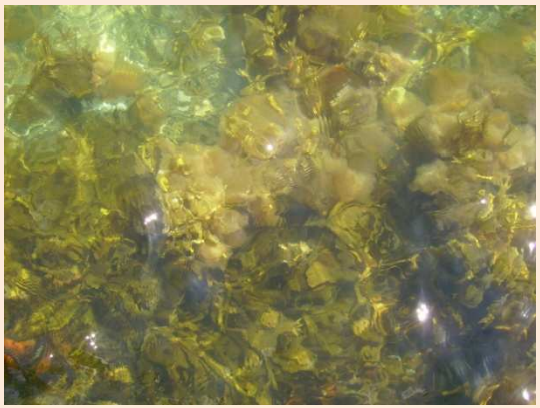
Reducing eutrophication in the Baltic Sea

Achievements and Challenges Ahead



Dr. Wera Leujak

Federal Environment Agency

Umwelt Bundes Amt
Für Mensch und Umwelt

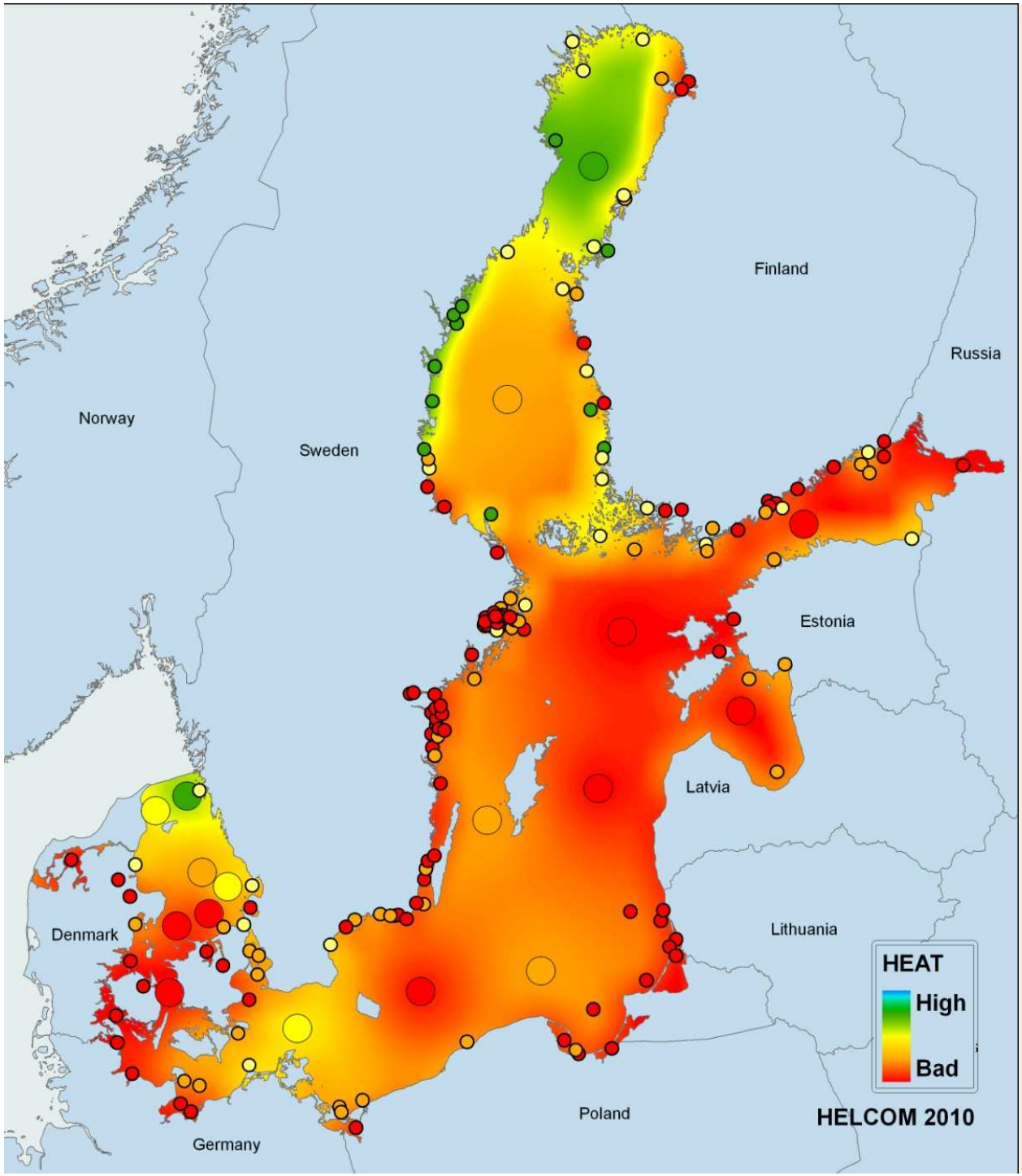
Conference „Wetlands for Clear Water“, Grüne Liga e.V., 24th-25th of March 2011

