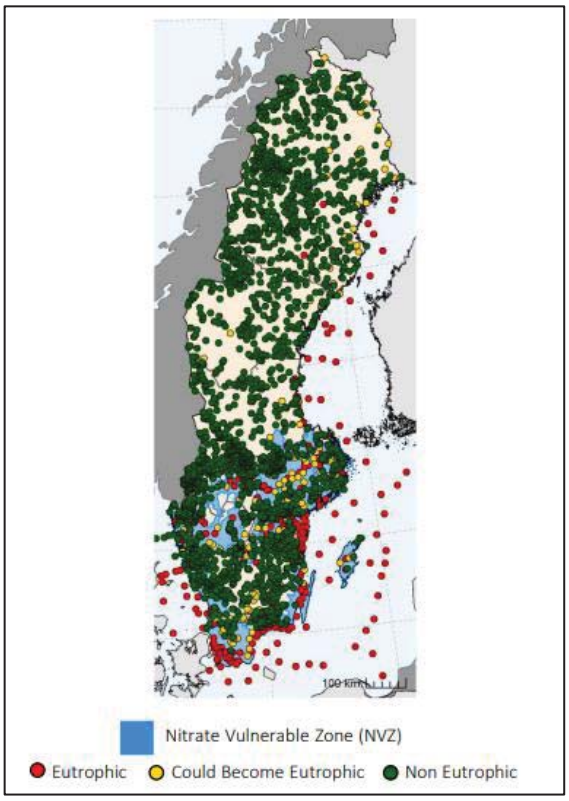
Agriculture affects the aquatic environment through, among others, nutrient leakage, and pesticide use. Sweden has identified agriculture as a major sector for the diffuse loads of nutrients on surface water bodies in all its river basin districts. In lakes and rivers, agriculture accounts for 28-37% of total nutrient load; and in coastal waters, the share of agriculture is 18-35% of total nutrient load. The excess of nutrients leads to eutrophication causing proliferation of algae blooms and oxygen depletion in both lakes and coastal waters. Problematic oxygen depletions in the Baltic Sea can be observed especially at the coast of Sweden[15].

Other sectors with diffuse nutrient pollution on surface waters can be traced to industry, traffic, and wastewater from households. Wastewater treatment plants and landfills are important point sources of chemical (including nutrient) pollution. According to the latest reporting under the Urban Waste Water Treatment Directive[16], 97% of wastewater is treated and the cleaning is completely based on biological treatment with nitrogen and phosphorus removal. Sweden has made a progress in reduction of nutrients from urban wastewater treatment plants since 2000, especially for nitrogen which is amounting for a reduction of more than 4 000 tonnes per year from 2000 to 2020[17].

The excess of nutrients discharged into the surface waters leads to eutrophication causing proliferation of algae blooms and oxygen depletion in both lakes and coastal waters. Under the Nitrates Directive reporting, Sweden indicated that many monitoring points at coastal and marine areas show surface waters as eutrophic (Figure 3).

[14] Swedish Agency for Marine and Water Management - Towards sustainable hydropower in Sweden: https://www.havochvatten.se/en/eu-and-international/towards-sustainable-hydropower-in-sweden.html
[15] Article by Swedish Meteorological and Hydrological Institute 'Den extrema syrebristen i Östersjön fortsätter': https://www.smhi.se/nyhetsarkiv/den-extrema-syrebristen-i-ostersjon-fortsatter-1.169650
[16] WISE – country profiles on urban waste water treatment – Sweden: https://water.europa.eu/freshwater/countries/uwwt/sweden
[17] Swedish Environmental Protection Agency: Wastewater treatment in Sweden 2020: https://www.naturvardsverket.se/4acbd4/globalassets/media/publikationer-pdf/8800/978-91-620-8896-5.pdf

Figure 3. Map of the monitoring points showing eutrophication assessment in Sweden, according to the reporting of the Nitrates Directive.[18]



According to the reporting, regarding other chemicals than the nutrients, Sweden recognises emissions of chemical substances into surface waters without knowledge of the source and no further reasons can be found.

Subsequently, the pressure of invasive alien species (IAS) on waters has not been assessed. In total, there are 42 aquatic species of EU concern in Sweden[19]. While Sweden introduces a national catalogue of measures to combat terrestrial IAS, a corresponding catalogue for aquatic IAS is currently lacking, despite the fact that a large proportion of invasive species are aquatic. The RBMPs call for national measures to eradicate or to manage the IAS of marine and freshwater environments in long term.

Pressures on groundwaters

Significant impacts on groundwater emanate from chemical pollution (notably chloride and sulphate), nutrient pollution, pesticides from agriculture, and changed groundwater levels.

Water abstraction is not identified as a significant pressure at the national or RBD level or even in a significant part of any RBD. However, there is a growing concern nationwide on the availability of water resources for drinking water supply during periods of droughts.

[18] NITRATES DIRECTIVE - Reporting Period 7 (2016-2019) – trophic status: https://water.jrc.ec.europa.eu/portal/apps/dashboards/cb6034c2a75e4df282f8a62f90c16caa

[19] EASIN - European Alien Species Information Network: https://easin.jrc.ec.europa.eu/easin/

3. Policy elements contributing to biodiversity and climate change adaptation

3.1 Surface Water: what is their ecological status or potential

Monitoring

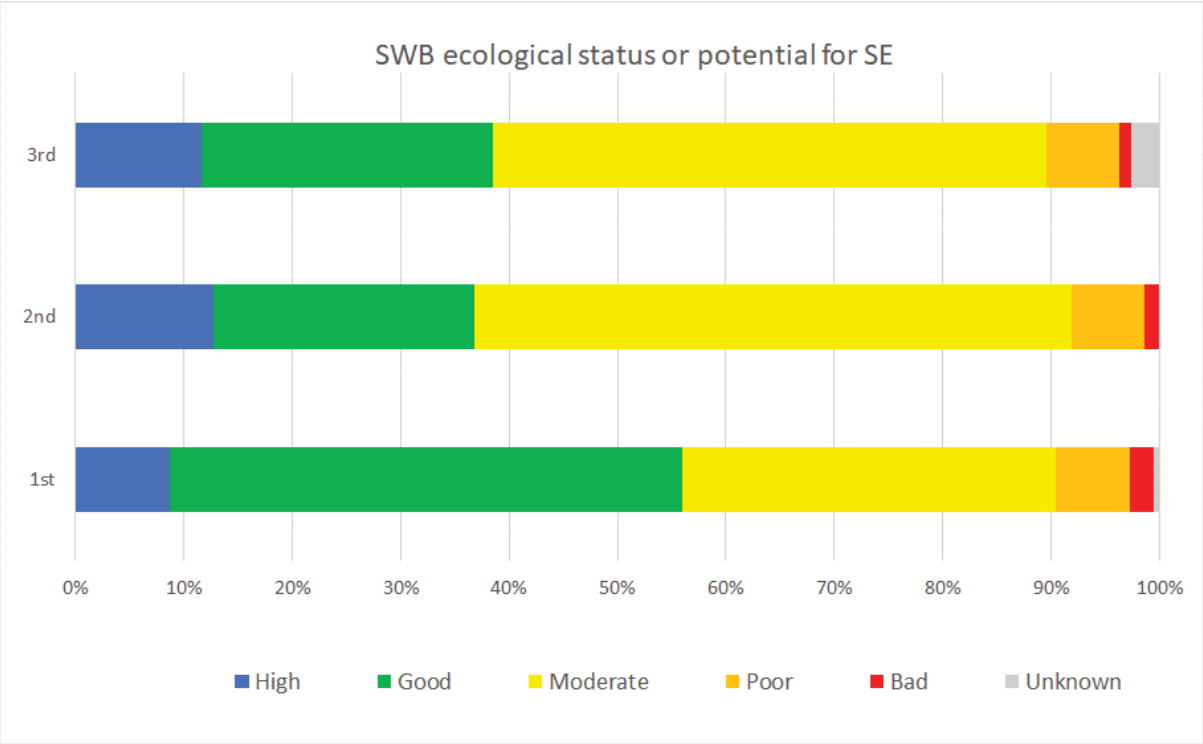
The monitoring of water bodies is carried out by national and regional authorities, municipalities, and private organisations. The ecological status / potential including biological, physico-chemical and hydromorphological quality elements, as well as river basin specific pollutants are monitored in 21% of the surface water bodies (for lakes 25%, for rivers 17% and for coastal waters 57%) in the surveillance and operational monitoring[20]. None of the coastal water bodies, lake water bodies and river water bodies included in surveillance monitoring are monitored for all required biological, hydromorphological or physico-chemical quality elements. A grouping methodology has been used where waters have the same natural conditions and the same impact profile, both in inland waters and in coastal waters. The RBMPs do not provide aggregated data on the coverage of each monitored quality element, nor their monitoring frequencies. They are also not describing the methodologies used to assess the ecological status. Nevertheless, the VISS[11] service gives information on location of monitoring sites, as well as the measured parameters and their frequencies for each site.

Status assessment

The trends observed show a nuanced picture. A very slight improvement in the status of water bodies can be observed as the proportion of water between the current and previous status assessment. Figure 4 shows, in overall, 59% of (14 032) the surface water bodies are not in good or better ecological status or potential. The available data show that the water bodies with unknown status has increased without clear reason.

