Ecological assessment for management of European marine and fresh waters

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JRC EUROPEAN COMMISSION

ies Institute for Environment and Sustainability

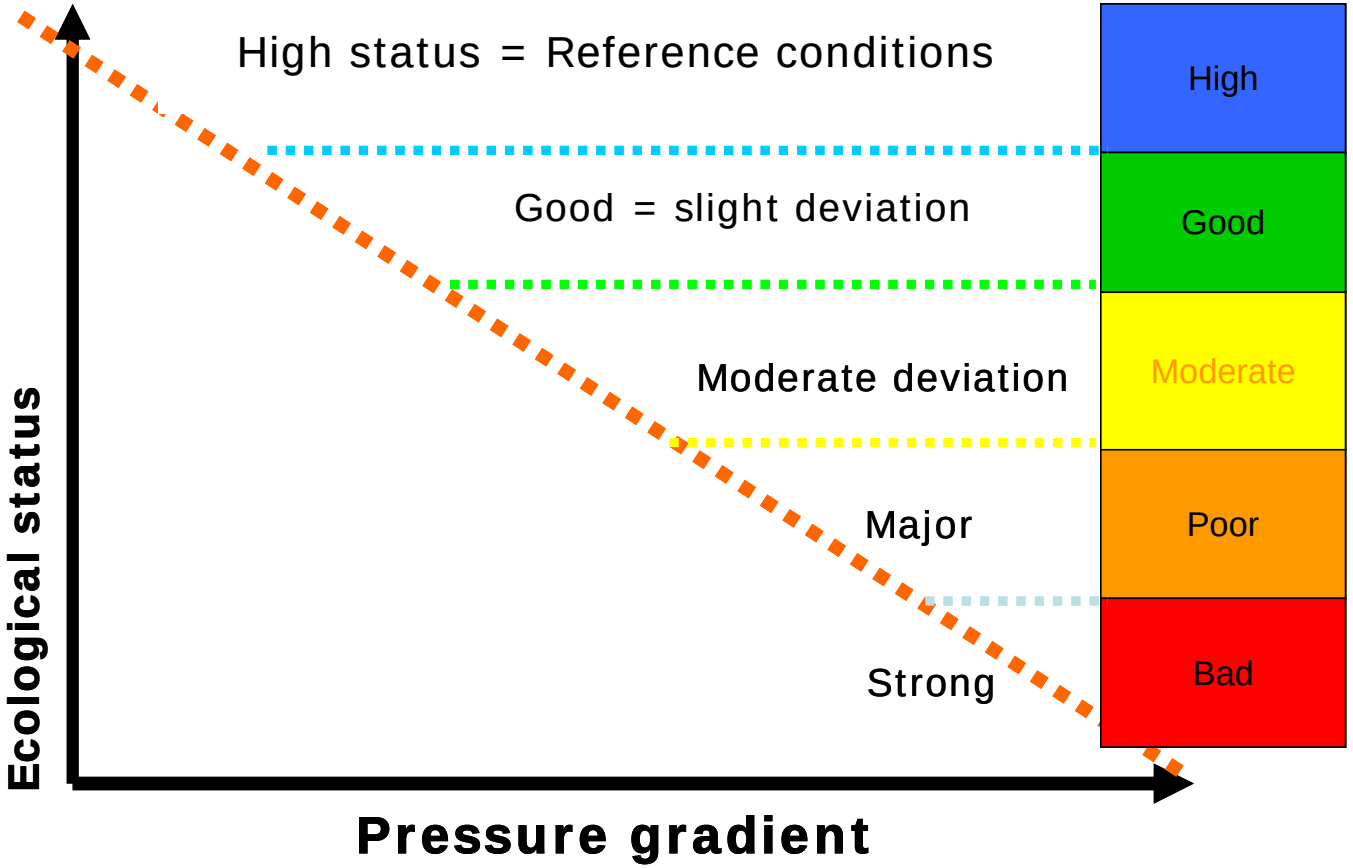
The aim

- Current state-of-the art in ecological assessment
  - under Water Framework Directive
  - and Marine Strategy Framework Directive
- Define the main achievements and gaps
- Challenges ahead ?

WATER FRAMEWORK DIRECTIVE:

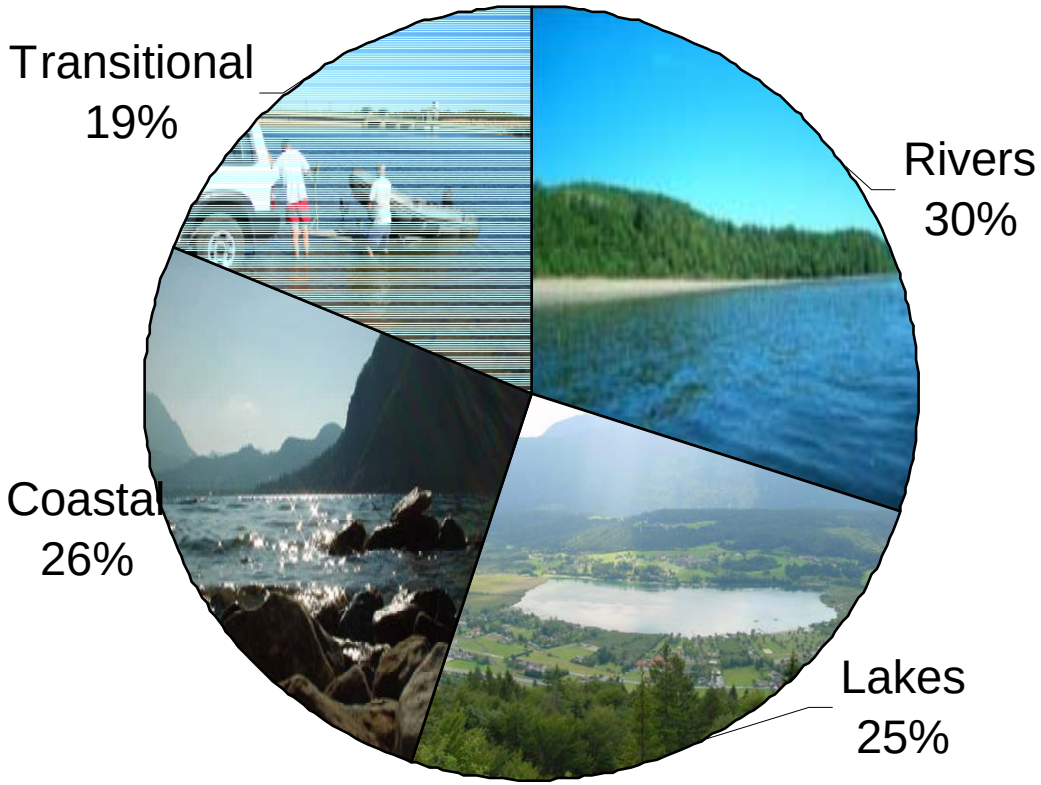
Good ecological status

- **Biological quality elements**
- **Assessment based on the deviation from reference conditions**

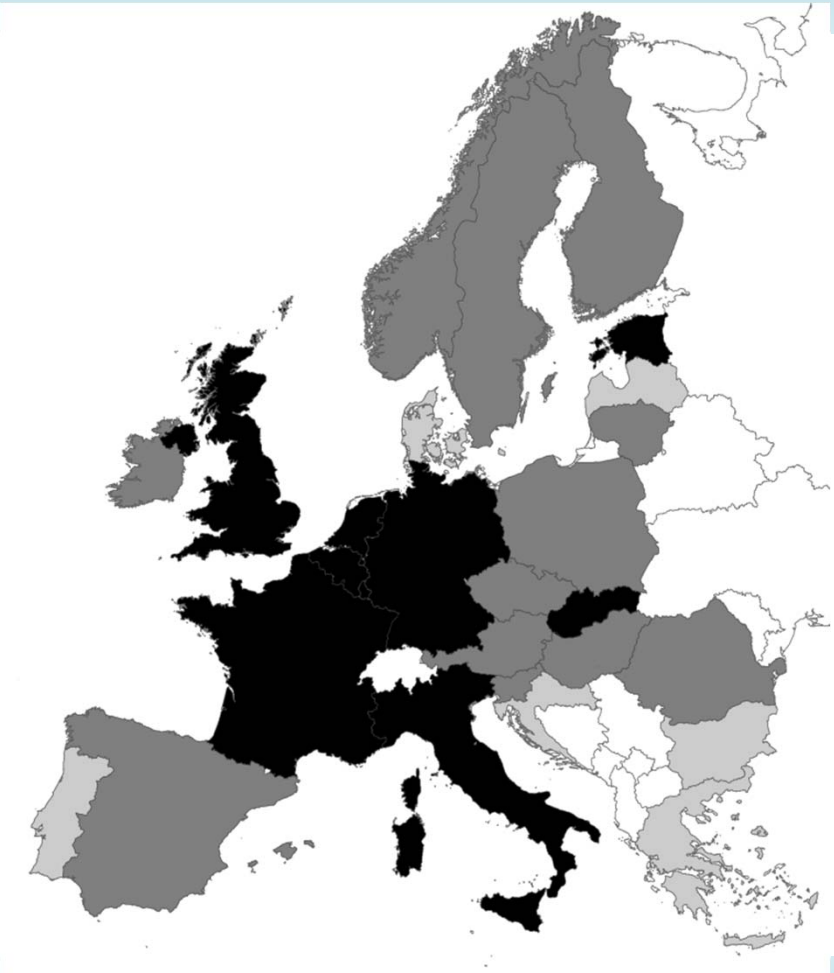


WFD ecological assessment methods

297 methods reported



Are all methods developed ?