Presentation overview

I. Eutrophication status of the Baltic Sea
II. Achievements and challenges
III. The role of wetlands in combating eutrophication
IV. HELCOM & European Directives to tackle the problem
V. Conclusions

Source: ESA

- In July 2010 the largest carpet of blue-green algae seen in the Baltic Sea since 2005 was formed
- It covered almost 90% of the Baltic Sea (377,000 km^2)
- Estimated annual average waterborne inputs of nitrogen were app. **641,000 tonnes** and of phosphorus **30,200 tonnes**
- Baltic Sea is very sensitive to eutrophication effects since it is an enclosed sea with slow water renewal



- Eutrophication status of the Baltic Sea based on HEAT (HELCOM Eutrophication Assessment Tool; 2001-2006)

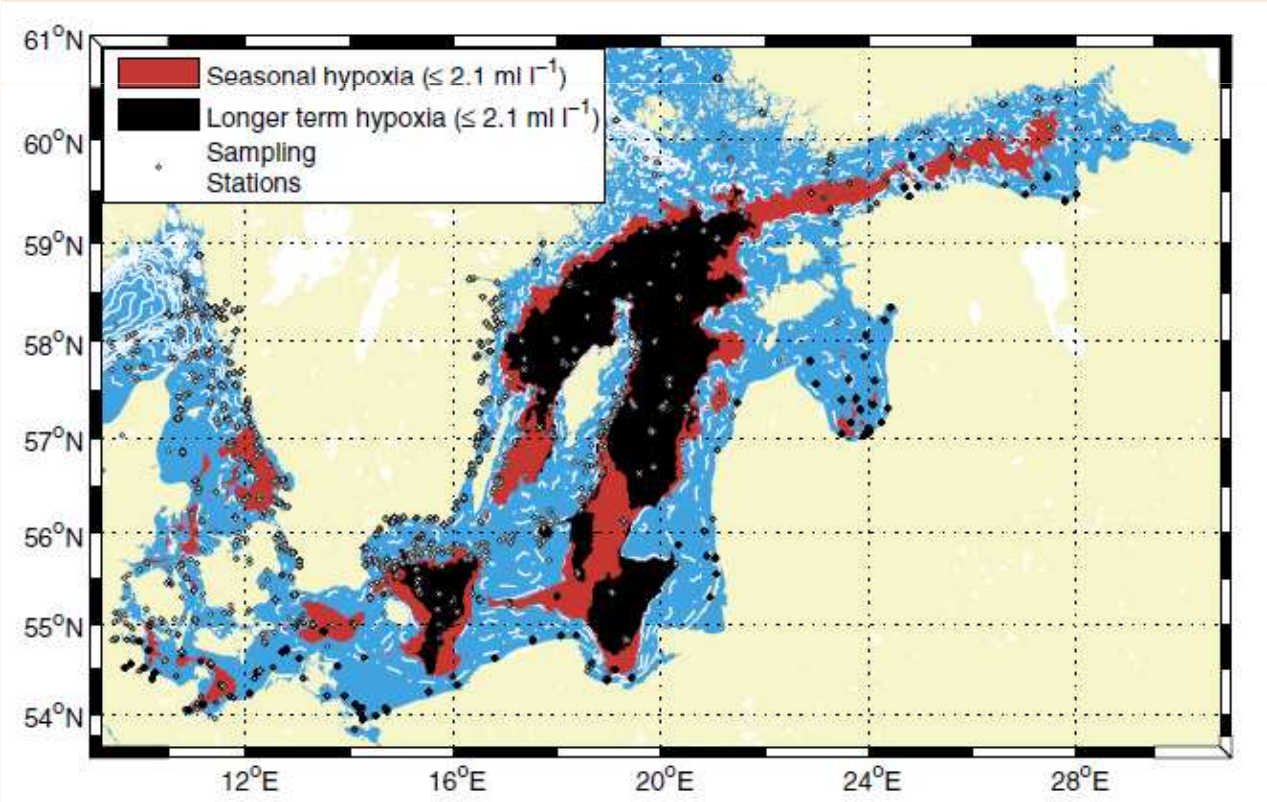
- Of the 189 investigated areas only 13 were classified as not eutrophied (Gulf of Bothnia and Northeastern Kattegat)