[20] There are two types of monitoring: i) operational monitoring to determine the status and which covers all water bodies at risk and ii) surveillance monitoring aimed rather at identifying impacts and long-term changes.

Figure 4. Ecological status or potential of surface water bodies (SWBs) in Sweden in the 1st, 2nd, and 3rd RBMPs.



Source: WISE electronic reporting

When examining the data spatially, the status of waters is much better in the north than in the south of the country. This difference is most likely linked to the higher density of population (largely concentrated in the southern cities of Stockholm, Goteborg, and Malmö) and large number of pressures in the South. Regarding water categories, lakes are doing better with the highest proportion in good or better ecological status / potential, namely 51.5%. For rivers, the proportion of water bodies in good or better ecological status or potential is 33%. On the contrary, almost 80% of coastal water bodies are not in good ecological status.

Against this background, Sweden only expects a modest improvement of the status of the water bodies by 2027; indeed, it expects to improve good ecological status/potential from 41% to still less than 50% of all surface water bodies. Section 5.1 illustrates how Sweden makes use of exemptions in those water bodies which are not achieving good ecological or chemical status.

To bring about achieving good ecological status, the RBMPs indicate that the annual nutrient emissions should reduce by 688 tons of phosphorus and 4 770 tons of nitrogen from all sectors. The RBMPs do not seem to include a similar distance to target estimation for the hydromorphological impacts on surface waters resulting from dams, barriers, and locks.

3.2 Hydromorphological changes and artificialization (HMWBs and AWBs)

As mentioned earlier, compared to the total number of water bodies, the proportion of heavily modified and artificial water bodies is relatively small in Sweden: 2.9% and 0.2% are heavily modified and artificial water bodies, respectively. In lakes, there are 265 heavily modified water bodies (HMWBs) and two artificial water bodies (AWBs). In rivers, there are 403 HMWBs and 36 AWBs. All coastal water bodies are natural. Spatially, the heavily modified water bodies are mostly located in the northern parts of the country comprising most of the large rivers which are flowing from the

mountains to the sea. Hydropower production is the main activity which is leading to the designation of water bodies as heavily modified.

Sweden has used the mitigation measures method for defining good ecological potential (GEP)[21]. Regrettably, according to VISS[11], only ten HMWBs are in good ecological potential (1.5% of all HMWBs). This means that 98.5% of HMWBs are in less than good ecological potential as follows: 17 in moderate, 623 in poor and 18 in bad ecological potential. The artificial water bodies are mostly in moderate ecological potential (29 out of 38 AWBs) and only 4 are in good ecological potential. It is not clear, whether this is the result of low improvement in measures to tackle nutrient pollution or insufficient progress in measures to tackle the hydromorphological pressures, or both.

All in all, it can be concluded that the anthropogenic intervention on hydromorphological conditions of the very numerous water bodies is limited; however, the physical changes consider most of the largest rivers and where they occur, the changes are quite acute and deteriorate considerably the ecological potential of those water bodies. On the other hand, the updated national guidance on heavily modified water bodies and ecological potential[22] is expected to increase the number of HMWBs in the 4th RBMPs, allowing Sweden to emphasize more water uses and set lower objectives to the quality elements which are sensitive to impacts caused by these uses. Moreover, Sweden has introduced a proposal to amend the Swedish Environmental Code and the regulations related to it to ease the designation of water bodies as heavily modified and might affect setting reference conditions to heavily modified water bodies.[23]

3.3 Groundwater bodies - have they sufficient water – quantitative status

Due to a change in delineation methodology, the total number of groundwater bodies (GWBs) has increased by 12% from 3 311 in the 2nd RBMPs to 3 704 in the 3rd RBMPs.

Monitoring

It is positively noted that compared to the 2nd RBMPs, Sweden has improved its monitoring and its overall knowledge of the quantitative status. However, it remains that only 59 (1.6% of) groundwater bodies are monitored. Of particular concern is the fact that, according to VISS[11], there seems to be no quantitative monitoring for several GWBs which are in poor quantitative status. For instance, the Island Gotland has no quantitative monitoring while the island features many groundwater bodies in poor quantitative status. It is not clear how Sweden has assessed the quantitative status of groundwater bodies without monitoring.

Status assessment

As depicted in Figure 5, most of groundwater bodies in Sweden are in good quantitative status. Up to 99.2% (3 676) of groundwater bodies are in good quantitative status. However, punctual challenges exist, and 28 groundwater bodies are not meeting the objective of good quantitative status and further 115 groundwater bodies are at risk failing to achieve good quantitative status in 2027. These 28 groundwater bodies are all showing decreasing water levels in a longer-term

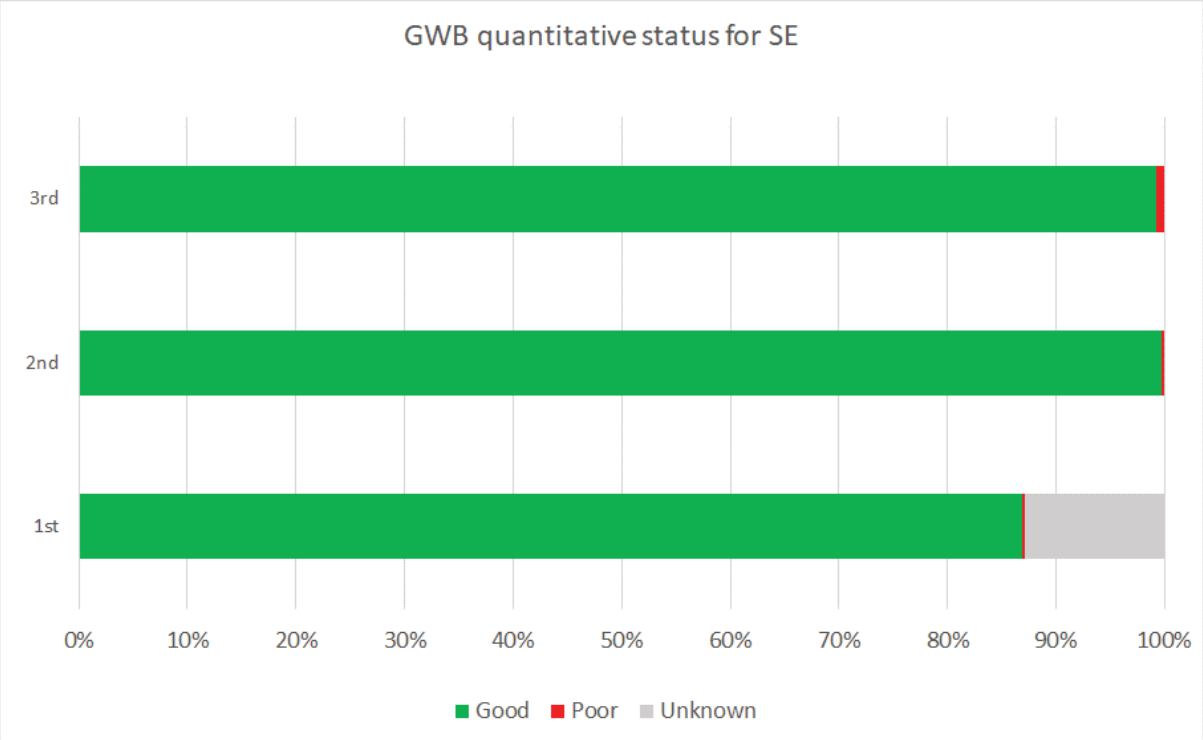
[21] The definition of GEP can be derived by the reference method or by the mitigation measures method. More detail is provided in the CIS Guidance 37: https://circabc.europa.eu/ui/group/9ab5926d-bed4-4322-9aa7-9964bbe8312d/library/e6036f6b-b277-4b0f-9ca3-861b4d1262a9/details

[22] Vägledning om kraftigt modifierat vatten (KMV) och ekologisk potential (7 December 2023): https://www.havochvatten.se/download/18.3d94dcba18c294cbf7e52f83/1702304330802/Vagledning-kraftigt-modifierat-vatten-ekologisk-potential.pdf

[23] Press release - Förutsättningarna för vattenkraftens omprövning förbättras: https://www.regeringen.se/pressmeddelanden/2024/08/forutsattningarna-for-vattenkraftens-omprovning-forbattras2/

perspective. 17 of these 28 failing groundwater bodies also have salt intrusion, which is signalling over-abstraction. 3 of the 28 failing groundwater bodies are failing because of damage in dependent terrestrial ecosystems.

Figure 5. Quantitative status of groundwater bodies (GWBs) in Sweden in the 1st, 2nd, and 3rd RBMPs.



Source: Data mining of the 3rd RBMPs

The main pressures on groundwater quantity are caused by major abstractions and for some groundwaters also by quarries with excavation below the groundwater surface[24]. In 2016-2020, the average annual abstraction from groundwater is 383 million cubic metres, from which half is for public water supply and one fifth for private households, followed by mining and quarrying (13%), agriculture (10%), and manufacturing (6%)[25]. There has been a slight increase in total abstraction (6%); and despite having a small proportion, abstraction for manufacturing has almost doubled from 16 million cubic metres in 2016 to 27 million cubic metres in 2020. For one groundwater body, Sweden reports in VISS that there are large numbers of unlicensed irrigation abstractions within the prevalence[26]. Furthermore, the strong abstractions near the coast are causing saline intrusion in the groundwaters signing of over-abstraction, and also having an influence on the qualitative status. Additionally, urban expansion in some regions leads to the risk of impeded infiltration causing lower groundwater levels.