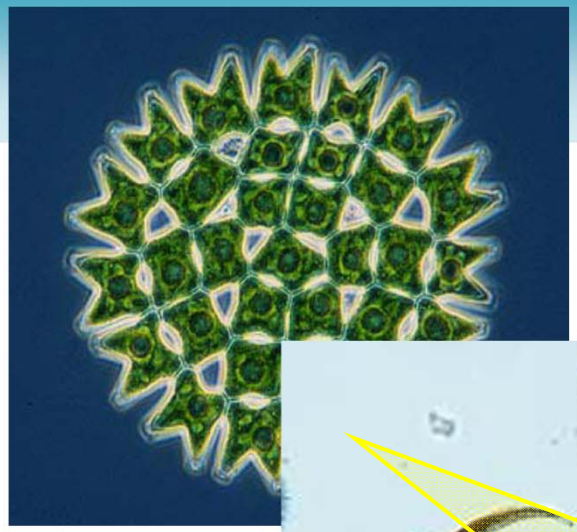


Black: >75%
Dark grey: 50% – 75%
Light grey: <50%

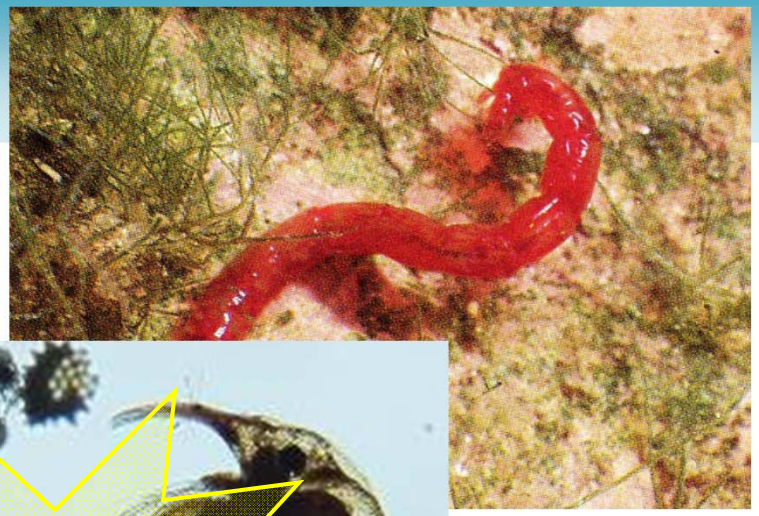
WFD assessment methods:

- Ca 300 methods available now !
- Only 66% of the required number of assessment methods
- The main gaps: Eastern and Southern EU
- Few methods for transitional waters