- HELCOM HOLAS 2010: "**Eutrophication and overfishing have been identified as the main threats to ecosystem services in the Baltic Sea**"

Primary or direct effects of eutrophication

- Increased production and biomass of phytoplankton
- Changes in phytoplankton species composition
- Toxic and nuisance algal blooms
- Reduced water clarity
- Reduced depth distribution of macrophytes due to shading
- Growth of epiphytes and nuisance macroalgae

Secondary or indirect effects of eutrophication



- Changes in species composition of macrozoobenthos
- Oxygen depletion in sediments and bottom water
- Mass death of macrozoobenthos due to lack of oxygen or hydrogen sulphide release
- Changes in species composition of zooplankton and fish

Source: HELCOM 2009

What are the sources of nutrient inputs?

Along the coast or in the catchment area

POINT SOURCES

- Sewage outfalls; MWWTPs
- Aquaculture
- 56% of phosphorus

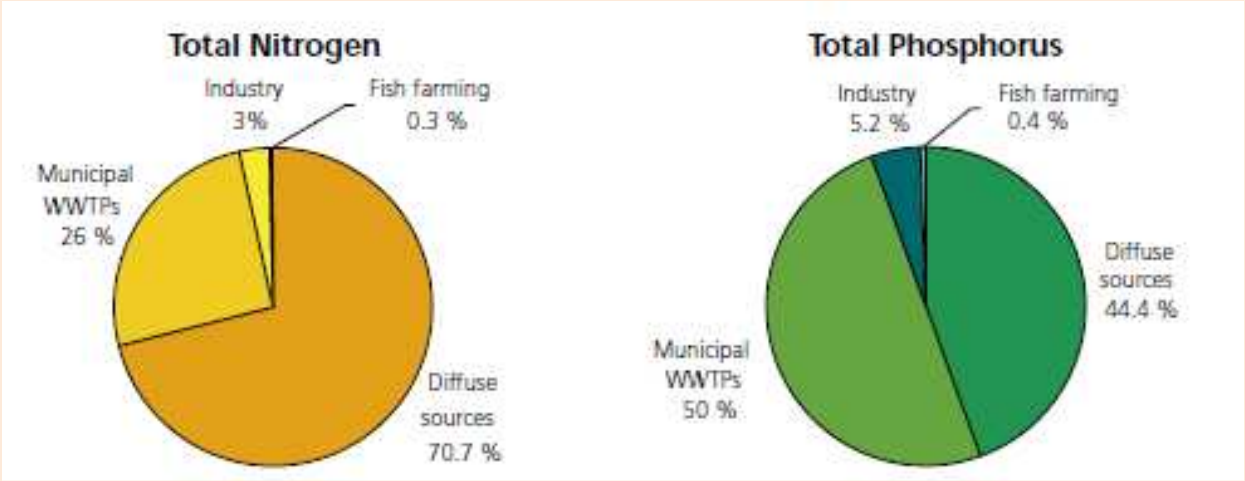
DIFFUSE SOURCES

- Agriculture
- Scattered dwellings
- 71% of nitrogen and 44% of phosphorus

ATMOSPHERIC DEPOSITION

- Agriculture
- Shipping

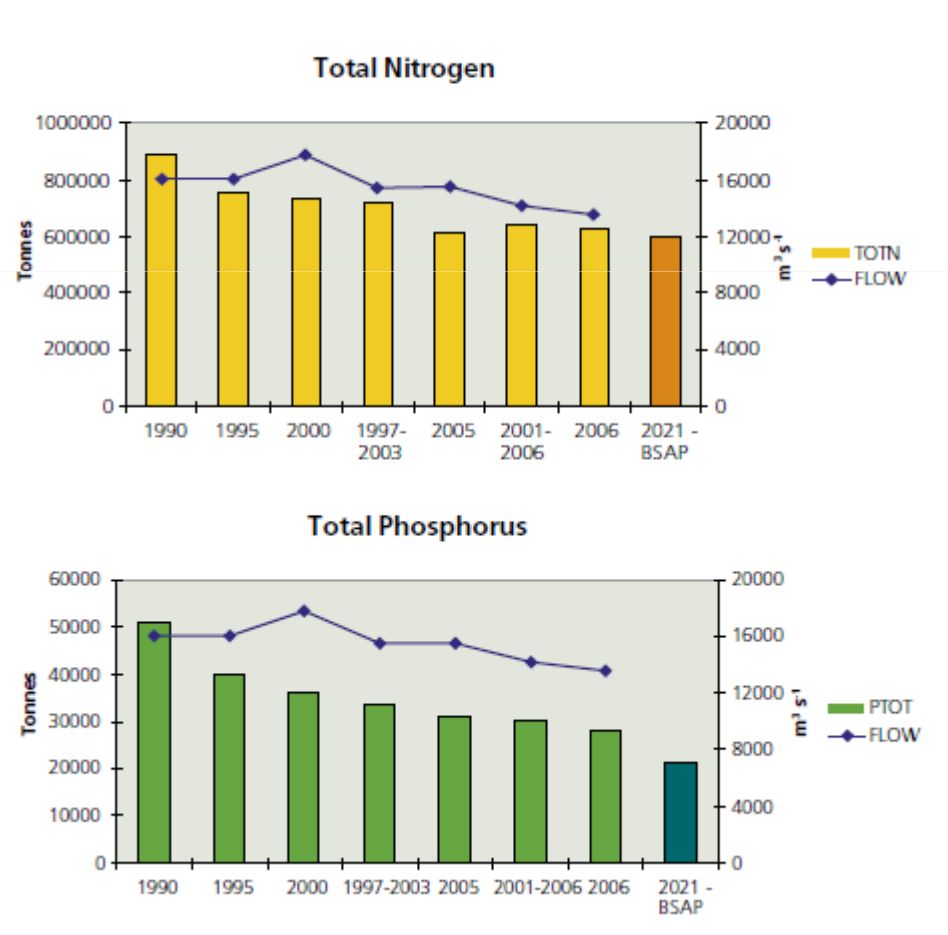
75% of N and 95% of P enter the Baltic Sea via rivers or as direct discharges
Atmospheric deposition of N is about 25%



Source HELCOM 2009

What has been achieved?

Trends in direct riverine and point-source loads of N and P in the Baltic Sea



Source: HELCOM 2009

- Anthropogenic inputs of N and P to the Baltic Sea have decreased since 1990 (Germany has reduced P by 76% and N by 50%)