[24] An example from the VISS, the groundwater body Mellersta Gotland – Roma: https://viss.lansstyrelsen.se/Waters.aspx?waterMSCD=WA96690582

[25] Eurostat - Annual freshwater abstraction by source and sector (not considering leakages or evaporation from the surfaces of reservoirs and canals after abstraction): https://ec.europa.eu/eurostat/databrowser/bookmark/6b68c4a2-a2f9-499d-af2c-6625c2d8d657?lang=en

[26] The groundwater body Bjäre: https://viss.lansstyrelsen.se/Waters.aspx?waterMSCD=WA90181504

3.4 Protected Areas (identification, monitoring, objectives and measures)

Sweden has more than 4 100 Natura 2000 areas and additionally over 27 000 protected areas designated by national laws[27]. All in all, 15% of land and 15% of marine waters are covered by protected areas. However, the proportion of protected species and protected habitats in bad or poor conservation status is high; namely 51% in bad and 77% in poor status.

There are several reasons why certain water bodies are protected under the EU legislation. For surface water bodies, protected areas have been designated under the Drinking Water, Bathing Water, Habitats and Birds Directives as well as for areas designated for the protection of economically significant aquatic species (i.e. aquaculture). Additionally, Nitrates Vulnerable Zones and Nitrates Sensitive Areas are designated under the Nitrates Directive and the Urban Waste Water Treatment Directive, respectively. For groundwaters, protected areas are designated under the Drinking Water and the Habitats and Birds Directives.

Sweden has identified all types of protected areas which are associated with surface waters and groundwaters (Table 3). It is positively deemed that the overall number of protected areas has increased compared to 2nd RBMPs, except for bathing areas, which has decreased.

Positively noted, additional objectives have been identified and reported in the 3rd RBMPs for Natura 2000 sites, for areas designated for the protection of economically significant aquatic species, and for drinking water areas (surface water bodies). The additional objectives are set as specific requirements that affect the Environmental Quality Standards for the Natura 2000 sites in question. Furthermore, in some RBDs, Sweden has set specific environmental quality standards for surface waters which have economically significant fish and mussel species. However, for other protected areas, no information is provided on additional objectives.

Table 3. Number of water bodies included to the protected areas listed in Annex IV to the WFD which are associated with surface and groundwaters in the 3rd RBMPs.

Protected area type	Number of Water Bodies Associated with protected areas in			
	Rivers	Lakes	Coastal	Groundwater
Drinking water zones	79	219	2	1 478
Bathing waters	5	123	92	-
Natura 2000 / Birds Directive	1 262	778	179	35
Natura 2000 / Habitats Directive	4 111	2 364	315	147

[27] Biodiversity Information System for Europe: https://biodiversity.europa.eu/countries/sweden

Nitrates Vulnerable Zones/ Nitrates Directive	1 933	807	439	1 196
Nutrient-sensitive areas / Urban Wastewater Treatment Directive	15 687	7 453	654	-
Protection of economically significant aquatic species	67	132	33*	-

*Note *: Mussel waters (shellfish) are only applicable for Skagerrak and Kattegat RBD.*

Source: Data mining of the 3rd RBMPs

As regards to measures for the protection of areas designated for the abstraction of water intended for human consumption (drinking water zones), there are administrative measures, such as supervision of abstractions as well as measures to prevent pollution and overexploitation. It is worth noting that Sweden recognises the need to strengthen the national efforts to establish more protected areas for drinking water sources. For other protected areas under the WFD, there is no information reported on measures to achieve the objectives.

3.5 What is being done to prevent/reduce hydromorphological pressures

Back to 2014, the Swedish Agency of Marine and Water Management and the National Energy Agency suggested a national strategy to balance the need of improved ecological status with the need of hydropower[28]. Legislation has since then been adopted in 2019 and Sweden has introduced a national assessment plan[29] to review the permits of hydropower plants which have a significant effect on water bodies. The review process will take place in steps, and the last reviews of permits will start at the earliest in 2039. Because the review process of permits is scheduled to take several years, Sweden does not expect improvements to hydromorphological conditions to be achieved by 2027 and evidently not even by 2040. Because of scheduling of permit reviews over long time, there is a risk that obsolete and unprofitable hydropower plants are not prioritised while prompt actions in this category might considerably improve the status of concerned waters. Furthermore, Sweden is frequently postponing the review schedule which is leading to even more delays in improvement of hydromorphological conditions of surface waters[30,31].

[28] Strategi för åtgärder inom vattenkraften: https://www.havochvatten.se/data-kartor-och-rapporter/rapporter-och-andra-publikationer/publikationer/2014-07-04-strategi-for-atgarder-inom-vattenkraften.html
[29] Nationell plan för omprövning av vattenkraft: https://www.energimyndigheten.se/fornybart/elproduktion/vattenkraft/nationell-plan-for-moderna-miljovillkor/
[30] Regeringen flyttar fram pausen av omprövningen av vattenkraftens miljötillstånd till 1 juni för vissa aktörer https://www.regeringen.se/pressmeddelanden/2024/03/regeringen-flyttar-fram-pausen-av-omprovningen-av-vattenkraftens-miljotillstand-till-1-juni-for-vissa-aktorer/
[31] Omprövning av vattenkraftverkens miljötillstånd pausas 12 månader https://www.regeringen.se/pressmeddelanden/2022/12/omprovning-av-vattenkraftverkens-miljotillstand-pausas--12-manader/

Ecological flows are considered in Sweden for achievement of environmental objectives of natural surface waters. The ecological flow is partly defined, but there are no examples of its application. This may change with the revision of the permits mentioned above.

Regarding changes in flow, Sweden introduces measures for 22% of water bodies (5 153); and regarding changes in morphology and continuity, measures are introduced for 46% of water bodies (10 881). Some specific measures include ensuring minimum flow in natural river stretches affected by hydropower, fish passes and ladders, restoration of river bed affected by straightening, and restoration of riparian area.

In terms of basic measures, there is an authorisation and / or permitting regime in place to control physical modifications according to the WFD. There is also a register of physical modifications of water bodies. According to the Swedish Environmental Code, all activities impacting hydromorphological characteristics of waters need a permit. A permit may be limited in time, but periodical review is generally not required; however, the permits can be updated through re-examination, or they can be revoked by the court.

The Programmes of Measures introduce measures which reduce flood risks and hazards, some of which are nature-based solutions. These are e.g., improving spatial planning, improving water supply and stormwater management. Nature-based measures aim at preventing and mitigating the effects of floods and include, for instance, restoration of straightened and cleaned rivers or stream beds, floodplains, and wetlands.

3.6 What Sweden is doing for abstractions and water scarcity

Although a water-rich country, Sweden is paying increasing attention to water scarcity in some of its RBDs even if water abstraction is not identified as a significant pressure in general. The current estimation of the annual Water Exploitation Index Plus (WEI+) varies between 0 and 2[32], while water scarcity is generally considered to occur when the ratio of water abstraction to long-term average available water resources exceeds 20.

In Sweden, water scarcity is identified as a significant pressure for limited number of groundwater bodies in southern parts of the country. For the Southern Baltic Sea RBD (SE4), the most affected by water shortages, a management plan[33] and programme[34] on water scarcity and droughts are available. According to the plan, ten surface water bodies (nine lake water bodies and one river water body) and 81 groundwater bodies are subject to significant pressures caused by water abstraction. Notably, some additional 36 water bodies will need a more in-depth assessment to identify potential pressures.

The average annual freshwater (surface and groundwater) abstraction in Sweden for the period of 2016-2020 amounted to 2.4 billion cubic metres of which the dominant sectors are manufacturing and public water supply with 51% and 36%, respectively[26]. Indeed, agriculture, mining and quarrying, and cooling do not exceed 5% of the annual abstraction. However, a comparison between 2020 and

[32] Water exploitation index, plus (WEI+) from 2009 to 2019: https://ec.europa.eu/eurostat/databrowser/bookmark/8e6c6e33-3a7c-4c9a-b6c7-11710a1fbba0?lang=en
[33] Delförvaltningsplan mot torka och vattenbrist 2022-2027 Södra Östersjön: https://www.vattenmyndigheterna.se/tjanster/publikationer/2022/forvaltningsplan/delforvaltningsplan-mot-torka-och-vattenbrist-2022-2027-sodra-ostersjon.html
[34] Delåtgärdsprogram mot torka och vattenbrist 2022-2027 Södra Östersjön: https://www.vattenmyndigheterna.se/tjanster/publikationer/2022/atgardsprogram/delatgardsprogram-mot-torka-och-vattenbrist-2022-2027-sodra-ostersjon.html

2016 shows a significant increase of abstraction for agriculture (+28%) as well as mining and quarrying (+18%). For other sectors, the changes in abstraction have been small.

