Establishing indicators to measure success toward the UN Sustainable Development Goal for ”Life under water”

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Establishing indicators to measure success toward the UN Sustainable Development Goal for ”Life under water”

1. Sustainable development goal 14 – what is it, and how to measure success?
2. Marine management and indicators
3. What exists already, what has Finland reported to UN in 2022?
4. Take-home message

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The UN sustainable development goals

https://sdg-tracker.org/

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The UN sustainable development goals

Source: Azote Images for Stockholm Resilience Center

From: Global manual on measuring SDG14.1.1, SDG14.2.1 and SDG14.5.1

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Measuring progress towards the Sustainable Development Goals

- The United Nations Sustainable Development Goals (SDGs) are targets for global development adopted in September 2015, set to be achieved by 2030. All countries of the world have agreed to work towards achieving these goals.
- Our SDG Tracker presents data across all available indicators from the Our World in Data database, using official statistics from the UN and other international organizations. It is a free, open-access publication that tracks global progress towards the SDGs and allows people around the world to hold their governments accountable to achieving the agreed goals.
- The 17 Sustainable Development Goals are defined in a list of 169 SDG Targets. Progress towards these Targets is agreed to be tracked by 232 unique Indicators. Here is the full list of definitions.
- This new version of our SDG-Tracker was launched on 28th June 2018. We will keep this up-to-date with the most recent data and SDG developments through to the end of the 2030 Agenda.
- For many Indicators data is available, but major data gaps remain. If you are aware of high-quality data we have yet to include please notify us. We hope that this collaborative approach allows us to support the United Nations in developing the most complete and up-to-date sources for tracking global progress to 2030.

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https://sdg-tracker.org/

The SDG 14 indicators

SDG INDICATOR 14.1.1

Reduce marine pollution

Definition: Indicator 14.1.1 is the *"index of coastal eutrophication and floating plastic debris density"*.

SDG INDICATOR 14.2.1

Protect and restore ecosystems

Definition: Indicator 14.2.1 is the *"proportion of national exclusive economic zones managed using ecosystem-based approaches"*.

SDG INDICATOR 14.3.1

Reduce ocean acidification

Definition: Indicator 14.3.1 is the *"average marine acidity (pH) measured at agreed suite of representative sampling stations"*.

SDG INDICATOR 14.4.1

Fish stocks within sustainable levels

Definition: Indicator 14.4.1 is the *"proportion of fish stocks within biologically sustainable levels"*.

SDG INDICATOR 14.5.1

Protected marine areas

Definition: Indicator 14.5.1 is the *"coverage of protected areas in relation to marine areas"*.

SDG INDICATOR 14.6.1

Combat illegal, unreported and unregulated fishing

Definition: Indicator 14.6.1 is *"progress by countries in the degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing"*.

SDG INDICATOR 14.7.1

Income from sustainable fisheries

Definition: Indicator 14.7.1 is *"sustainable fisheries as a proportion of GDP"*.

SDG INDICATOR 14.A.1

Research resources for marine technology

Definition: Indicator 14.A.1 is the *"proportion of total research budget allocated to research in the field of marine technology"*.

SDG INDICATOR 14.B.1

Support small scale fishers

Definition: Indicator 14.B.1 is *"progress by countries in the degree of application of a legal/regulatory/policy/institutional framework which recognizes and protects access rights for small-scale fisheries"*.

SDG INDICATOR 14.C.1

Implementing international sea law

Definition: Indicator 14.C.1 is the *"number of countries making progress in ratifying, accepting and implementing through legal, policy and institutional frameworks, ocean-related instruments that implement international law, as reflected in the United Nations Convention on the Law of the Sea"*.

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GPA Global Programme of Action for the Protection of the Marine Environment from Land-based Activities

SDG 14.1 Target
Marine pollution indicators

Progress and approach to the SDG indicator process

Habib El-Habr, Coordinator,
Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA)

SDG 14 indicator on **Marine pollution**

- **Target 14.1:** ***By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities***
- "Composite" comprising of **2 parameters**
- **Indicator 14.1.1: Index of coastal eutrophication** and **floating plastic debris density**

- Indicator classed as **"Tier III"** meaning…
  - No internationally established methodology / standards are yet available
  - Methodology/standards are being (or will be) developed or tested
- **UN Environment is Custodian Agency; supported by IOC-UNESCO**

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Indicator selection – why?

Index of coastal eutrophication Potential (ICEP)

- ICEP is calculated based on **relative concentrations of nutrients** - riverine nitrogen (N), phosphorus (P) versus silicon (Si) deliveries to coastal environments
  - When Si is in excess over N and P - favours development of diatoms;
  - When **N and P are discharged in excess over Si** (with respect to requirements of diatoms, these will be limited) - nondiatoms, often **non-siliceous algal species will develop instead**

- **ICEP allows determination of possible problems resulting from new production of often undesirable harmful algal species that lead to eutrophication**
- Conventional measure – **chlorophyll-a concentration**; while useful not always linked to eutrophication and ecosystem degradation **BUT useful indicator!**

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GPA Global Programme of Action for the Protection of the Marine Environment from land-based Activities

Ref: ***N:P:Si nutrient export ratios and ecological consequences in coastal seas evaluated by the ICEP approach*** in
J of Biogeochemical Cycles. J. Garnier, A. Beusen, V.Thieu, G. Billen L. Bouwman
https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2009GB003583

Indicator selection – why?

Index of coastal eutrophication Potential (ICEP)

- Excess N and P are typically from agricultural runoff, livestock discharges, wastewater
- ICEP offers predictability of potential coastal ecosystem degradation from land-based pollution
  - Influence policy toward improved watershed management practice

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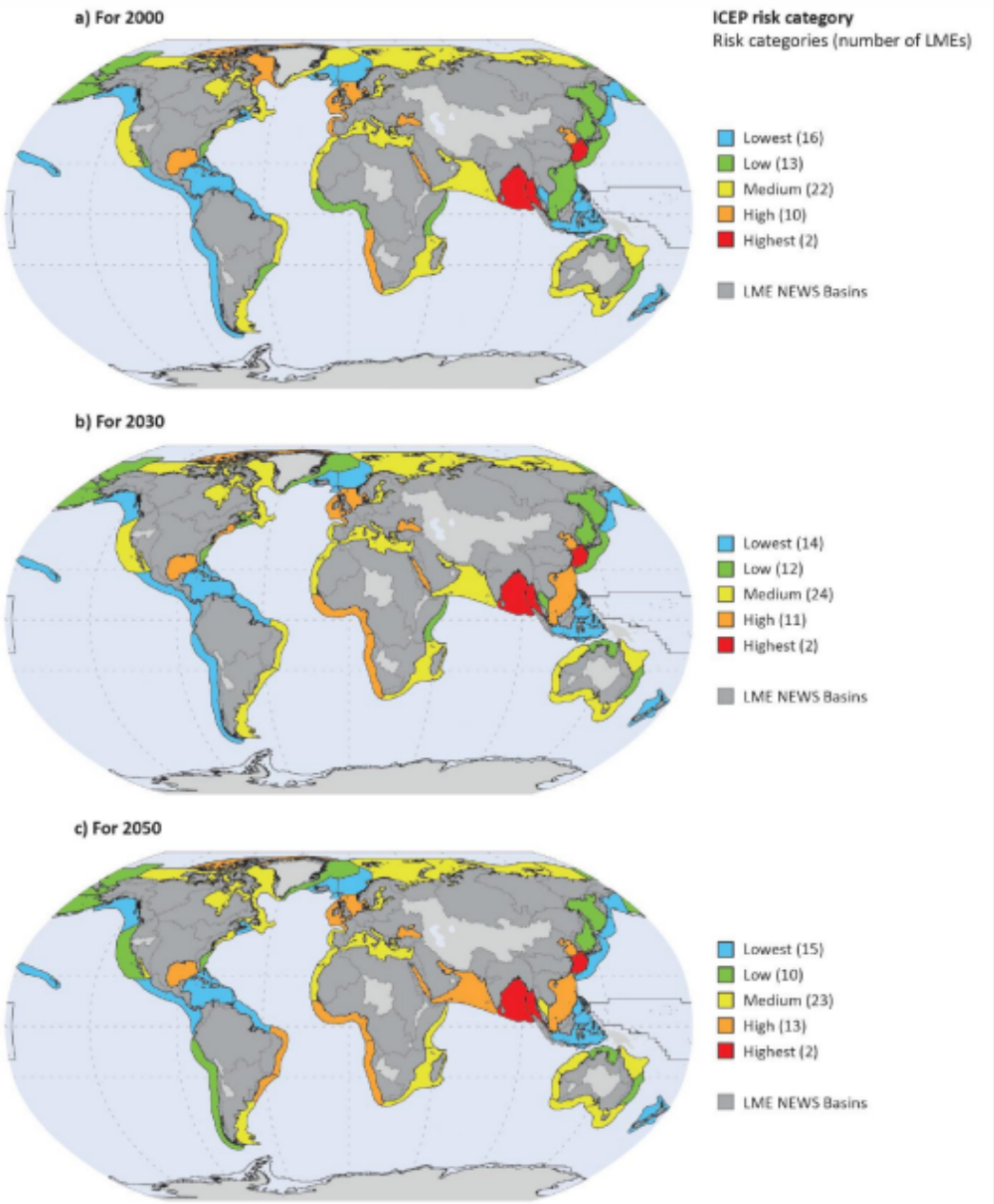
SDG 14.1 indicator **Index of Coastal Eutrophication Potential**