- Successes especially due to tackling point-sources (MWWTPs, P-free detergents)
- Progress in reducing nutrient discharges from diffuse sources is slow
- Agriculture contributes about 80% of the diffuse load
- Atmospheric nitrogen deposition will increase in the future (shipping)

The role of wetlands in combating eutrophication

- Wetlands improve water quality by breaking down, removing, using or retaining nutrients, organic waste and sediment
- Wetlands are a good tool to reduce nutrients loads in particular from diffuse sources

BUT

- Wetlands are an “End of Pipe” measure since they reduce nutrients after they have been discharged
- Wetlands should not be used as a substitute for combating eutrophication at source

Even for diffuse nutrient loads from agriculture a number of possible measures exist:

- Reducing fertiliser input
- Practice of manure handling and fertiliser application
- Cultivating catch crops in winter
- Crop selection
- Buffer zones
- Cultivation (non-plough tillage)
- Avoiding ploughing up of grasland …

The Baltic Sea Action Plan BSAP

- The BSAP is one of the major programmes that HELCOM is currently implementing
- Adopted at the Ministerial Meeting in Krakow, Poland, in 2007 and reinforced at the Ministerial Meeting in 2010 in Moscow
- Can be seen as the first attempt by a regional marine protection convention to implement the ecosystem approach
- Its major goal is to achieve good ecological status in the Baltic Sea by 2021