WHAT DO WE MEASURE: Biological Quality Elements

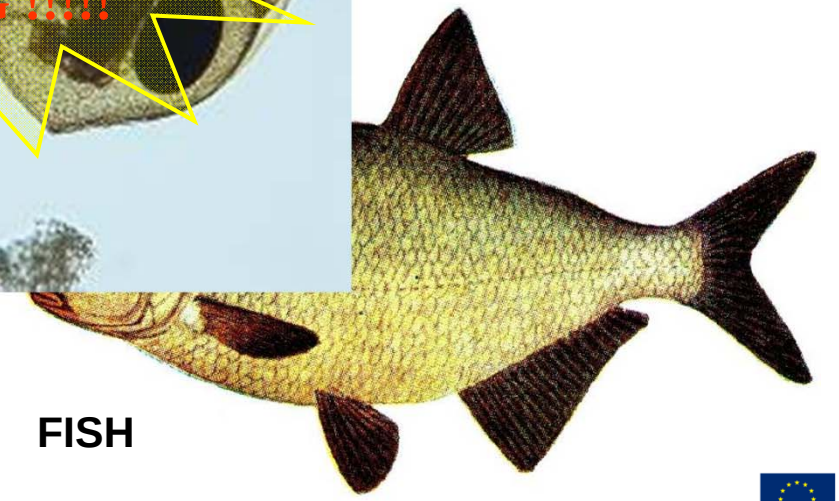


PHYTOPLANKTON



BENTHIC INVERTEBRATES

MACROPHYTES



FISH

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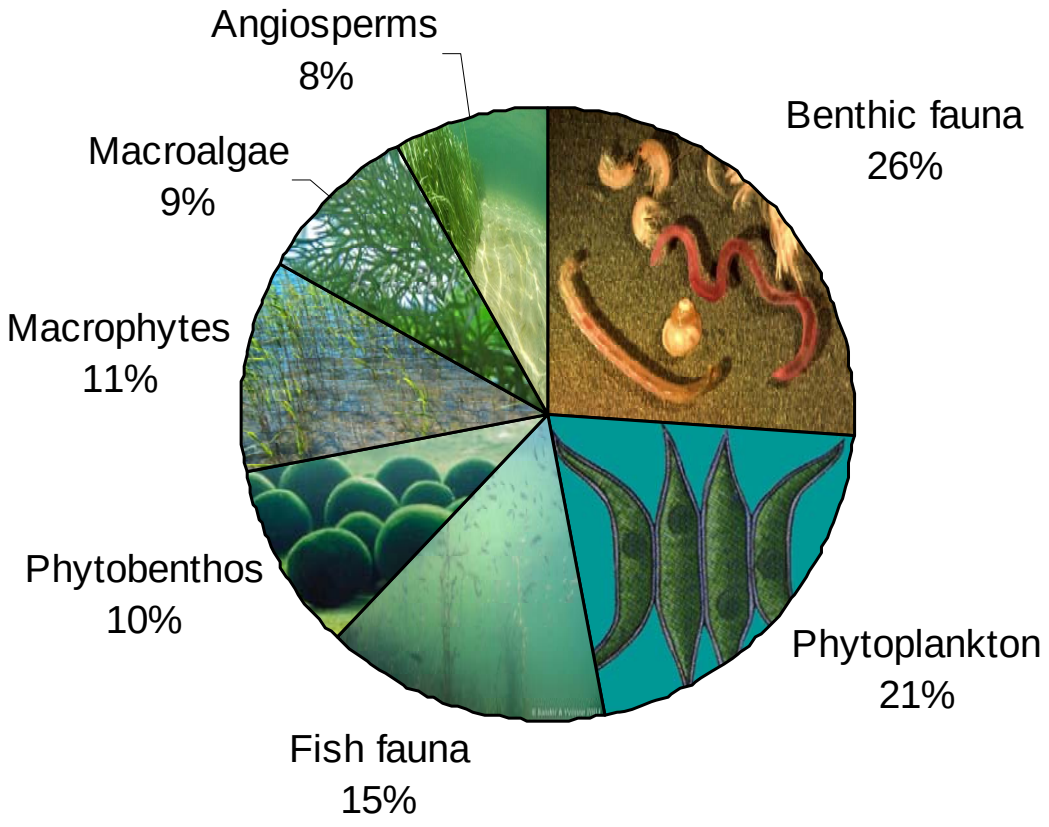
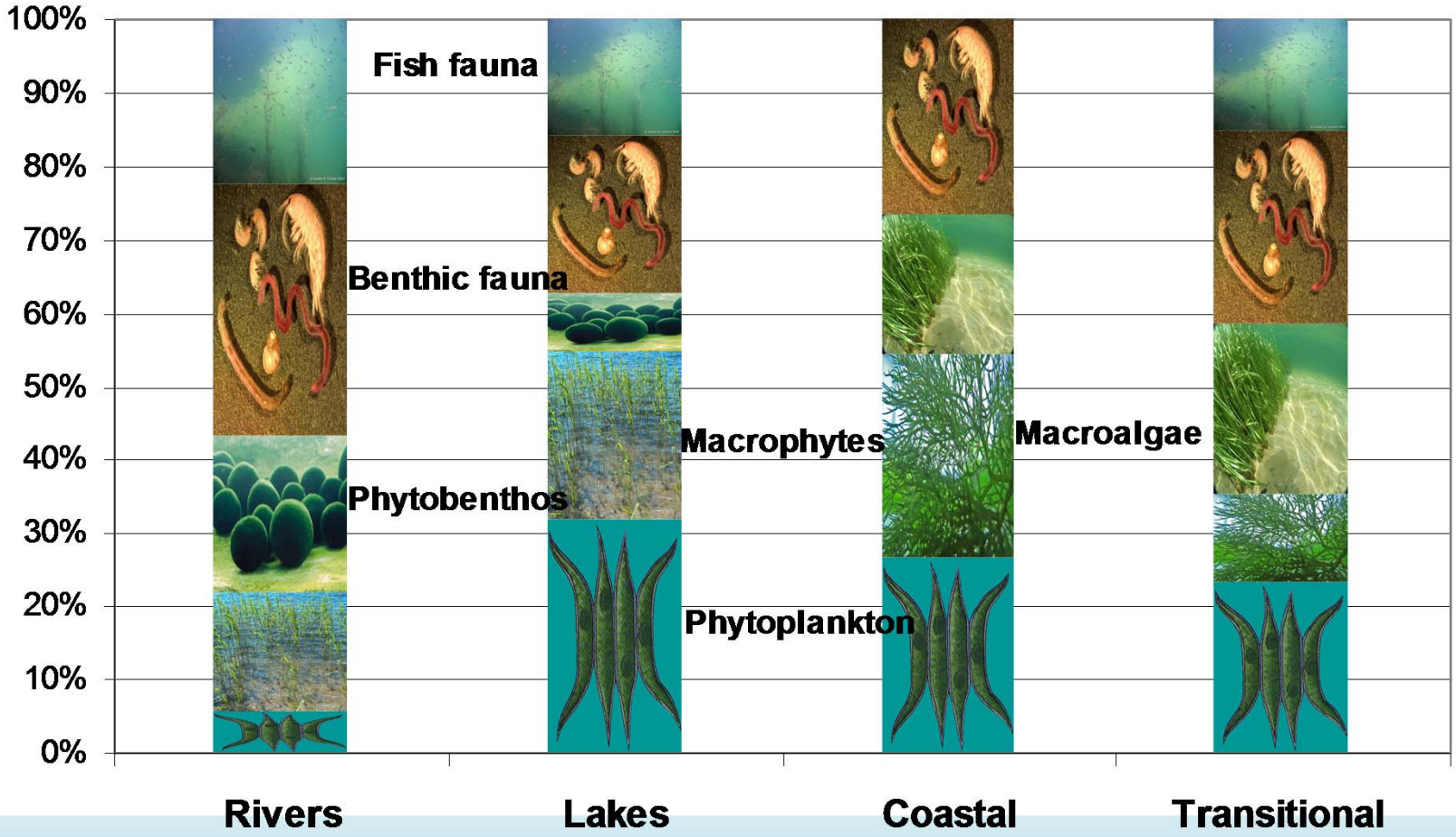
WFD ecological assessment