According to Swedish Environmental Code, the authorities are obliged to control abstraction through permits which include precautionary measures and mitigation measures to reduce the environmental impact. Sweden requires an authorisation for any abstraction from surface waters and groundwaters which is higher than the usual consumption of one or two households. Furthermore, Sweden maintains a register for abstractions and impoundments, which, however, is not covering all abstractions and impoundments.

3.7 Adaptation to climate change

Sweden has set a requirement for all competent authorities to take the climate change into account within their activities. As previously mentioned, there is a management plan and programme for one RBD, including legally binding measures, such as water efficiency guidance for companies and industry; guidance for supervision of water abstraction; guidance on reducing vulnerability of agriculture and horticulture to water scarcity through water efficiency, storage and reuse; and guidance for county administrative boards to facilitate water retention measures in drained areas and old peatlands. Sweden does not introduce measures to reduce water use at catchment area scale or to prioritise water use during drought periods.

The RBMPs emphasize the importance of measures due to climate change but also highlight that more information and research are needed to better select the appropriate measures. Due to climate change, there is a risk of increased run-off of nutrients and pollutants into water and changes in flow regime, etc.

Flood management

The Floods Directive requires to consider the impacts of climate change on the occurrence of floods, and therefore in the preparation of Flood Hazard and Risk Maps (FHRMs) and Flood Risk Management Plans (FRMPs). More information on these can be found in Section B. However, considering the close relationship between overall water management and floods management and the importance of climate change on both, consideration climate change is jointly addressed in this section.

Climate change was considered in the first FHRMs, but only for fluvial floods, as coastal floods were not included. The MSB used the updated and regionalized information from the Swedish Meteorological and Hydrological Institute (SMHI). The maps on the online flood map portal show, the extent of the flooded areas for the 100-year flood for the future climate. In addition, the 200-year flood scenarios considering climate change are also included on the portal. It is also noted in the Swedish second Preliminary Flood Risk Assessment (PFRA)-report that there are two exceptions for the Torne river and the Göta river which do not have climate change projected 100-year floods. However, as of October 2023, the Torne river also appears with a 100-year flood under a future climate on the online flood portal[35]. For the 50-year floods, only today's climate is used, as it was also the case for the first FHRMs. The Swedish authorities explain that for the high probability scenario, the municipalities and the rescue services needed to have information of more frequent floods for today's climate in order to have information about the prevailing situation (such information was lacking in the previous flood inundation maps).

[35] Översvämningsportalen – Map of Haparanda along Torne River: https://gisapp.msb.se/Apps/oversvamningsportal/avancerade-kartor/hot-och-riskkartor/haparanda/tornealv/hotkartor.html

While not all five FRMPs assessed refer to Sweden's national strategy for adaptation, all refer to coordination with regional strategies (county adaptation plans). The FRMPs also note that Sweden's second FHRMs included a scenario considering climate change. The plans mention climate impacts on flooding, including flash floods related to cloudbursts and four of the five FRMPs either include cloudburst maps or refer to the development of such maps. The FRMPs assessed note that changes in the sources of flooding will be linked to sea-level rise and increased temperatures, which will lead to changed weather and rainfall patterns. The Falun FRMP explains that the calculation of future flood levels involves the combination of critical factors such as rainfall, snowmelt, high soil moisture, high water levels in lakes and reservoir filling in regulated rivers[36].

4. Policy elements contributing to zero pollution

4.1 Surface Water: what is their chemical status

Monitoring

Sweden is monitoring chemicals in all three matrices: water, sediments, and biota. The monitoring for chemical status covers 4% of river water bodies, 17% of lake water bodies and 26% of coastal water bodies. In total, only 9% of the water bodies (2 151) are monitored, out of which surveillance monitoring is covering the largest proportion by 7% of water bodies. All 45 priority substances are monitored, and the monitoring network has been set following a risk-based approach implying that not all priority substances are analysed at all monitoring sites. The status is mostly derived based on medium and low confidence in classification and it is not clear what are the reasons for that. For water bodies without monitoring, the status is assessed using grouping and extrapolation.

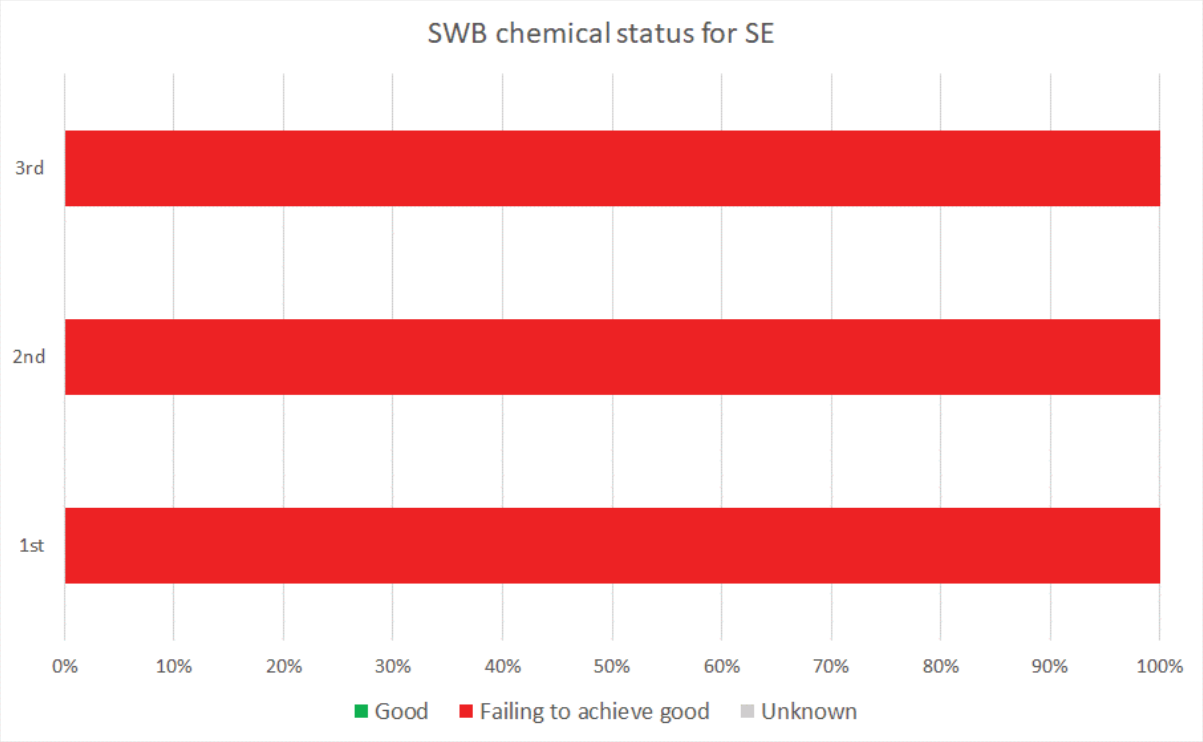
For the priority substances that tend to accumulate in sediments, all 14 substances are monitored in sediments of coastal waters (25 monitoring sites) and eight substances in sediments of inland waters (15-30 monitoring sites depending on the specific substance). Regarding monitoring of substances which accumulate in biota, i.e., fish and molluscs, 8 out of 14 substances are monitored in both coastal and inland waters (15-54 sites in coastal waters and 15-30 sites in inland waters depending on the specific substance).

Status assessment - Evolution of chemical status of surface water bodies since the 2nd RBMPs

No surface water body is in good chemical status in the 3rd RBMPs, and none is expected to be in good chemical status by 2027 (Figure 6) mainly due to two ubiquitous persistence, bioaccumulative and toxic (uPBT) chemicals: mercury and polybrominated diphenyl ethers (PBDE). The emissions of mercury and PBDE can be challenging to tackle due to long-range atmospheric transport and deposition. These two substances have a very strong and dominating effect in the status of waters. Indeed, without these two substances, a totally different picture arises with 96% to 99% of surface water bodies, depending on the river basin district, are in good chemical status. In those failing cases (1-4%), the EQS exceedances are related to perfluorooctanesulfonic acids (PFOS), Cadmium, Nickel, polyaromatic hydrocarbons (PAH) and tributyltin (TBT).

[36] SE2 Falun, Section 2.