Based on nutrient ratios – dissolved Si to N or P, compared to ratio required for diatom growth. If there is excess N or P relative to Si growth of potentially harmful non-siliceous algae will be favoured over siliceous algae (diatoms), which are generally not harmful. ICEP is expressed in kg of carbon (of potential new non-siliceous algal growth) per km^2 of river basin area per day.

TWAP
TRANSBOUNDARY WATERS ASSESSMENT PROGRAMME

Figure 7.12 Index of Coastal Eutrophication Potential (ICEP) risk categories for LMEs for a) 2000, b) 2030, and c) 2050. Based on the ratio of nutrients (N and P relative to Si) entering LMEs from rivers, potential for non-siliceous harmful algae blooms is 'high' or 'highest' in 12 LMEs. The risk is most evident in portions of southern and eastern Asia, Western Europe and Gulf of Mexico, although also applying to LMEs in a number of other regions. If current trends continue, the potential for non-siliceous harmful algae blooms will have increased in 12 LMEs by 2050 relative to 2000 conditions.



General challenges

Development/application of marine pollution indicators

- **Weak global harmonization** of work on SDG14.1 indicator
  - numerous research nodes working independently
- **Disconnection between research communities** working on:
  - nutrient pollution/eutrophication and plastics
  - freshwater and marine water quality indicators
- **Poor level of understanding** on operationalization of the ICEP and the floating plastic density indicators among national stakeholders
- **Assessment difficulty at national levels** given nature of indicator – applies to transboundary spatial areas (multi-country)
  - challenge to attribute a 'national 'number' as required for SDG reporting
- **Weak national assessment and reporting**; challenge to regional and global reporting
- **Resource constraints for validation** of modelled approaches
  - Will require in-situ data with strong national support (rely on research community)

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Opportunities & work to date
Regional Seas Programmes

- **Much work already** under the Regional Seas Programmes
  - Indicators on nutrient loads:
    - in-situ observations of N and P; Chlorophyll-a concentrations (direct measurement and remote-sensed)
  - Indicators on plastic debris:
    - Beach deposition/wash-up

- Refer to UN Environment reports:
  - *"Regional Seas follow up and review of the Sustainable Development Goals (SDGs) related to oceans"*
  - *"Global Manual on Ocean Statistics - Towards a definition of indicator methodologies"* (Science Div – UNEP-WCMC)

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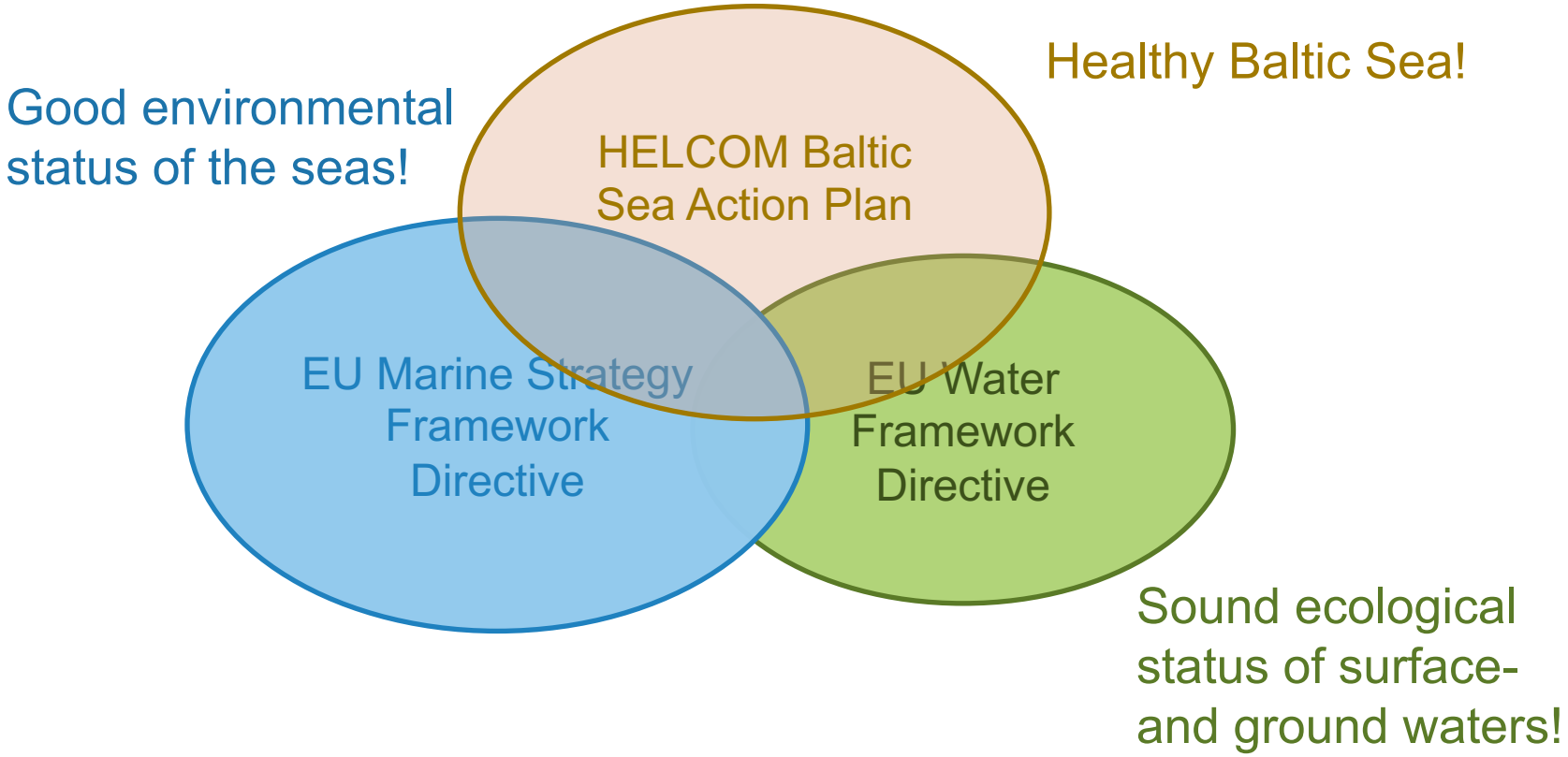
What are the European and Baltic goals we already have regarding eutrophication?