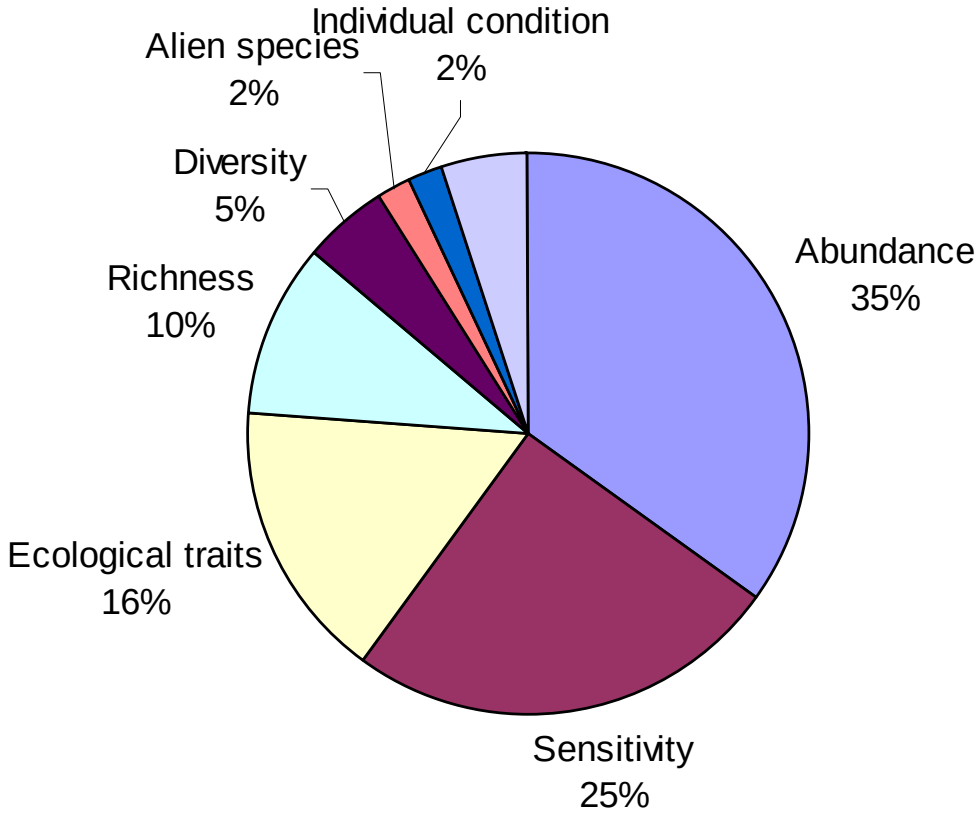
WFD ecological assessment



WFD ecological assessment

- Most widely adopted:
  - Rivers-benthic invertebrates and
  - Lakes-phytoplankton
- Less adopted:
  - Phytoplankton in rivers and phytobenthos in lakes,
  - also fish fauna in lakes and coastal waters