Figure 6. Chemical status of surface water bodies (SWBs) in Sweden in the 1st, 2nd, and 3rd RBMPs

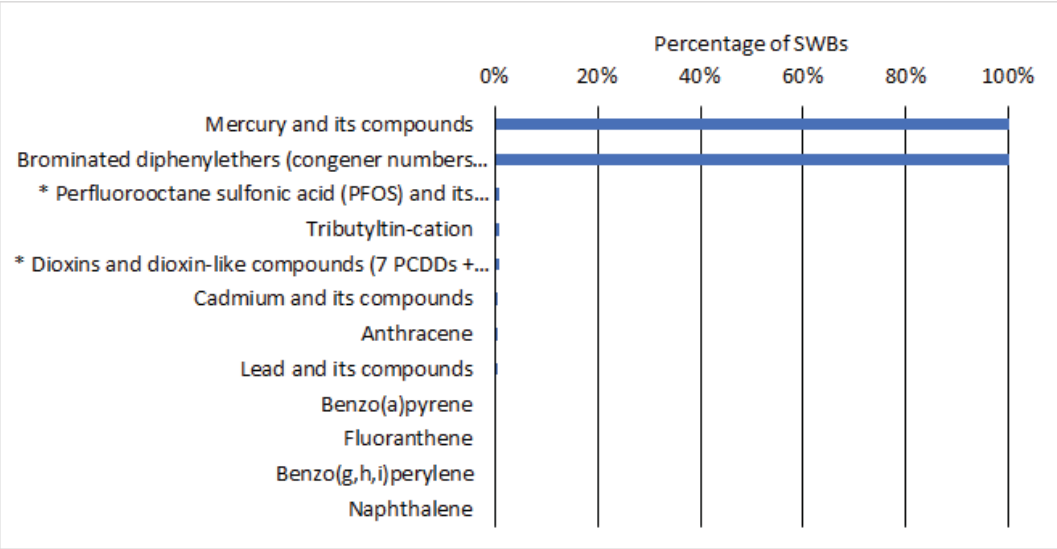


Source: WISE electronic reporting

Aspatial analysis shows that for Bothnian Bay (SE1), Bothnian Sea (SE2), and North Baltic Sea (SE3), the main substance aside from mercury and PBDEs causing exceedances of EQS is PFOS. For instance, in the Bothnian Bay RBD (SE1), PFOS is responsible for almost 70% of all failures in rivers and lakes which is significantly ahead of the next substances i.e., nickel in rivers and PAHs in lakes. For the Bothnian Bay (SE1) and Bothnian Sea (SE2) RBDs, dioxins and furans are the primary substances causing EQS failures in coastal water bodies, as PFOS is much less appearing as a substance causing failures of achieving good chemical status.

Based on electronic reporting, Figure 7 shows the proportion of surface water bodies affected by top-10 substances which are causing the failure to achieve good chemical status.

Figure 7. The top-10 Priority Substances causing failure to achieve good chemical status in surface water bodies in Sweden with addition of two new priority substances.



Note: The new priority substances according to the 2008/105/EU as amended by 2013/39/EU[37] are marked with asterisk (*).

Source: WISE electronic reporting

4.2 Groundwater Bodies: what is their chemical status

Monitoring

Alltogether, according to Annex 8 to the RBMPs, Sweden monitors 56% of groundwater bodies (1 850) for chemical status, from which 19% (639) are included in the surveillance monitoring, and for the rest, 3% of groundwater bodies (111) are included into the operational monitoring because of poor chemical status and 33% groundwater bodies (1 100) because of risk of deterioration from good to poor. According to the regulation on environmental quality standards in groundwaters[38], all substances causing risk of deterioration[39] are included in monitoring of groundwaters. The methodology for assessing chemical status of groundwaters considers in addition to the general chemical quality elements also intrusions of salts or other pollutants as well as the impact on groundwater associated aquatic ecosystems and groundwater dependent terrestrial ecosystems. There is ongoing work on assessing Natura 2000 areas and their sensitivity to be integrated in the assessment of chemical status of groundwaters.

Status assessment

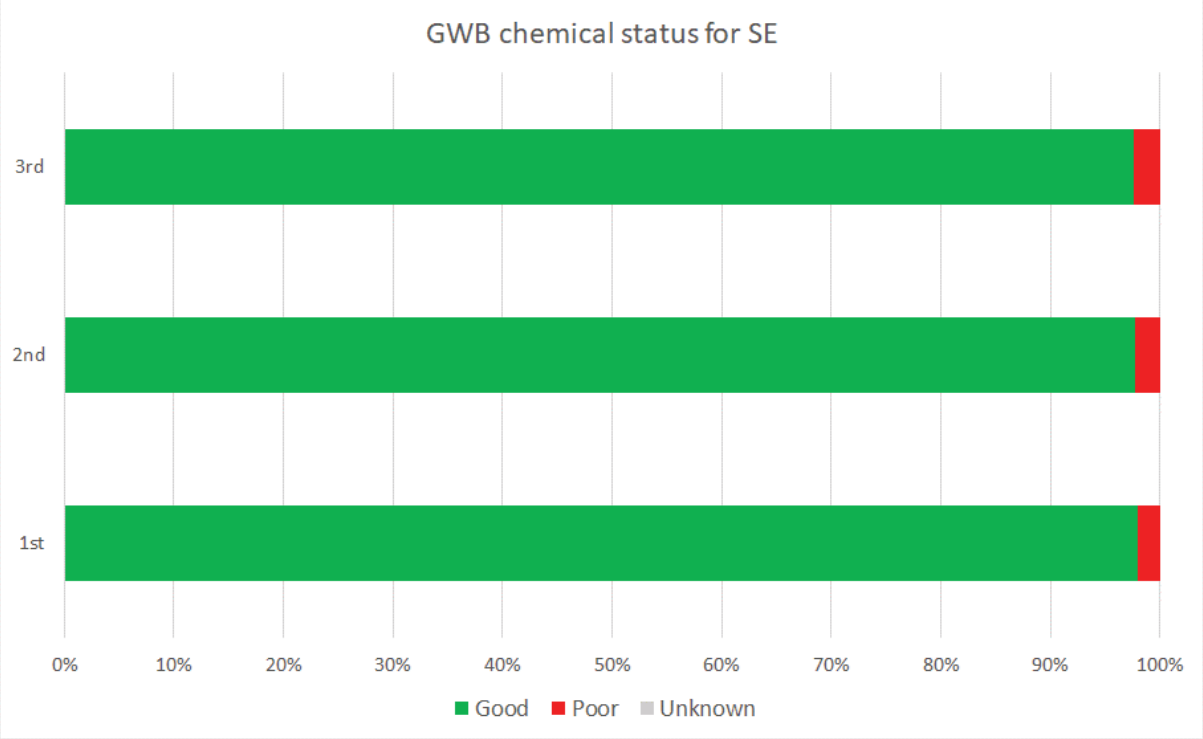
It is noted very positively that, according to the data provided, the vast majority of groundwater bodies are in good chemical status. There are only 2.4% of groundwater bodies in poor chemical status and another 4% are at risk of failing to remain in good chemical status by 2027. Spatially, no concentration of groundwaters in poor chemical status can be deemed and they are spread across Sweden. Figure 8 depicts that the development of the chemical status has been stable, and no further

[37] Directive 2008/105/EC as amended by Directive 2013/39/EU added 12 new substances i.e. numbered 34 to 45 to the priority substance list. For the 3rd RBMP, Member States have only had the obligation to monitor them. Compliance with the Environmental Quality Standard values for these 12 new priority substances will be assessed in 2027.
[38] Sveriges geologiska undersöknings föreskrifter om miljökvalitetsnormer och statusklassificering för grundvatten: https://resource.sgu.se/dokument/om-sgu/foreskrifter/sgu-fs-2013-2.pdf
[39] Substances in GWD Annex I and Annex II (Part B) and core parameters in WFD Annex V Section 2.4.2

deterioration occurs, but it can also be seen that no real progress emerges in the groundwater bodies that fail to achieve good chemical status.

There are many pollutants which are causing failure of good chemical status in groundwaters, from which the top 5 are environmental toxins, chloride, sulphate, nitrogen compounds (e.g., nitrate, nitrite, and ammonium) and phosphate. The sources of these pollutants are not explained in detail.

Figure 8. Chemical status of groundwater bodies (GWBs) in Sweden in the 1st, 2nd, and 3rd RBMPs.



Source: WISE electronic reporting

4.3 What Sweden is doing to combat pollution from agriculture

Sweden has a small share of agricultural land compared to other European countries. Agricultural land is covering only 8.8% of total surface area[40]. As already mentioned, Sweden has also a relatively high coverage of organic farming which contributes to lower nutrient discharges. Sweden has calculated that to reach good ecological status / potential by 2027, the annual nutrient load from agriculture needs to be reduced by 385 tons of phosphorus and by 1 600 tons of nitrogen. This translates to one-third reduction from total required nitrogen load reduction and over half of required phosphorus load reduction (see total reduction need in section 3.1). The planned measures to tackle pollution from agriculture are planned until 2033 but they are expected to yield only about two-third of the nutrient reduction needed to achieve good status.

For groundwaters, no information is provided regarding agricultural pollution even though the two top polluting chemicals are nitrogen and phosphorus. According to the reporting for the Nitrates Directive, the high concentrations of nitrogen in groundwater from agricultural origin are mainly

[40] Land cover and change accounts 2000-2018: https://www.eea.europa.eu/data-and-maps/dashboards/land-cover-and-change-statistics

detected in a few areas in the South of Sweden[41]. Regarding pesticides which are impacting mainly groundwaters, the substances analysed in groundwaters are banned and no longer in use.

To support measures to tackle agricultural pollution, the Swedish CAP strategic plan 2023-2027 introduces a funding of EUR 1.3 billion to support environmental and climate objectives including implementation of environment-friendly practices as well as raising awareness among farmers on these issues[42]. According to an overview of the Swedish CAP[43], the minimum requirements for farmers involve, among others, buffer strips along water bodies, increased soil cover, and crop rotation. As an example, the support of 84 000 hectares has been introduced to maintain wetlands and ponds.