The BSAP addresses eutrophication

Main goal is: **A Baltic Sea unaffected by eutrophication**

Ecological objectives

- ***Concentration of nutrients close to natural levels***
- ***Clear water***
- ***Natural level of algal blooms***
- ***Natural distribution and occurrence of plants and animals***
- ***Natural oxygen levels***

BSAP contains concrete and meaningful actions to reduce eutrophication (e.g. country-wise provisional nutrient reduction requirements)

	Phosphorus (tonnes)	Nitrogen (tonnes)
Denmark	16	17,210
Estonia	220	900
Finland	150	1,200
Germany	240	5,620
Latvia	300	2,560
Lithuania	880	11,750
Poland	8,760	62,400
Russia	2,500	6,970
Sweden	290	20,780
Transboundary Common pool	1,660	3,780

The role of wetlands in the BSAP

- Wetlands are mentioned as an example for measures reducing N and P losses from agriculture (under farming infrastructure and alongside buffer zones)
- Definition of these wetlands is very broad: „ … can be natural or artificial, permanent or temporary, with water that is static or flowing, fresh or brackish. The wetland may be a wet grassland, wet woodland, reed bed, bog, sedimentation pond or lake.“

Effectiveness

Depends on the size of the wetland, vegetation, loading and influx

Costs

Expensive to implement and their construction will often involve the loss of some agricultural land

Constructed wetlands require maintenance due to deposition of sediment and organic matter

The EU Strategy for the Baltic Sea Region

- Adopted in June 2009; comprehensive strategy for a macro-region addressing environmental, economic and social concerns of the region
- Action Plan identifies 15 priority areas and 4 thematic pillars
- Priority areas are implemented through detailed action; flagship projects are described
- Theme 1: to make the Baltic Sea region an environmentally sustainable place
- 1. To reduce nutrient inputs to the sea to acceptable levels
  - Strategic actions: e.g. implementation of BSAP & WFD; practices which reduce nutrient loss from farming
  - Cooperative actions: **„Establish and restore more wetlands“ to recycle nutrients and to mitigate floods**

Financing mechanisms for wetlands

HELCOM

- By March 2011 all HELCOM Contracting Parties have presented NIPs documenting progress in the implementation of the BSAP
- These NIPs are analysed and evaluated by the HELCOM NIP project

Number of mechanisms supporting the BSAP implementation process:

- BSAP Trust Fund managed by NEFCO (Nordic Environment Finance Co-operation) & NIB (Nordic Investment Bank) → facilitate and speed up preparation of bankable projects

EU

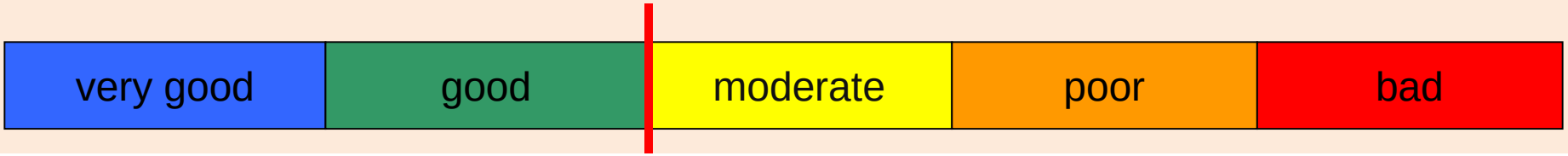
- Support BSAP implementation and EU strategy for the Baltic Sea Region
- E.g. EU Baltic Sea Region Progamme 2007-2013; LIFE+
- European Agriculture Fund for Rural Development (EAFRD)

Private Foundations

- Raise funds and gather public and private commitment to improve marine environment of the Baltic Sea (e.g. Baltic Sea 2020)

The EC Water Framework Directive

- Came into force in December 2000
- Takes a river basin approach to water management
- Implements the ecosystem approach
- Obliges EU Member States to achieve or maintain „good chemical and good ecological status“ of their surface and ground waters (includes coastal waters up to 1nm from the baseline, 12 nm for chemical status)
- Stepwise implementation approach: analysing water uses, impacts & pressures; establish monitoring programmes; identify and implement programmes of measures; evaluate the impact of programmes