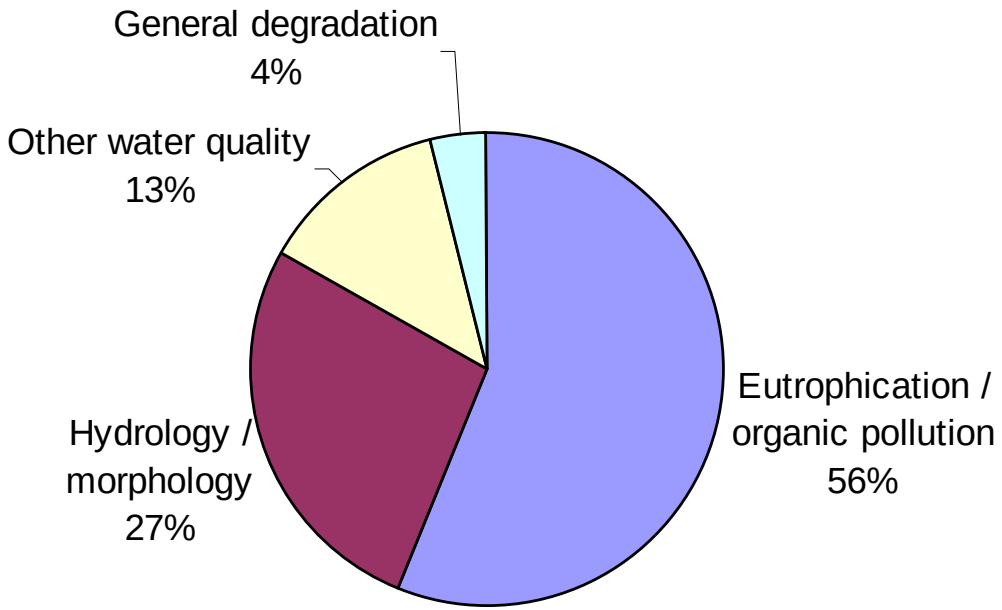
Metrics in WFD assessment



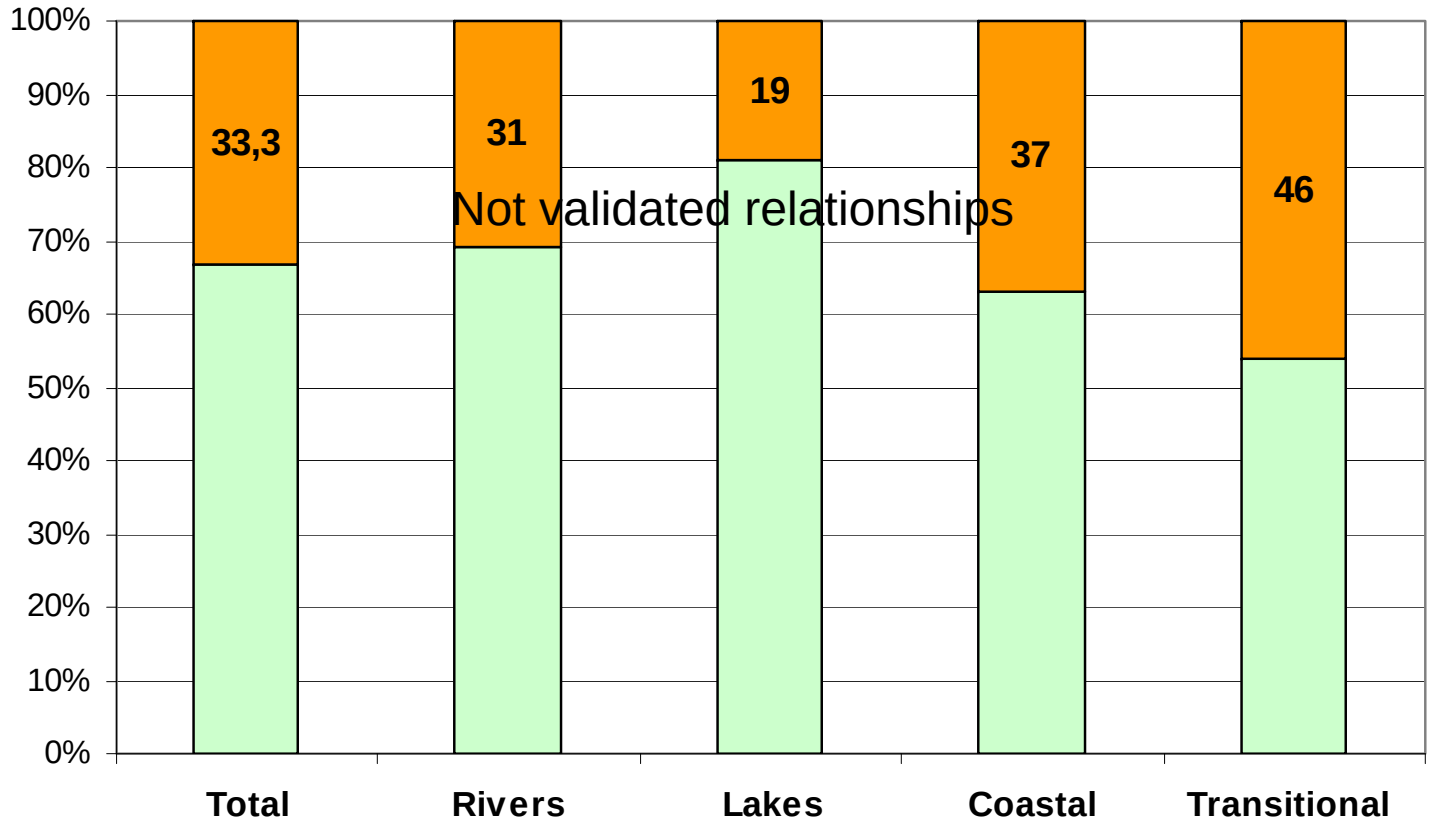
Metrics in WFD assessment

- Ecological status = structure and functioning of aquatic ecosystems
- Only structural metrics measured
- Good structure = good functioning ?