In the RBMPs, Sweden indicates that it is necessary to fund the measures over two planning periods until the year 2033. This would mean that Sweden is not expecting achievement of environmental objectives of all water bodies by 2027. The agriculture sector finances 30% of the cost of measures and the rest is funded by the CAP and / or other public support. The legally binding measures in the Programme of Measures are directed to the regional authorities and municipalities which implement the measures themselves or require relevant polluters or private actors to take measures. National measures are funded by national budgets, while the municipalities fund the measures that are under their responsibilities. The measures which are carried out by the farmers are subsidised mainly through the CAP.

4.4 What Sweden is doing to combat pollution from other sectors

As regards tackling pollution from non-agricultural, diffuse pollution, both nutrients and other chemicals, can be traced to industry, mining and quarrying, transportation, and households. Wastewater treatment plants and landfills are important point sources.

Sweden introduces several measures to reduce and avoid industrial discharges; to upgrade wastewater treatment plants; to prevent and control pollution from urban areas and transport; to remediate contaminated soils; to prevent and control pollution from forestry; and to prevent acidification.

In practice, all concrete measures are implemented at a water body level, specified by the relevant authority. For example, discharge permits are subject to review and appropriate requirements are added to comply with the stricter objectives. For nutrients, Sweden has set reduction targets covering nitrogen and phosphorus for various sectors at water body level.

Since the population in some regions is quite scattered, small sewage systems and non-connected dwellings stand, depending on the river basin district, for 24-35% of the nutrient loads in inland waters and for 10-26% in coastal waters. Thus, the measures to tackle nutrient pollution are improving treatment processes and upgrading facilities. Beyond nutrients, there is no overview for individual substances causing chemical pollution, so it is not possible to assess the expected progress towards closing the gap for specific chemical substances.

[41] Nitrates concentration in groundwater, reporting for the Nitrates Directive: https://water.jrc.ec.europa.eu/portal/apps/dashboards/cb6034c2a75e4df282f8a62f90c16caa

[42] Mapping and analysis of CAP strategic plans (2023-2027): https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cmef/regulation-and-simplification/mapping-and-analysis-cap-strategic-plans_en

[43] At a glance: Sweden's CAP Strategic Plan: https://agriculture.ec.europa.eu/document/download/1704d861-9b01-4e32-9d4c-1aea53896a51_en?filename=csp-at-a-glance-sweden_en.pdf

4.5 What Sweden is doing to combat significant pressures – overall assessment of the Programmes of Measures

The 3rd RBMPs contain 57-60 measures depending on the river basin district. Most measures (86%) are the same as in the 2nd RBMPs, very few are new (13), and some have been discontinued (9). So, there is a very considerable continuity in the choices made. Some of the new introduced measures pertain to prevention of emissions of substances which are causing failure to achieve good chemical status in groundwater. Roughly half of the measures (29) constitute basic measures and the other half are supplementary measures under Article 11 WFD. Regrettably, Sweden has not made a comprehensive cost-effectiveness analysis, and prioritisation of single measures has been given to the responsibility of the local authorities.

5. Exemptions and economics

5.1 To what extent are exemptions applied in Sweden

As the good status has not been achieved in all water bodies, Sweden has applied a significant number of exemptions. Figure 9 shows the use of exemptions according to Art. 4(4) and 4(5) in Sweden and Table 4 shows in more detail the number of exempted groundwater bodies and surface water bodies. In addition to national guidelines for using exemptions[44,45], Sweden has provided detailed and comprehensive justifications of used exemptions at a water body level.

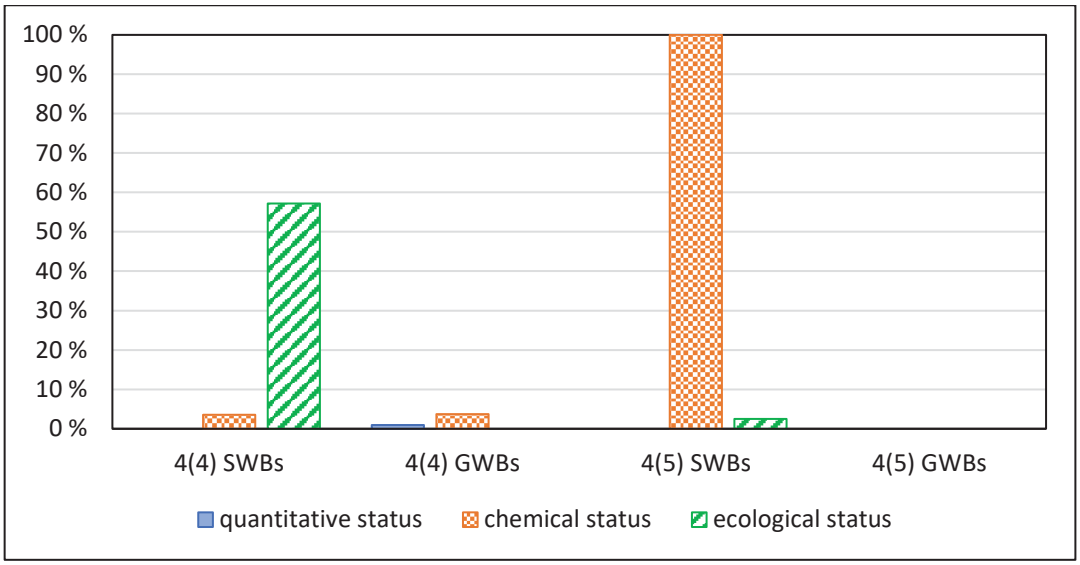
Regrettably, the main change since the 2nd RBMPs is the considerable increase in the number of exemptions applied under Art. 4(4) WFD. For groundwaters, the proportion of used exemptions is limited but still has increased significantly; for quantitative status it has increased from 7 to 34 GWBs and chemical status from 76 to 137 GWBs. For surface waters, a comparison cannot be directly made on the readily available information.

For the exemptions under Art. 4(5) WFD, it must be highlighted that mainly because of the presence of Mercury and PBDE, Sweden is setting lower environmental objectives for the chemical status in all surface water bodies. Sweden considers that the achievement of good status is impossible, because the cause of negative effects is unknown, there is no known technical solution, or the cause is due to lack of actions by other countries.

[44] Kompletterande riktlinjer för miljökvalitetsnormer och undantag 2021-2027: https://viss.lansstyrelsen.se/ReferenceLibrary/55080/VM_Kompletterande-riktlinjer-MKN-undantag.pdf

[45] Vägledning om förlängd tidsfrist och mindre stränga krav : https://www.havochvatten.se/download/18.1d23b59c190125a43f2dbc26/1719485317870/V%C3%A4gledning%20om%20f%C3%B6rl%C3%A4ngd%20tidsfrist%20och%20mindre%20str%C3%A4nga%20krav.pdf

Figure 9. The use of exemptions under Art. 4(4) and 4(5) WFD in surface water bodies (SWBs) and groundwater bodies (GWBs) in Sweden.



Source: Data mining of the 3rd RBMPs

Table 4. The use of exemptions in Sweden in the 3rd RBMPs.

Article	Groundwater bodies (GWBs)	Surface water bodies (SWBs)
4(4)	34 GWBs for quantitative status (0.9%) from 7 GWBs in the 2nd RBMPs 137 GWBs for chemical status (3.7%) from 76 GWBs in the 2nd RBMPs	13 607 SWBs for ecological status / potential (91.9%) 846 SWBs for chemical status (3.6%) from 385 SWBs in the 2nd RBMPs
4(5)	Not applied	588 SWBs for ecological status / potential (2.5%) 23 813 SWBs for chemical status (100%) from 23 161 SWBs in the 2nd RBMPs
4(6)	Not applied	Not applied
4(7)	2 GWBs (quantitative status)	3 SWBs (ecological status)
GWD 6(3)	Not applied	-

Source: Data mining of the 3rd RBMPs

5.2 Use of economic analysis and water pricing – cost recovery

Sweden defines water services as water supply and waste water treatment by municipal utilities. In addition, other uses are including water abstraction, pollution and physical pressures by individual households, agriculture, or industry.

While an updated economic analysis is provided, the 3rd RBMPs lack information about the progress made since the 2nd RBMPs. In conclusion of the RBMPs, the following topics under Annex III to the WFD were explicitly reported:

- Long-term forecasts of water demand differentiated over industry, households, and agriculture.
- Volume estimates associated with the various water uses (industry, households, and agriculture) for 2010 and 2015.
- Estimates of relevant investments including forecasts of such investments[46].

The RBMPs show that water prices (user tariffs) provide an incentive for an efficient water use. The RBMPs indicate that financial cost recovery measures were implemented for water services and the cost recovery rates are calculated at the municipal utility level indicating a full recovery of all costs. This could be considered to imply some degree of cost recovery, but any remaining pollution costs are not recovered.

There is no specific evaluation conducted to estimate environmental and resource damage costs; instead, the RBMPs present estimates of the value of clean water to contextualize the costs of the Programme of Measures.

Sweden's total environmental taxes, including taxes related to water, in 2019 amounted to approximately SEK 101 billion. While the taxes on pesticides amounted to SEK 126 million, there is no clarification how and if these or other environmental taxes are used to achieve good status of surface waters and groundwaters.