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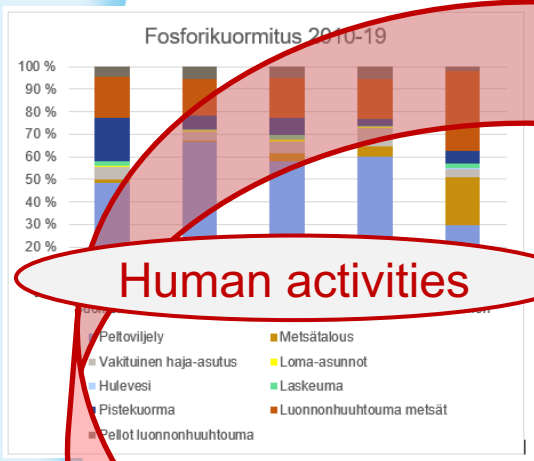
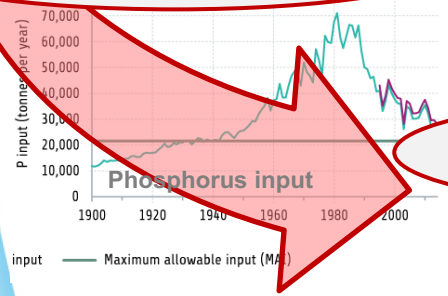
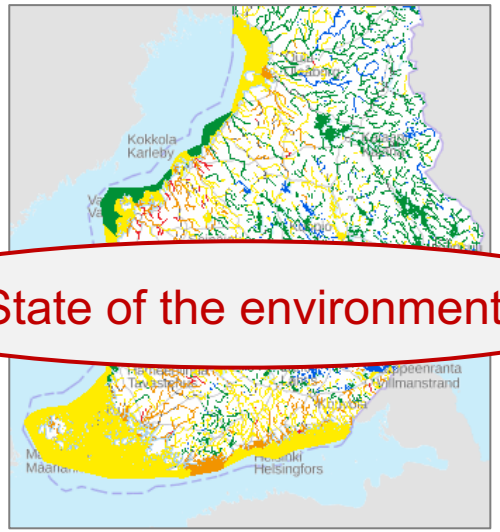
Marine management towards a healthy sea

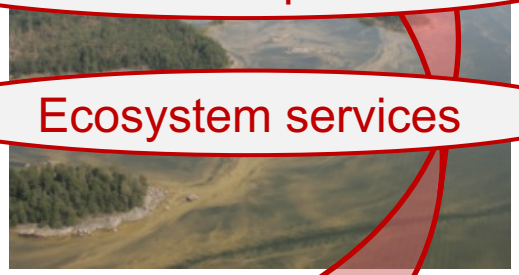


Merialue	Vähennys-tarve vähintään (tonnia)	Vesienhoidon toimenpiteillä aikaansaatava fosforivähennys (tonnia)					
		Yhteensä*	Maa-talous	Metsä-talous	Haja-asutus	Piste-kuormitus	Hule-vedet
Suomenlahti					12	6	**
Perämeri					23	6	**
Yhteensä	**440**	**235**	**161**	**9**	**46**	**19**	**

tilan kuvaaja	Hyödyt (miljoonaa euroa, nykyarvoistettuna vuoteen 2014)
Monimuotoisuus ja ravintoverkot (K1, K4)	363 – 1 068
Rehevöityminen (K5)	1022 – 3580







Actions

Human activities

Pressures

State of the environment

Social impacts

Ecosystem services

Success is measured through indicators!

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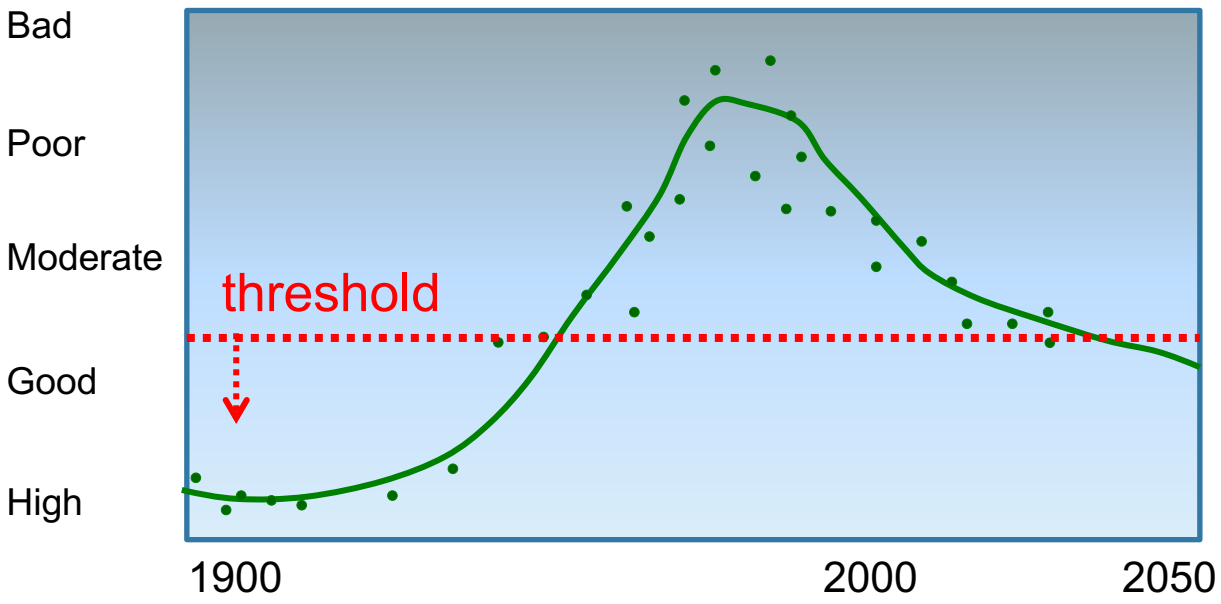
Indicators relate the status in relation to threshold or target



- Define good status
- Aim at sustainable use of seas, not at a level without human activities
- Operational goal, actions shall be taken when level is exceeded
- Scientifically based but politically agreed

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Modified from picture by *Juha-Markku Leppänen*

Indicators communicate the status of key features

Abilities of a good environmental indicator
Shows fidelity to the assessed feature and process
Reacts robustly to change
Responds to environmental pressures caused by humans
Is applicable in different geographical areas and at different times
Understandable, also to non-experts
Can be monitored and easily updated
Well documented and scientifically based

”As opposed to regular metrics, indicators are supposed to tell us more than what they actually measure” (Daan 2005)

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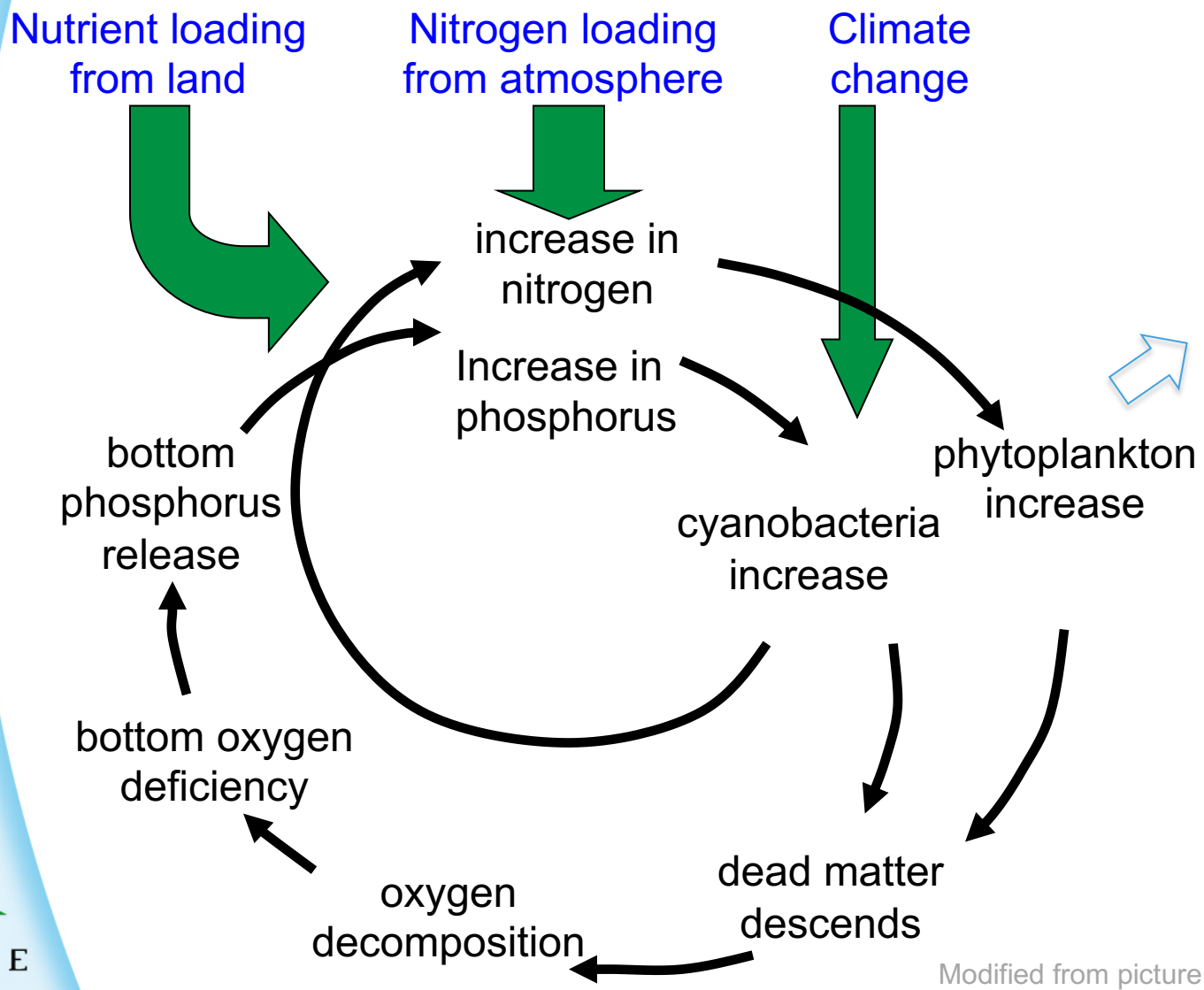
Choosing indicators: what is the problem?