The WFD and wetlands

- Preamble: refers to a communication adapted by the Commission in 1995 “on the **wise use and conservation of wetlands”;** recognises the important functions wetlands perform for the protection of water resources
- Article 1: purpose of the Directive is to establish a framework that: „prevents further deterioration and protects and enhances the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and **wetlands** directly depending on the aquatic ecosystems“
- Part B Annex VI: list of supplementary measures: „**Recreation and restoration of wetlands**“

Status of German coastal waters under the WFD

- Coastal waters were assessed in 2008
- In the German Baltic Sea 44 water bodies were assessed
- Failure to reach good ecological status mainly due to eutrophication effects (phytoplankton, macrophytes)

very good 0%	good 2%	moderate 32%	poor 50%	bad 16%

Source: Reimers LLUR

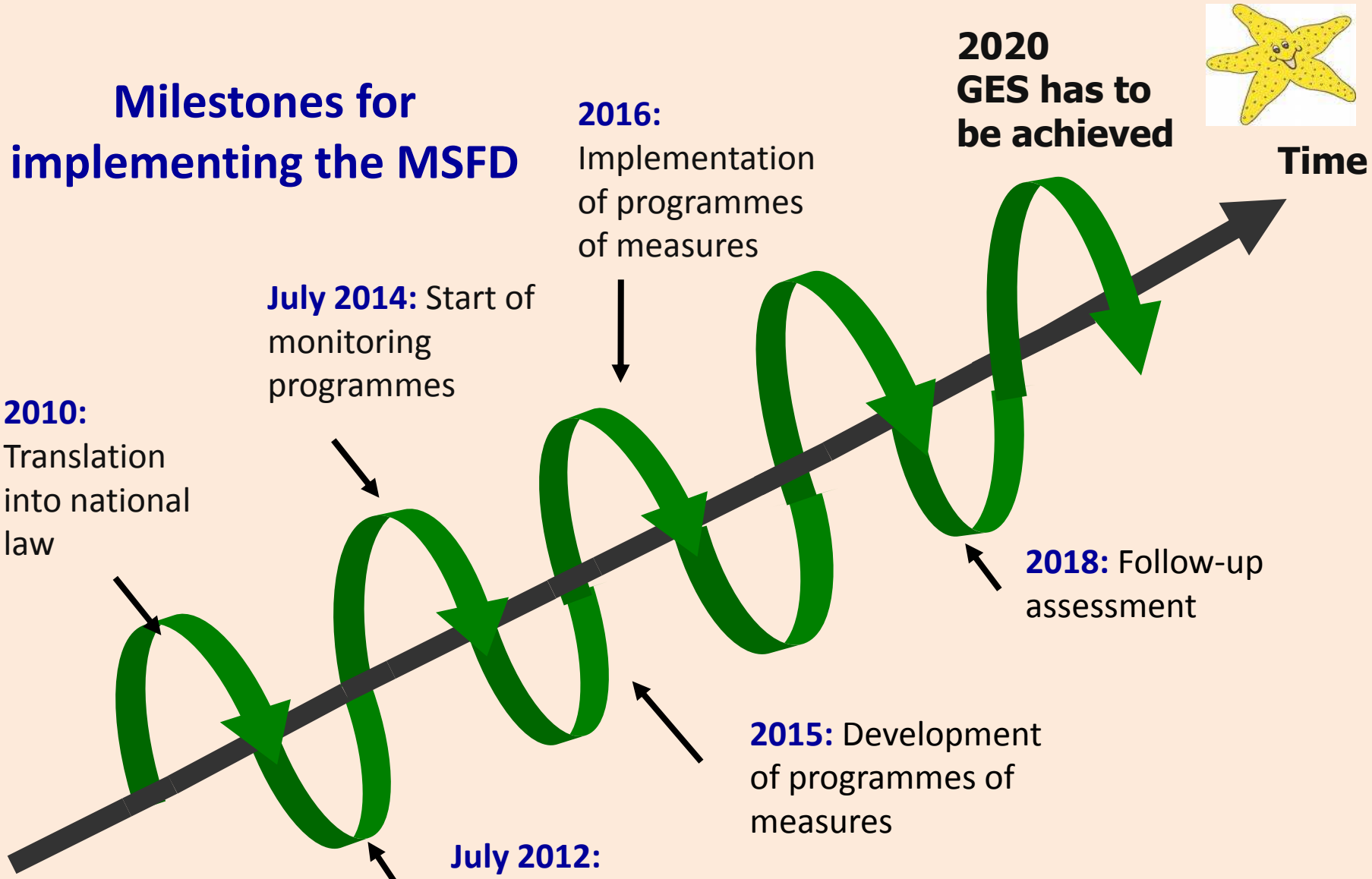
The WFD River Basin Management Plans

- First RBMPs were drafted for the period 2009-2015
- Are not very explicit on specific measures including measures to combat eutrophication effects
- RBMPs acknowledge the protection and restoration of wetlands as an important measure to reach good ecological status but no concrete figures provided

The EC Marine Strategy Framework Directive

- Came into force in July 2008
- Environmental pillar of the integrated EU maritime policy
- Ecosystem-based approach to management of human activities which supports the sustainable use of marine goods and services
- Overarching goal is to achieve or maintain „Good Environmental Status“ (GES) by 2020 across Europe’s marine environment (EEZ of Member States – 200 nm)
- Stepwise implementation process (full management cycle)

Milestones for implementing the MSFD



The MSFD and eutrophication

- GES should be determined by reference to a series of 11 descriptors
- Descriptor 5 (Annex I): „**Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms and oxygen deficiency in bottom waters**“
- Eutrophication effects are also captured by other „status“ descriptors: D1 biodiversity, D4 food webs, D6 seafloor integrity
- Initial assessment needs to include pressures and impacts listed in table 2 of Annex III: nutrient and organic matter enrichment