The Environmental and Resource Costs (ERC) of water services are incorporated through legislation, emphasizing polluters covering these costs through measures in the Programme of Measures and existing pollution legislation. Agriculture is an exception from this principle. The RBMPs state that the Polluter Pays Principle has been applied for all sectors apart from agriculture. Indeed, there the pollution mitigation measures are subsidised mainly through the CAP.

6. WFD recommendations

Recommendations - Sweden should:

1. Address the identified lack of compliance of achieving good status by increasing the level of ambition and reducing the compliance gap as much as possible until the next reporting cycle;
2. Increase the investments and ensure adequate financing in prevention and restoration to ensure achievement of good status as required by the Directive e.g., by making better use of the 'polluter-pays principle' and by eliminating environmental harmful subsidies whilst

[46] Given that the water demand is not estimated to change, there are limited investments related to the forecast. Costs associated with the Programmes of Measures have been estimated including costs related to water services.

ensuring affordable, just and implementing fair pricing mechanisms for all water users in line with Article 9 WFD. This should be based on a robust economic evaluation of measures to improve the cost-effectiveness analysis and the prioritisation of measures as well as a better estimation of the investments applied as well as the funding needs;

3. Identify and put in place all basic measures and necessary supplementary measures to reduce existing persistent environmental challenges (pressures) preventing the achievement of good status as those pressures will be aggravated by climate change (e.g., pollution concentrates in times of less water availability).

   This implies, for example:

   a. Reduction of nutrient pollution, especially from agriculture, in all river basin districts to achieve the objectives of WFD, MSFD and ND with particular focus on the vulnerability of the Baltic Sea. Furthermore, the ambition of reducing annual nutrient loads for agriculture should be raised from approximately 75% to 100%.;

   b. Phasing out or prevention of the emissions of most relevant priority substances and rivers basin specific pollutants (namely mercury and PBDE as well as perfluorooctanesulfonic acids (PFOS), Cadmium, Nickel, polyaromatic hydrocarbons (PAH), and tributyltin (TBT));

   c. Further prevention and reduction of point source pollution to address nutrients and priority substances and river specific pollutants e.g., by reviewing existing permits for point source emissions to lower pollutant loads;

   d. Expanding the efforts on nature-based solutions including re-naturalisation and ecosystem restoration which will reduce the hydromorphological pressures on its water bodies (e.g., reducing pressures from agricultural drainage);

   e. Stepping up efforts to improve river continuity, ensuring minimum ecological flows, improve the general hydrological situation also in cooperation with neighbouring countries;

   f. Reviewing permits for hydropower plants and the implementation of measures to tackle modifications to hydrological and physical characteristics of surface waters;

   g. The review of permits for hydropower plants and the implementation of measures to tackle modifications to hydrological and physical characteristics of surface waters should be accelerated;

   h. Including a clear provision on periodical review of abstraction and impoundment permits as well as other permits related to hydromorphological changes and describing how this review is implemented in the following RBMPs;

   i. The use of abstraction permits and fees for all water users, preventing illegal abstraction, monitoring the actual abstracted amounts, and harmonisation of the inconsistent use of exemptions from water fees with the aim to ensure a balance between abstraction and recharge of water bodies in which withdrawals take place, with the aim of achieving good quantitative status of groundwaters and good hydrological conditions of surface waters;

   j. Setting specific measures to achieve the additional objectives for all protected areas under relevant Directives and ensuring their link to the WFD implementation.

4. Enhance the consideration of climate change in all RBMPs and / or develop regional drought management plans where droughts are foreseen to causing problems to the economics and society. Although not explicitly required by the Directive, failure to do so will make it increasingly difficult to achieve the Directive's objective and, in some case, even lead to a deterioration of waters where progress has been achieved;

5. Improve further governance and better coordinate between the different administrative levels and authorities dealing with the implementation of the WFD and other related pieces of legislation. This also includes removing obstacles identified in the implementation of measures, such as insufficient administrative capacities and resources;

   Moreover, Sweden should:

   a. Improving the work on international River Basin Management Plans for the Torne River Basin;

   b. A joint consultation of the River Basin Management Plans and the Flood Risk Management Plans;

   c. Improving the comparability of status assessment with other EU countries, specifically regarding the assessment of physico-chemical and hydromorphological conditions related to their sensitive biological quality elements.

6. Further close knowledge gaps and improve data availability, access to data, as well as data quality and comparability by harmonising methods and electronically collected data across river basin districts and marine regions, on monitoring, assessments, projections, economic assessment, etc. and make all data openly available through timely publication in line with the requirements of the Open Data Directive and INSPIRE Directive;

   This implies immediate actions:

   a. Strengthening the monitoring of surface waters by covering all relevant quality elements and chemicals in all water categories. An increased level of monitoring should lead to a lower dependence on expert judgment for the classification of ecological status / potential and chemical status;

   b. Developing an enhanced and robust quantitative monitoring to improve the knowledge of groundwaters in poor quantitative status or at risk failing to achieve good quantitative status;

   c. Developing chemical status monitoring programmes to ensure all relevant priority substances (including mercury) and River Basin Specific Pollutants are identified;

   d. Providing a detailed quantitative assessment of the additional need for measures to address nutrients, pesticides, and pollution from all the sectors in all RBDs;

   e. Assessing how the planned measures will close the gaps to good status. This will allow to address all point pollutions with concrete measures and better prioritise its measure at water body level;

   This also implies actions for the next RBMPs:

   f. Completion of the inventory of chemical substances which are corresponding to the available emission data for all substances according to the CIS Guidance 28;

g. Developing indicators to identify all significant pressures on surface waters and groundwaters;

h. Improving the methodology for establishing ecological flow;

i. Completion of designation of protect areas linked to drinking water abstraction;

7. Improve the transparency and useability of the RBMPs;

   In particular:

   a. A clear description how the confidence of the chemical monitoring of surface waters has been assessed.;
   b. A clear description of procedure and the criteria to assess the status of various quality elements (biological, general physico-chemical, river basin specific pollutants, and hydromorphological).

SECTION B:
FLOODS DIRECTIVE

7. Flood risk management under floods directive (FD)

The Directive requires each Member State to scan its territory for flood risks, assess the potential adverse consequences of future floods for human health, the environment, cultural heritage and economic activity, identify the significant risks, map the flood extent and the potential adverse consequences, and take measures to reduce the flood risk. These activities are reflected in (a) the preliminary flood risk assessments, or PFRAs (including the identification of areas of potential significant flood risk, or APSFRs), (b) the preparation of flood hazard and risk maps, or FHRMs, and (c) the establishment of flood risk management plans, or FRMPs.

There are ten Units of Management (UoMs) in Sweden, which are the same as the Water Framework Directive's River Basin Districts (RBD), but APSFRs have been identified in six. Fluvial and sea water floods are considered as potentially significant sources of flooding in Sweden. Sweden has designated 25 APSFRs. Sweden had used advanced and detailed modelling to incorporate climate change into its second preliminary flood risk assessments, the calculations are based on a method described in a report from 2011.

7.1 Flood hazard and risk maps

Sweden is using an online map portal[47] for their FHRMs. FHRMs were prepared at the national level. Maps for floods with low probability (1/200 years), with medium probability (1/100 years) and with high probability (1/50 years, but not for coastal floods) are provided. The maps show flood extent, water depth and number of inhabitants. Flood risk maps are based on the flood hazard maps and show which land uses and objects are affected by the flood events:

- economic activity
- type of land use where the economic activity takes
- sites with environmentally hazardous activities (Miljöfarlig verksamhet)[48]
- protected areas identified in Annex IV(1)(i), (iii) and (v) to Directive 2000/60/EC.

Since the first FHRMs, new and improved digital elevation data has been used in the flood hazard and risk assessments and the production of the maps. Indeed, the maps were earlier based on elevation data of 50x50m resolution, while now all maps are based on elevation data of 2x2m resolution with new national altitude data, providing an improved level of detail. Flood maps show the extent of inundated areas for several different flood alternatives in the future, as well as climate change adapted 100-year and 200-year discharges. In the second FHRM, maps for coastal flooding have also been produced and are shown on the online flood portal[49].

In terms of changes of contextual information, i.e., the way in which information about the maps is conveyed to the public, since the first FHRMs, there has been progress with the harmonisation of the categories of the legends, e.g., water depth, and potential impacts.

In terms of changes in methodologies used to prepare flood hazard maps since the first FHRMs, as coastal flooding was not included in the first FHRMs, this information has been added to the online flood portal in the second FHRMs.

[47] Hot- och riskkartor: https://gisapp.msb.se/Apps/oversvamningsportal/avancerade-kartor/hot-och-riskkartor.html
[48] These activities do not explicitly refer to the terms Industrial Emissions Directive (IED), but in the documentation provided by Sweden on EIONET it is explained that this is how these activities are described and covered.
[49] Översvämningsportalen: https://gisapp.msb.se/apps/oversvamningsportal/index.html

In terms of changes in administrative responsibilities regarding preparation of flood risk maps, during the first FHRMs, the County Administrative Boards were responsible for producing risk maps. In the second FHRMs, the MSB (the Swedish Civil Contingencies Agency, the competent authority in Sweden for flood risk management) facilitated the work by producing the basis for the risk maps using a common approach. The risk maps were reviewed by the County Administrative Boards, which made corrections where necessary, produced tabular data and finalised them. They also carried out further coordination on this issue with the municipalities. Hence, for the second FHRMs, the MSB also took a more active role in the production of the risk maps (not just the hazard maps).