Decreased water transparency

Change in coastal vegetation

Change in zoobenthic communities

Change in fish populations

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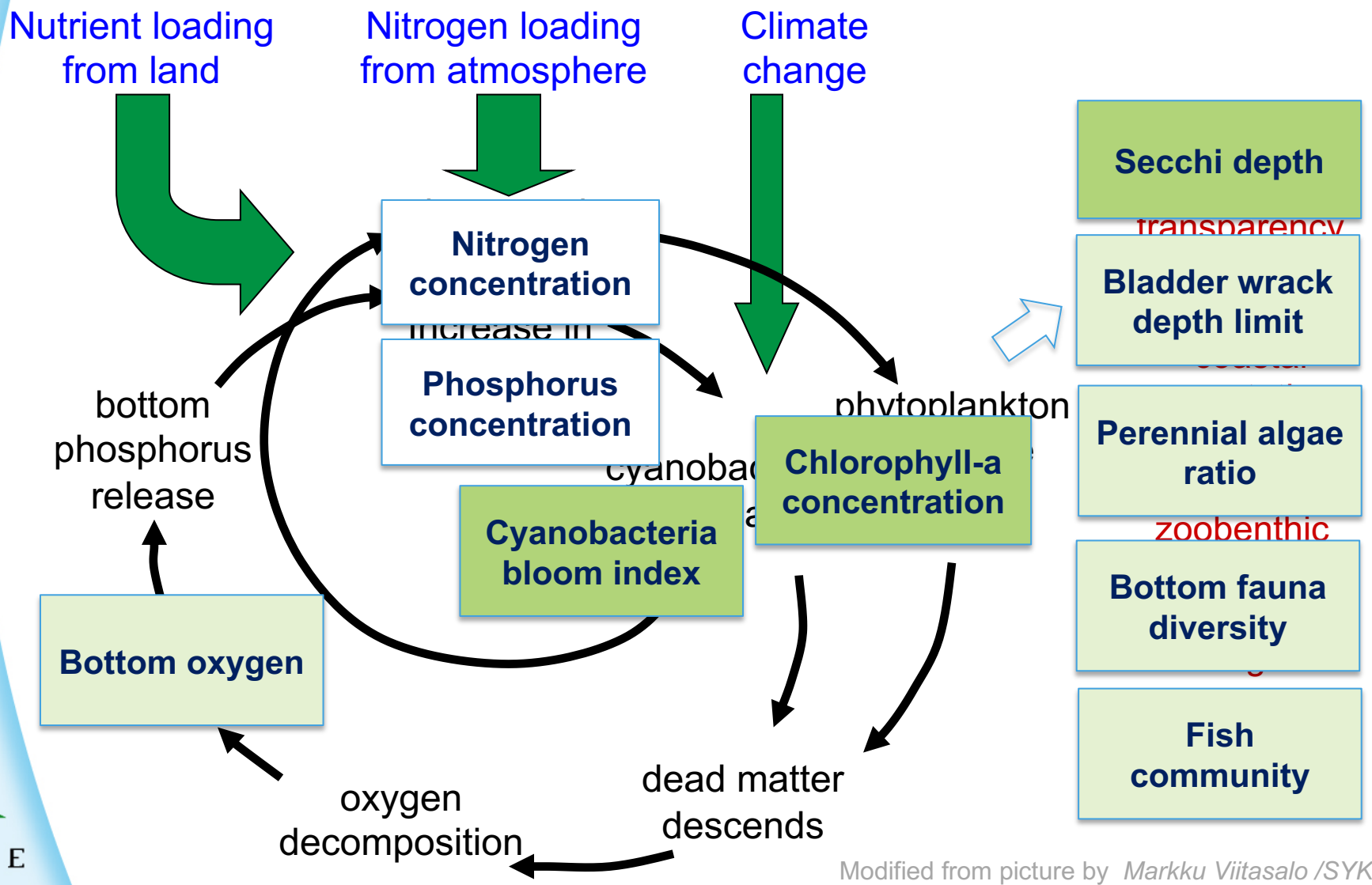
Modified from picture by *Markku Viitasalo /SYKE*

Choosing indicators: what **DESCRIBES** the problem?



Modified from picture by *Markku Viitasalo /SYKE*

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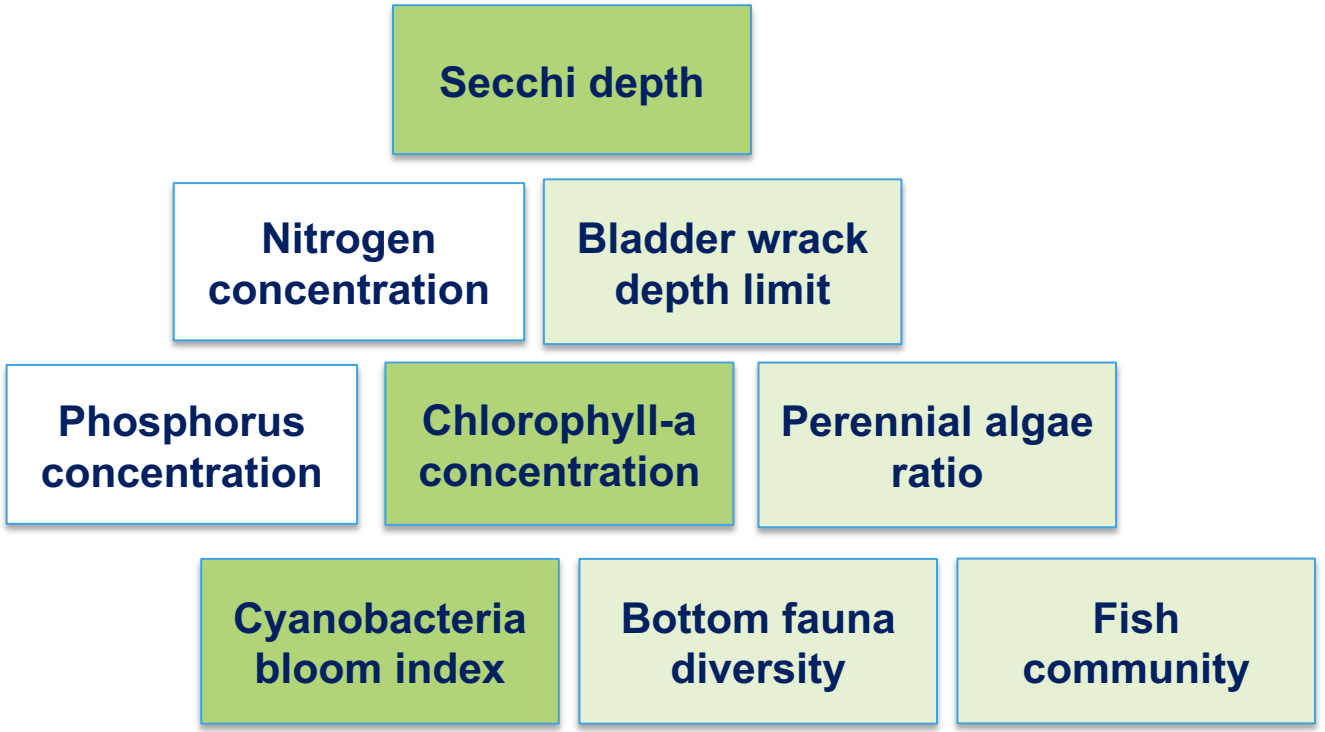
Choosing indicators:
… and how do you build the big picture?