- Are additional nutrient reductions going beyond WFD measures for the rivers necessary?

Conclusions

- Eutrophication is one of the most serious threats affecting the Baltic Sea and other European coastal waters
- Measures to combat eutrophication are demanded by the HELCOM BSAP, the EU Strategy for the Baltic Sea region, the WFD and MSFD
- While progress has been made in reducing nutrient discharges tackling diffuse sources is challenging
- Wetlands with their nutrient retention capacities are one of the tools for reducing nutrient loads in particular for diffuse sources
- Recreation and restoration of wetlands should feature more prominently in the RBMPs and in the upcoming programmes of measures for the MSFD

Thank you for listening

wera.leujak@uba.de

Umwelt Bundes Amt
Für Mensch und Umwelt

Quellenangaben

1) Wasserwirtschaft in Deutschland. Teil 2 – Gewässergüte. Umweltbundesamt. Juli 2010. http://www.umweltbundesamt.de/uba-info-medien/mysql_medien.php?anfrage=Kennummer&Suchwort=3470
2) HELCOM Baltic Sea Action Plan. Helsinki Commission 2007. http://www.helcom.fi/BSAP/ActionPlan/en_GB/ActionPlan/
3) Eutrophication in the Baltic Sea. An integrated thematic assessment of the effects of nutrient enrichment in the Baltic Sea region. Baltic Sea Environment Proceedings 115A. Helsinki Commission 2009. www.helcom.fi/stc/files/Publications/.../bsep115A.pdf
4) Ecosystem Health of the Baltic Sea. HELCOM Initial holistic assessment. Baltic Sea Environment Proceedings 122. www.helcom.fi/BSAP_assessment/en_GB/holas
5) Ökologische Zustandsbewertung der deutschen Übergangs- und Küstengewässer 2009 (Ecological Assessment of German Transitional and Coastal Waters 2009) . Voß, J.; Knaack, J.; von Weber, M. http://www.blmp-online.de/Seiten/Berichte.html
6) European Parliament and the Council of the European Union (2000) DIRECTIVE 2000/60/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 October 2000 establishing a framework for Community action in the field of water *policy.* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0060:EN:NOT
7) European Parliament and the Council of the European Union (2008) DIRECTIVE 2008/56/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive). www.ices.dk/projects/Directive.pdf
8) EU Strategy for the Baltic Sea region. http://ec.europa.eu/regional_policy/cooperation/baltic/