As regards the consideration of climate change effects in the preparation of flood hazard and risk maps, reference is made to section 3.7 on 'adaptation to climate change'.

7.2 Flood risk management plans

Objectives and measures

There are 25 FRMPs in Sweden from which 5 were assessed. The FRMPs can be downloaded from a web page on the dedicated floods portal of the Swedish Civil Contingencies Agency (MSB)[50]. Sweden has set four overarching national objectives, and they address the potential adverse consequences of floods. The FRMPs assessed have then set detailed objectives, classified in three types of objectives: performance, measure-oriented, and knowledge. Two of the five FRMPs assessed include knowledge objectives to improve the information base and in-depth knowledge on flood risks. All five FRMPs include measures for emergency planning, as well as objective and/or measures to strengthen public awareness. One of the four national overarching objectives addresses adverse consequences on human health, economic activity, environment, and cultural heritage.

All five FRMPs identify measures. In addition, Sweden has reported 929 measures. All five FRMPs assessed list the priorities of their measures, and Sweden has reported the priorities for all its measures disaggregated into following categories: critical (125 measures, 13 %), very high (175 measures, 19 %), high (461 measures, 50 %), moderate (142 measures, 15 %), low (26 measures, 3 %). The FRMPs provide little information, however, on the methods used to prioritise measures. All five FRMPs provide an overview of the approach to monitoring the progress of implementation of their measures.

One of the FRMPs assessed provides information on the costs of measures. The only plan that mentions specific sources of funding is the Karlstad FRMP, which states that for the measures to be implemented by the County Administrative Board, the existing budget is sufficient. For measures for the Karlstad Municipality, funding is covered by the existing budget, and that potential external financing may be possible without mentioning specific sources[51]. The other FRMPs do not discuss funding sources[52]. Two of the five FRMPs assessed provide information on methods for cost-benefit analysis (CBA): structural measures undergo CBA when they are in the production phase and structural measures must have a permit according to the Environmental Act. The FRMPs assessed include objectives for nature conservation, and two specify this in their measures. Sweden reported 64 natural flood management measures. These are found in two of the five RBDs. Three of the five FRMPs provide information on nature-based solutions that can contribute to water retention. Sweden

[50] Översvämningsportalen – Riskhanteringsplaner: https://gisapp.msb.se/apps/oversvamningsportal/avancerade-kartor/riskhanteringsplaner.html
[51] SE5 Karlstad, Section 6.
[52] Sweden's reporting to EIONET notes that energy companies, water service companies and property owners, among others, are responsible for some measures (see section 4.7 below). Consequently, they may also be responsible for funding measures, though this is not specified.

reported that WFD objectives were considered in all RBDs. Three of the FRMPs assessed provide some information on coordination with the WFD. Sweden reported 579 prevention measures to EIONET (62 % of all measures); 175 protection measures (19 % of all measures); and 140 preparedness measures (15 % of the total). All five FRMPs include measures for emergency planning and civil protection. Sweden reported 89 measures to remove and prevent receptors in flood risk areas, something not usually seen in other Member States. Three of the five FRMPs assessed identify measures for spatial planning.

Four of the five FRMPs assessed provide an overview of the extent to which the objectives in the respective first FRMPs were achieved. Three of the five assessed FRMPs describe in more detail, either in tables or in text, the progress made on the objectives from the first FRMPs[53]. The second FRMP for Falun states that the objectives set in the first FRMP have mostly been achieved. In the second FRMP for Stockholm, a table categorises the objectives of the first FRMP as either partly achieved, still under implementation, or not implemented. Among the eight objectives related to human health, six are partly achieved. The two objectives related to the environment are both partly achieved. Among the five objectives related to economic activities, all five are partly achieved. The objective towards cultural heritage is achieved. In the second FRMP for Karlstad, a table lists the 16 performance objectives of the first FRMP, indicating if the progress towards achieving each has a positive trend (the case for eight objectives) or no change (eight objectives). There is no change for the three environmental objectives and the three objectives for cultural heritage. For the two objectives on economic activities, there is a positive trend for one and no change for the other. The Haparanda FRMP provides progress of measures set in the first FRMP. In the FRMP for Kristianstad, no specific information was found on the progress of the objectives from the first period (because the County Administrative Board decided to cancel the first FRMP and replace it with the second FRMP).

Sweden reported the progress of all measures. The majority of measures were reported as not started (566 measures, 61 %). On the other hand, 30 % of all measures were reported as ongoing construction (283 measures). 64 measures were reported as in preparation (7 % of all measures), Sweden reported that 92 % of recovery and review measures as not started, as well as 81 % of protection measures, 69 % of preparedness measures, and 52 % prevention measures (in part due to new APSFRs and the addition of the coastal flooding information). Many of the measures are still in progress, partly due to the long timespan of the measures, and due to the priority order of measures. The progress was reported in the following way:

- Haparanda: Among the 13 measures in the first FRMP, six measures have been implemented, three have not started, two were in implementation, and three are continuously implemented.
- Falun: The progress towards the implementation of the measures is described qualitatively. the FRMP mentions eight implemented measures, and other measures that are either ongoing or about to start. The FRMP also lists two additional measures that were not included in the first FRMP but are relevant for the achievement of its goals that were implemented.
- Karlstad: The progress towards the implementation of the measures is categorised as either implemented/in progress (four measures), paused (two measures), or not implemented (two measures).
- Stockholm: 23 measures are in progress, and most of these are included in the second FRMP. One measure has been fully implemented, and one not yet being implemented. The plan also lists five additional measures that have been implemented but were not in the first FRMP.

[53] Haparanda, Section 13.1; SE2 Falun, Section 13; SE3 Stockholm, Section 13; SE5 Kristianstad, Section 12.1;

Governance

Sweden reported to EIONET that coordination has taken place at international level in one RBD, the Bothnian Bay International District Torne River (SE1TO). It refers to the 2010 Border River Agreement between Finland and Sweden and the Finnish-Swedish Border River Commission, whose purpose is to prevent floods and environmental accidents.

All five FRMPs assessed have a section describing the consultation process[54], explaining that the draft plans had a public consultation period of between two and three months. During the consultation period, relevant documentation was available on the County Administrative Board's website for all five FRMPs, and for three of the five FRMPs (Haparanda, Falun, Karlstad), a call for inputs was announced in local, regional and/or national newspapers. NGOs are reported as being involved in the consultation for only one FRMP.

Consideration of climate change

As regards the consideration of climate change effects in the preparation of flood risk management plans, reference is made to section 3.7 on 'adaptation to climate change'.

Progress identified in the second FRMPs

Three FRMPs assessed provide an overview of the achievement of the objectives in the respective first plans. The second FRMPs all present to at least some extent what their measures are trying to achieve, where, how, and by when: thus, the second FRMPs provide more specific and measurable information. Three of the five second FRMPs provide at least some information on the costs of measures, though only for a limited number of measures. Four of the five second FRMPs assessed provide some information on the progress of their measures, compared to two of the five first FRMPs assessed. Three of the five FRMPs assessed refer to nature-based solutions, though they provide only limited information. In addition, four of the five second FRMPs discuss measures to assess risks for cultural heritage or to protect cultural heritage. Moreover, four of the five second FRMPs mention the issue of damage costs and insurance-related issues, while none of the first FRMPs assessed did. Also, all five second FRMPs assessed describe a monitoring approach, compared to four first FRMPs assessed. Two of the five FRMPs refer to a cost-benefit analysis in a detailed manner (previously one of the assessed FRMPs did and briefly). All five FRMPs assessed refer to coordination with regional strategies for climate adaptation. Four of the five FRMPs discuss work on cloudburst mapping and one FRMP, for Falun, plans to carry out a climate vulnerability analysis for infrastructure measures.

8. FD recommendations

Based on the reported information and the FHRMs and FRMPs assessed, Sweden should:

- Consider pluvial flooding further in the FHRM;
- Provide, in the FRMP, detail on how the FHRM was used in the choice of objectives and measures;
- Provide, in all FRMPs, an overview of the achievement of the objectives in the respective first plans;

[54] Haparanda, Section 12; SE2 Falun, Section 12; SE5 Karlstad, Section 11; SE4 Kristianstad, Section 11; SE3 Stockholm, Section 12.

- Provide, in the FRMP, information on the costs of all measures included in the FRMP, as well as an overall budget and information on how these costs were derived;
- Provide, in the FRMP, information on the methods used to prioritise measures;
- Set out the progress of their measures in all FRMPs;
- Consider protection of cultural heritage in all FRMPs;
- Aim at a six-month duration of public consultation for the FRMP and encourage the participation of civil society;
- Consider, where appropriate, in the FHRM, flow velocity or relevant water flow and in the FRMP flood conveyance routes, as these are relevant to emergency response.