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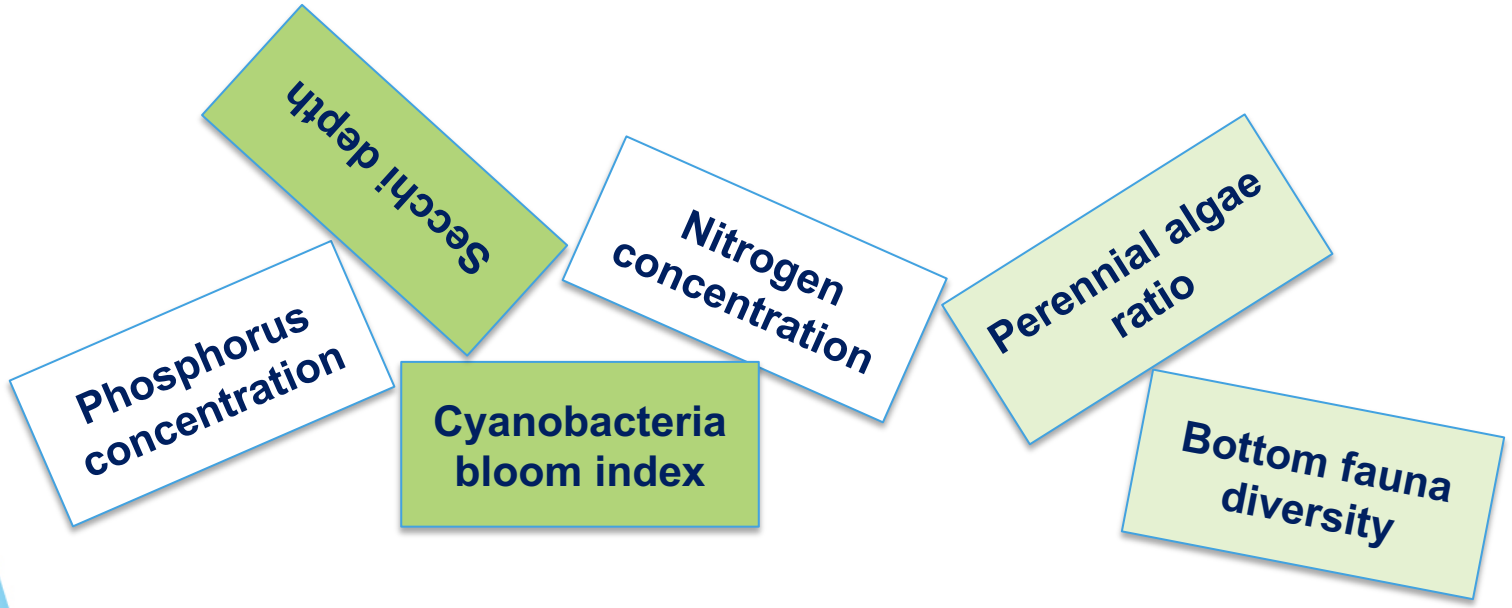

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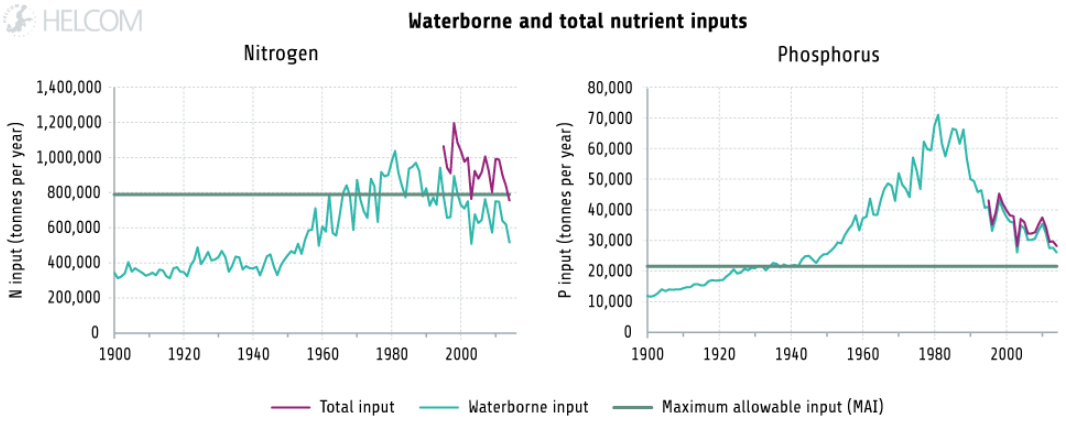
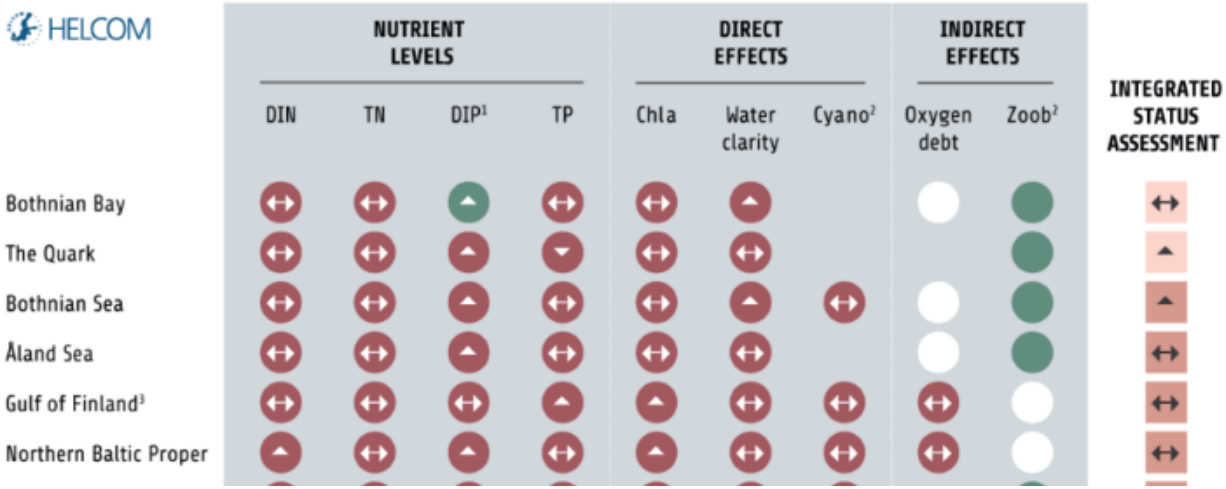
HELCOM eutrophication indicators

Pressures



Status



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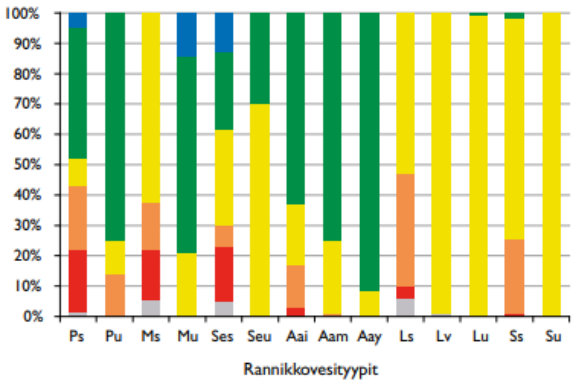
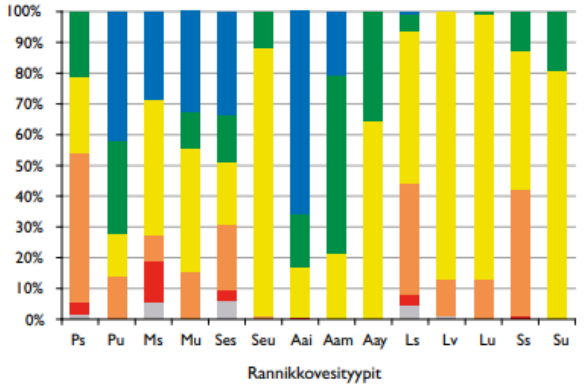
Finland WFD ecological status indicators