Pressures addressed in WFD ecological assessment



Pressure – response relationships

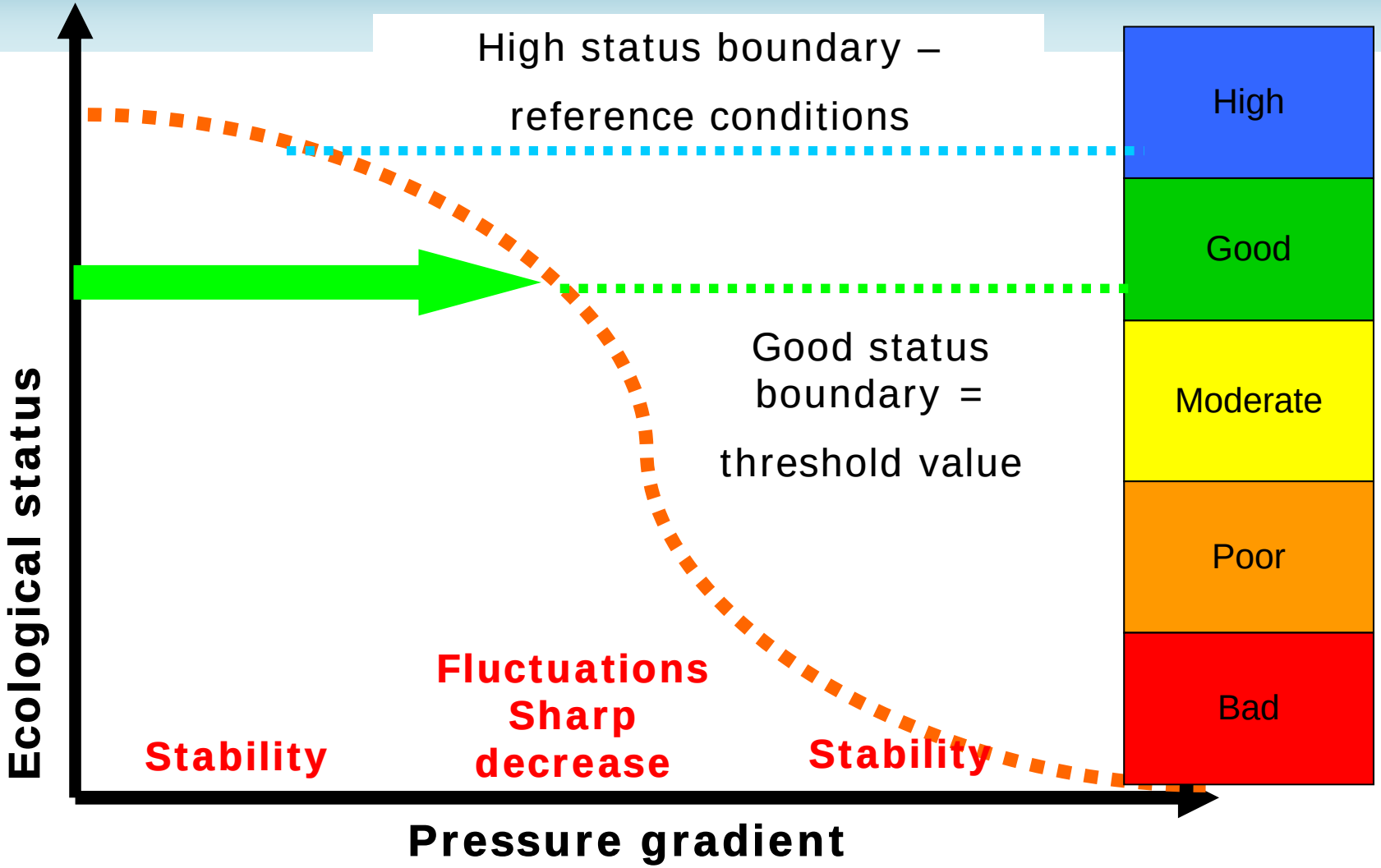


Pressure – response relationships

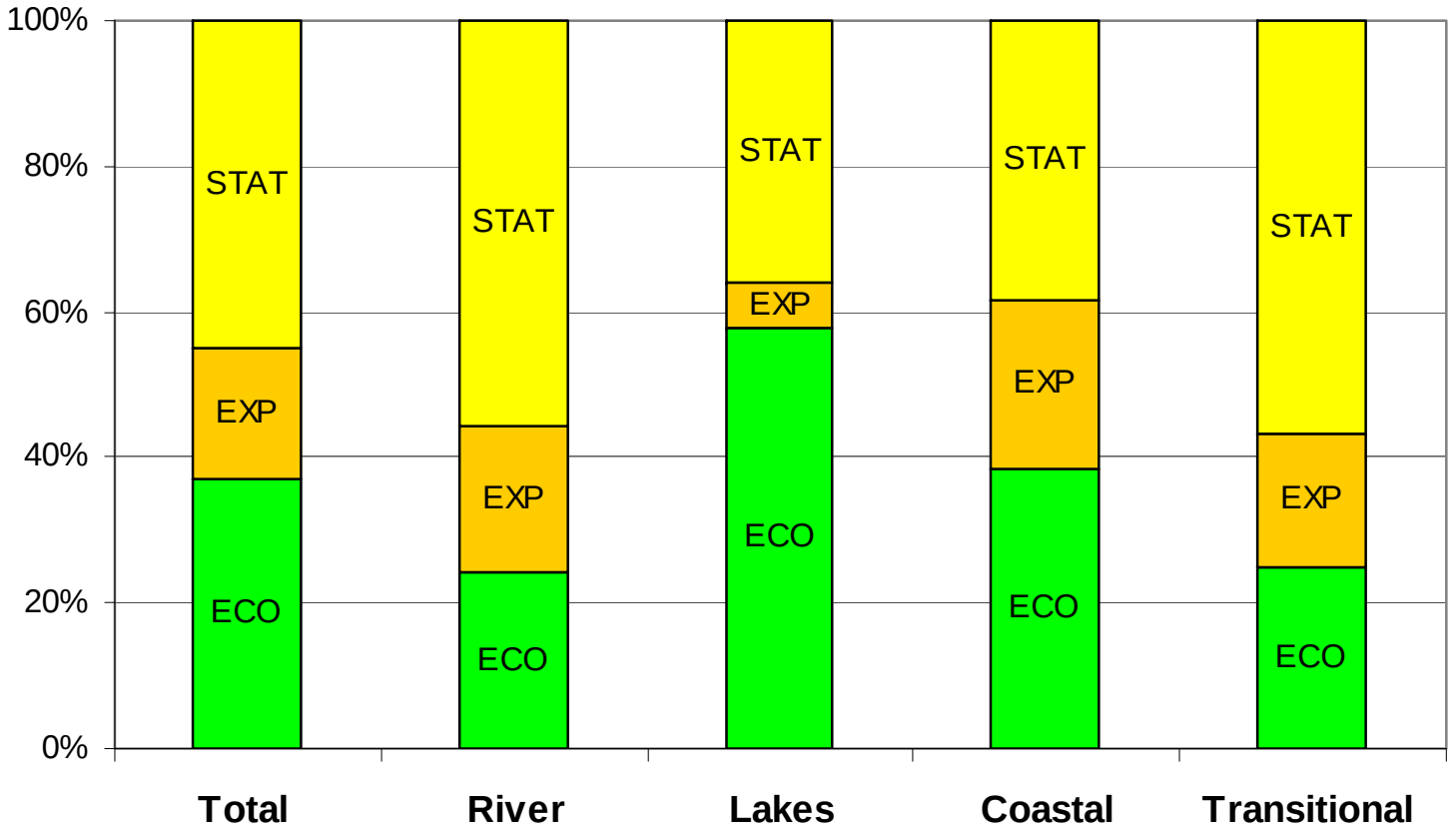
- High number of methods with untested pressure-response relationships : what do these methods actually assess ?

- A need to better understand cause-effect realtionships
  - For BQEs: fish and plants
  - For HyMo and other pressures
  - For coastal and transitional waters

Boundary setting approaches



Boundary setting



Boundary setting

- Mostly based on statistical principles, mostly equal division
- Only 37% use ecological approach
- Reasons – lack of pressure-response relationships,
- No guarantee that ecological boundaries correspond to meaingfull changes

WFD ecological assessment ?