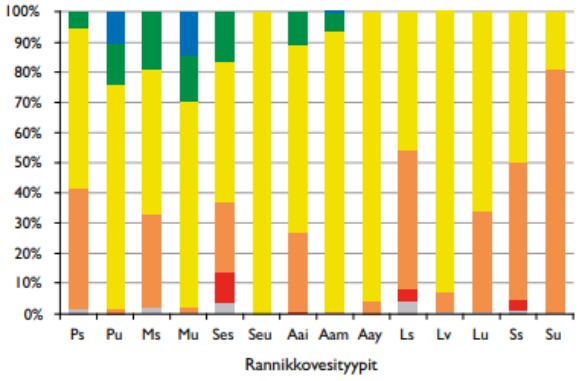
Nitrogen-indicator



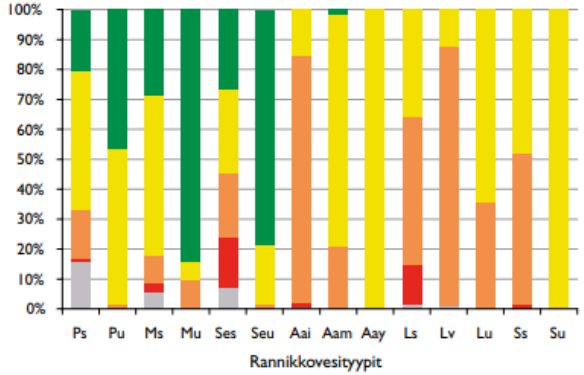
Phosphorus-indicator



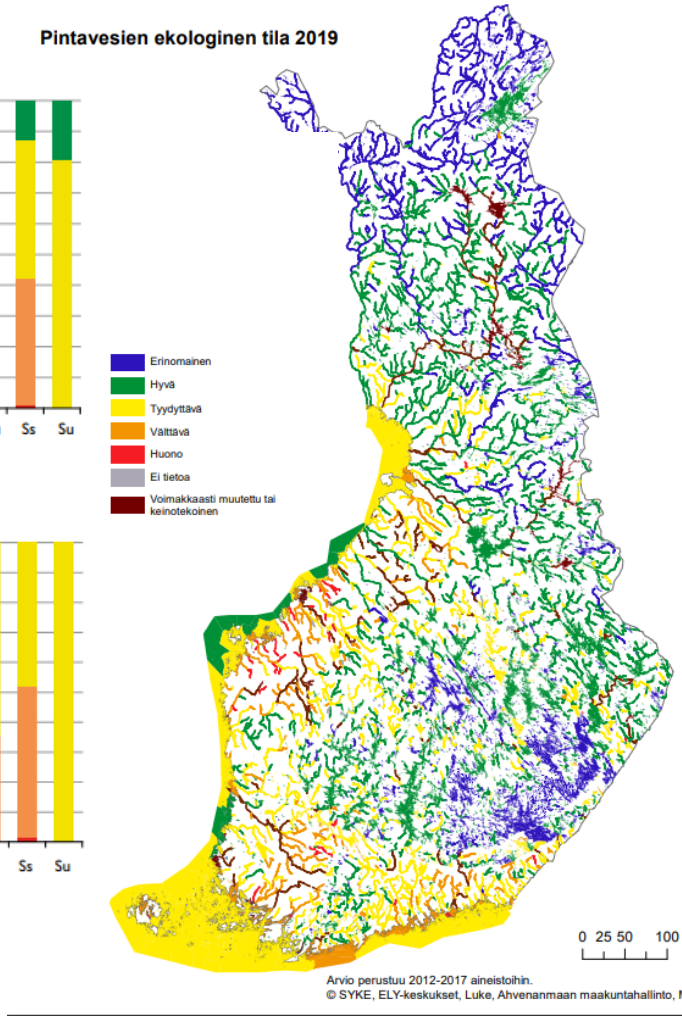
Chlorophyll-a indicator



Water clarity indicator



(proportion of coastal water bodies classified in status)



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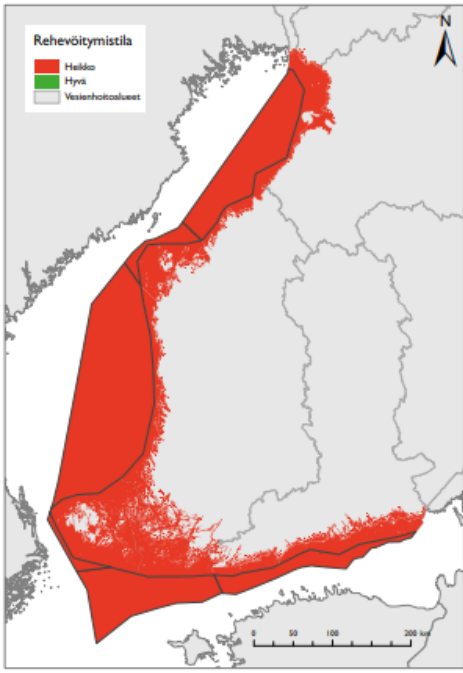
Finland MSFD eutrophication indicators

- Indicators from HELCOM and WFD are used
- Status: Good (green) or not-good (red)

Alue	Indikaattoritulokset									
	Ravinnetasot				Suorat rehevöitymis-vaikutukset			Epäsuorat rehe-vöitymisvaiku-tukset		Kokonais-rehevöi-tyminen
	DIN	TN	DIP	TP	Kloro-fylli	Näkö-syvyys	Sinilevät	Happi-velka	Pohja-eläimet	
Avoin Suomen-lahti *	↔	↔	↔	↗	↗	↔	↔	↔		↔
Pohjois-Itämeri	↗	↔	↗	↘	↗	↔	↔	↔		↗
Avoin Ahvenan-meri	↔	↔	↗	↔	↘	↔				↔
Avoin Selkämeri	↔	↔	↗	↔	↔	↗	↔			↗
Avoin Meren-kurkku	↔	↔	↗	↔	↔	↔				↗
Avoin Perämeri	↔	↔	↔	↔	↔	↗				↔



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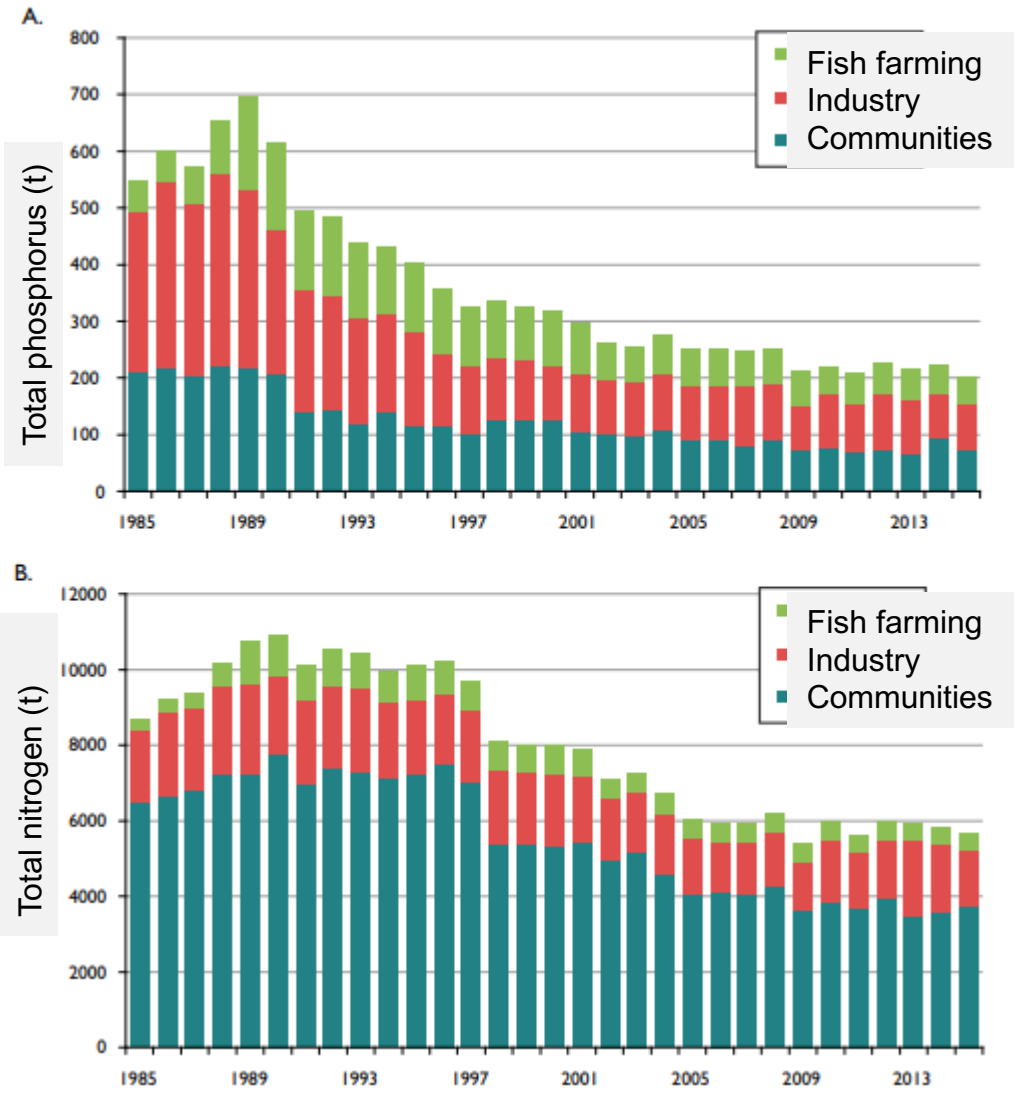
Finland MSFD estimate of loading



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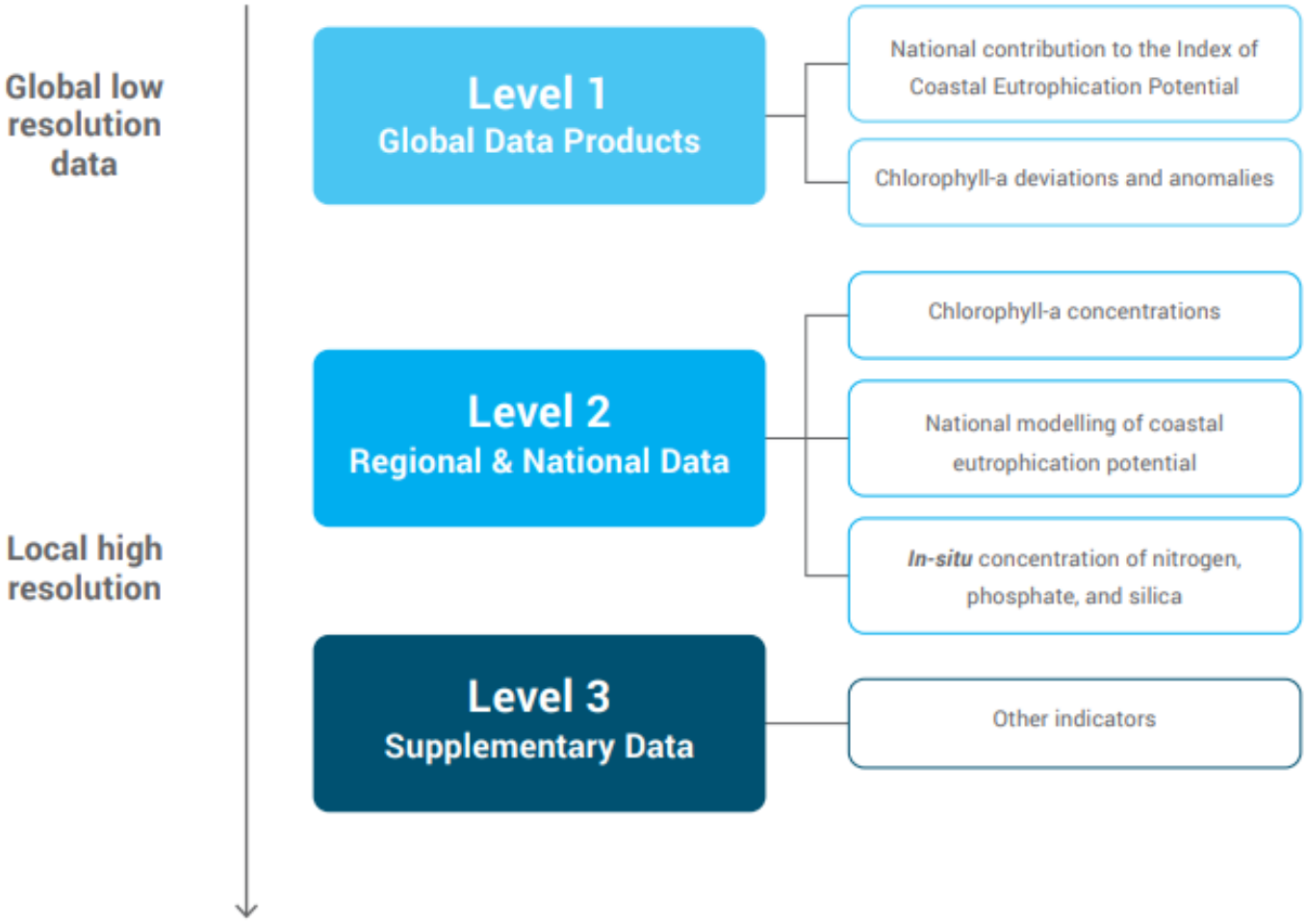
SDG indicators and their level



From: Global manual on measuring SDG14.1.1, SDG14.2.1 and SDG14.5.1

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SDG monitoring parameters

Table 1: Monitoring parameters for eutrophication to track progress against SDG Indicator 14.1.1a.

Monitoring parameters	Level 1	Level 2	Level 3	Reporting Frequency
Indicator for Coastal Eutrophication Potential (N and P loading)	X			Five years
Chlorophyll-a deviations (remote sensing)	X			Annual
Chlorophyll-a concentration (*remote sensing and in situ*)		X		4 years (aligned with Regional Seas)
National modelling of indicator for Coastal Eutrophication Potential (ICEP)		X		
Total Nitrogen of DIN (dissolved inorganic nitrogen)		X		
Total Phosphorus or DIP (dissolved inorganic phosphorus)		X		
Total silica		X		
Dissolved oxygen			X	NA
Biological/chemical oxygen demand (BOD/COD)			X	NA
Total organic carbon (TOC)			X	NA
Turbidity (remote sensing)			X	NA
River parameters from SDG 6.3.2			X	NA
Other water parameters (O_2 % saturation, Secchi depth, river discharge, salinity, temperature, pH, alkalinity, organic carbon, toxic metals, persistent organic pollutants)			X	NA
Microalgal growth, harmful algal blooms, submerged aquatic vegetation coverage, biodiversity and hypoxia			X	NA

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https://unstats.un.org/sdgs/metadata/files/Metadata-14-01-01.pd

SDG regional seas meeting, Oct 2021: draft list of indicators

Regional Sea Indicator for **Pollution**
Pressure Indicators(s)
CI-1 Chlorophyll a concentration as an indicator of phytoplankton biomass
CI-2 Trends for selected priority chemicals including POPs and heavy metals
CI-3 Quantification and classification of beach litter items
CI-17.3- % of untreated wastewater
Status Indicator(s):
CI-9 Locations and frequency of algal blooms reported
CI-10.1 Status of selected pollutant contamination in biota and sediments and temporal trends
CI-10.2 Number of hotspots
CI-10.3 Trends in the ambient noise level measured by observation stations and/or with the use of models if appropriate (proposed additional indicator)
Response Indicator(s):
CI-16 % National action plans to reduce input from LBS ratified / operational
CI-17.1 % coastal urban population connected to swage facilities
CI-17.2 % of wastewater facilities complying with adequate standards
CI-18.1 % port waste reception facilities available
CI-18.2 Incentives to reduce land-based sources of marine litter
CI-18.3 Amount of recycled waste on land (%)