- 300 assessment methods for coastal and freshwaters
- Still many gaps
  - Work not complete
  - Pressure-response relationships
  - Ecological boundary setting

Marine Strategy Framework Directive (2008)

- To protect more effectively the marine environment across Europe
- Good Environmental Status by 2020

Major steps

- 11 decriptors in the MSFD (2008)
- Definition of methodological criteria and standards (EC Decision - Sept 2010)
- Setting targets and indicators (July 2012)

11 qualitative descriptors of GES

1: Biological diversity

2: Non-indigenous species

3: Population of commercial fish / shell fish

4: Elements of marine food webs

5: Eutrophication

6: Sea floor integrity

11 qualitative descriptors of GES

7: Alteration of hydrographical conditions

8: Contaminants

9: Contaminants in fish and seafood

10: Marine litter

11: Introduction of energy (inc. noise)

Marine strategy:

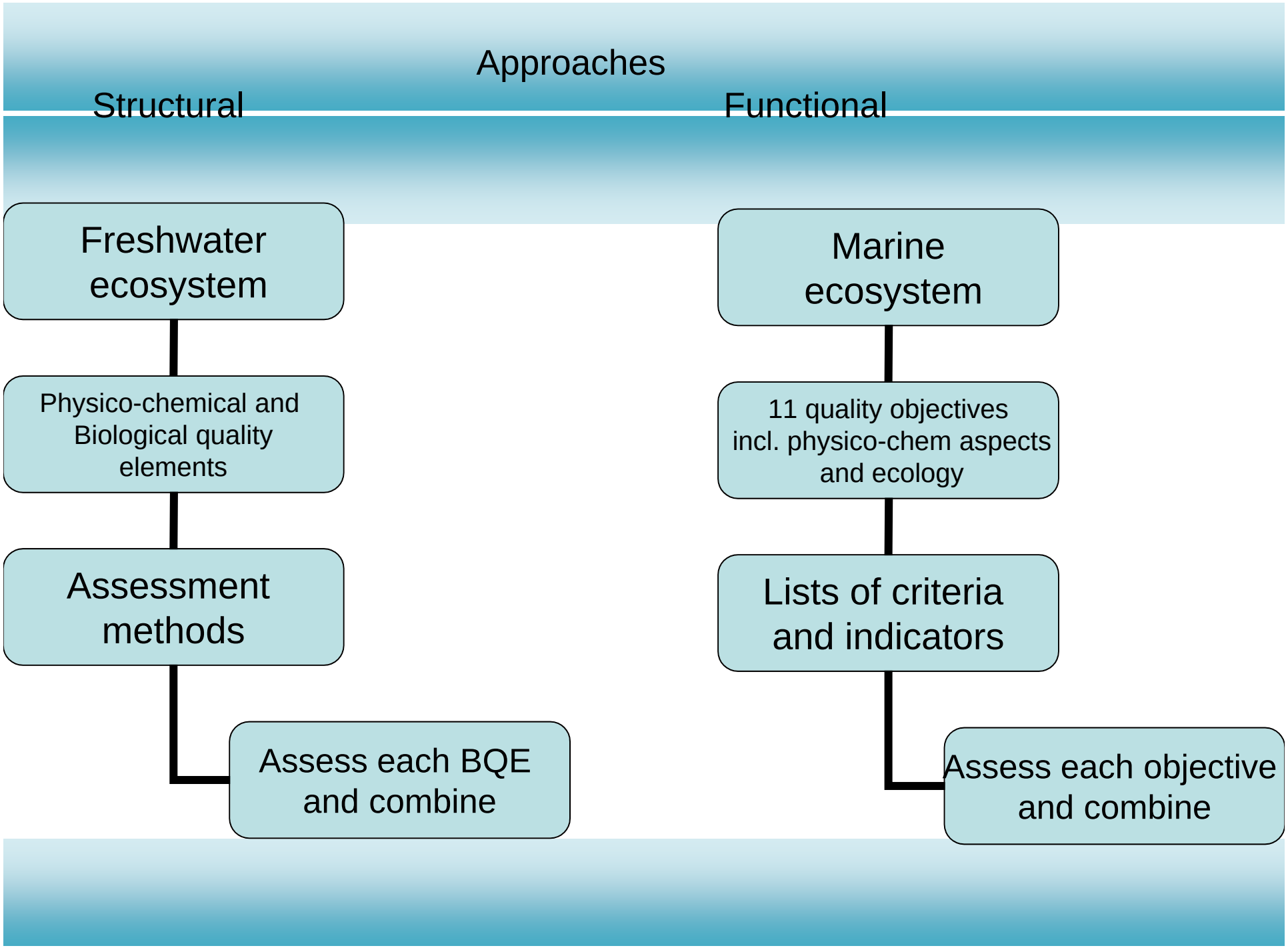
- Descriptor 5: human-induced eutrophication is minimised, esp adverse effects
- Criteria:
  - 5.1 nutrient levels
  - 5.2. direct effects, e.g., chl-a, water transparency, opportunistic macroalgae
  - 5.3. indirect effects, e. g., abundance of perennial seeweeds and seagrasses, oxygen concentration

Target setting, definition and assessment of GES

- A JRC/ICES Task Group Report
  - summarizing the state of the art for descriptor
  - suggesting indicators and approaches to define GES and targets
- 27 Criteria & 54 Indicators adopted by the EC decision (2010)
- Profit of and coherence with other relevant EU & international legislation

Target setting, definition and assessment of GES

- Many criteria and indicators require further refinement in order to become operational
- Need for development of suitable methods to assess indicators, particularly for some descriptors (e.g. litter and noise)
- Some existing concepts relevant to GES:
  - Good Ecological Status (WFD)
  - Favorable conservation Status (Habitats Dir.)
  - No problem area (OSPAR)


Approaches
Structural
Functional
Freshwater ecosystem
Physico-chemical and Biological quality elements
Assessment methods
Assess each BQE and combine
Marine ecosystem
11 quality objectives incl. physico-chem aspects and ecology
Lists of criteria and indicators
Assess each objective and combine

Challenges ahead

- Marine environment:
  - 2 directives overlapping
  - Many of the methods, tools, indicators, targets of the WFD could be used in the MSFD
  - Harmonised transition from coastal to marine
- WFD:
  - Stronger links to pressures and to functional targets
  - ecological status – ecosystem service

THANK YOU !