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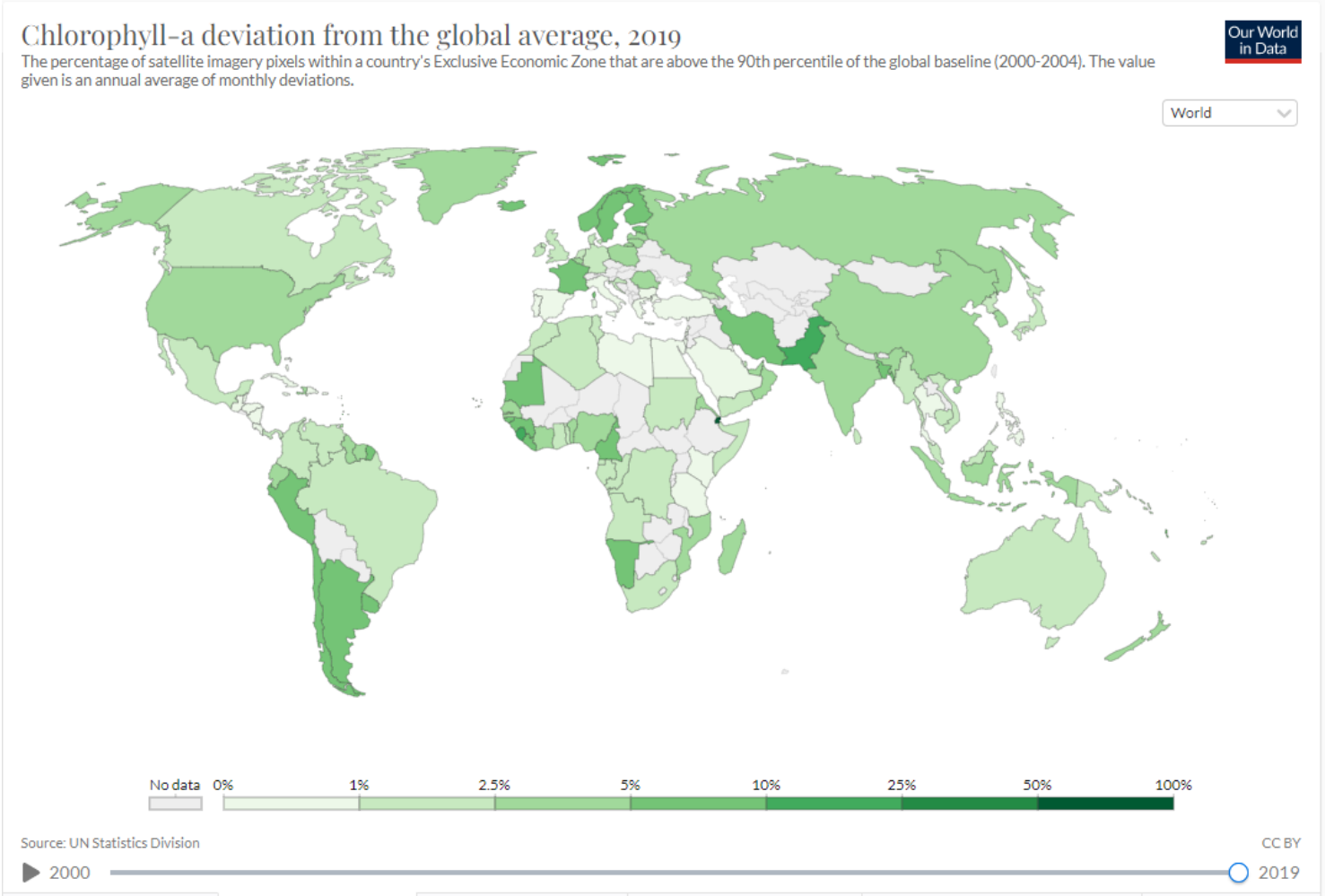
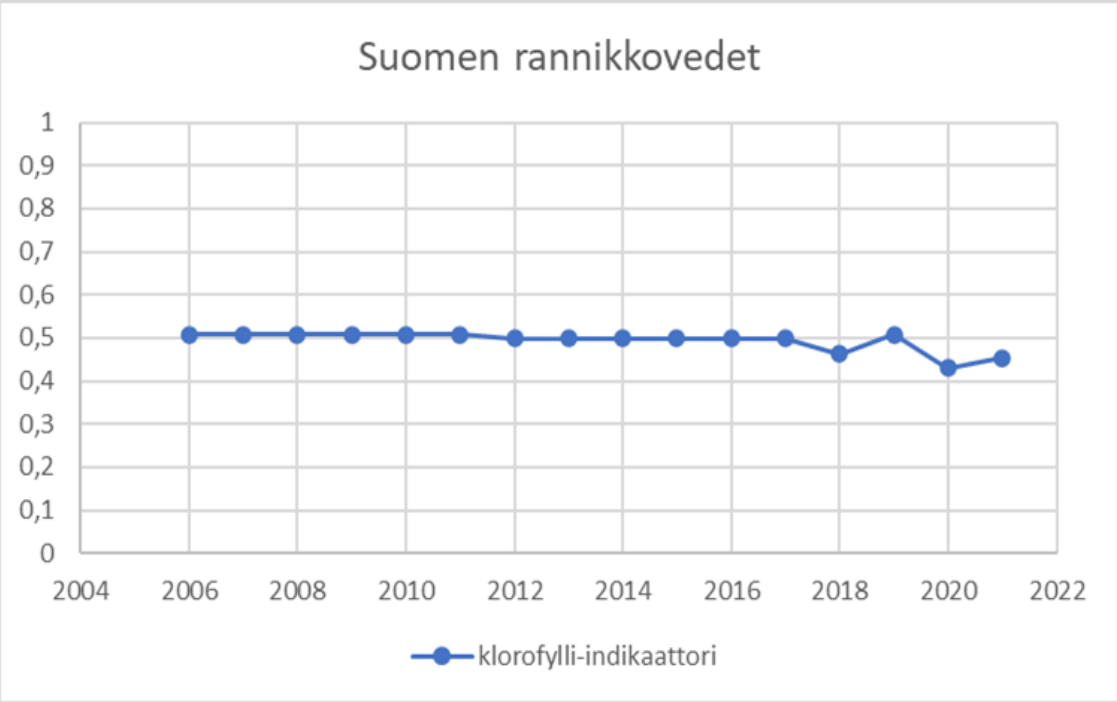
So far assessed: Level 1 (global)

Chlorophyll-a deviation from the global average



https://sdg-tracker.org/oceans

Finland has reported to UN SDG 14.1



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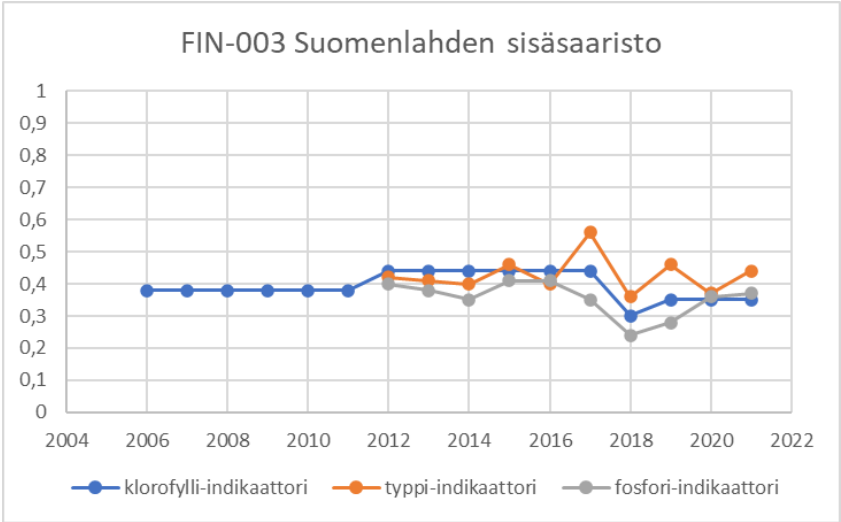
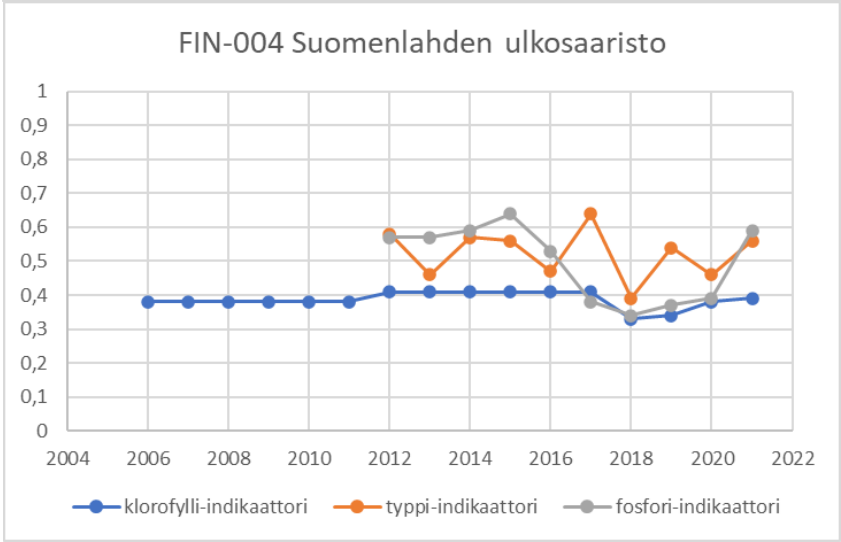
What could be easily added to SDG 14.1 – use what already exists

- More parameters: nitrogen, phosphorus, water transparency, bottom oxygen…
- Increase the spatial division: coastal – off-shore, coastal water types, smaller coastal water bodies…





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Take-home message

- Choosing and developing new indicators requires thorough work – adapting existing ones to new areas might be easier
- Report once – enjoy twice! ☺
- Instructions for SDG indicators are still vague, even contradicting, clearly under development
- Make sure what you are using the indicators for, who has the responsibility and where will they be used

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