ARISTOTLE UNIVERSITY OF THESSALONIKI

OPEN ACADEMIC COURSES

River Water Quality

Section **1**: Water Framework Directive

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Ευρωπαϊκή Ένωση
Ευρωπαϊκό Κοινωνικό Ταμείο
ΕΠΙΧΕΙΡΗΣΙΑΚΟ ΠΡΟΓΡΑΜΜΑ
ΕΚΠΑΙΔΕΥΣΗ ΚΑΙ ΔΙΑ ΒΙΟΥ ΜΑΘΗΣΗ
επένδυση στην κοινωνία της γνώσης
ΥΠΟΥΡΓΕΙΟ ΠΑΙΔΕΙΑΣ & ΘΡΗΣΚΕΥΜΑΤΩΝ, ΠΟΛΙΤΙΣΜΟΥ & ΑΘΛΗΤΙΣΜΟΥ
ΕΙΔΙΚΗ ΥΠΗΡΕΣΙΑ ΔΙΑΧΕΙΡΙΣΗΣ
ΕΣΠΑ 2007-2013
πρόγραμμα για την ανάπτυξη
ΕΥΡΩΠΑΪΚΟ ΚΟΙΝΩΝΙΚΟ ΤΑΜΕΙΟ
Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης

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The Water Framework Directive 2000/60/EC (WFD)

WFD Characterization-Typology-Classification

Section Contents

1. Characterization of Water Body types
2. Typology
3. Reference Conditions
4. Classification of Ecological Status
5. Presentation of monitoring results
6. Chemical status
7. Commentary

Characterization of Water Body Types

- Identify location & boundaries of bodies of surface water
- Categorize into surface water category:
  - ✓ rivers, lakes, transitional waters or coastal waters **AND**
  - ✓ As natural, protected, artificial or heavily modified surface water bodies

For each category, the surface water bodies within the river basin shall be differentiated according to types using “System A" or “B“

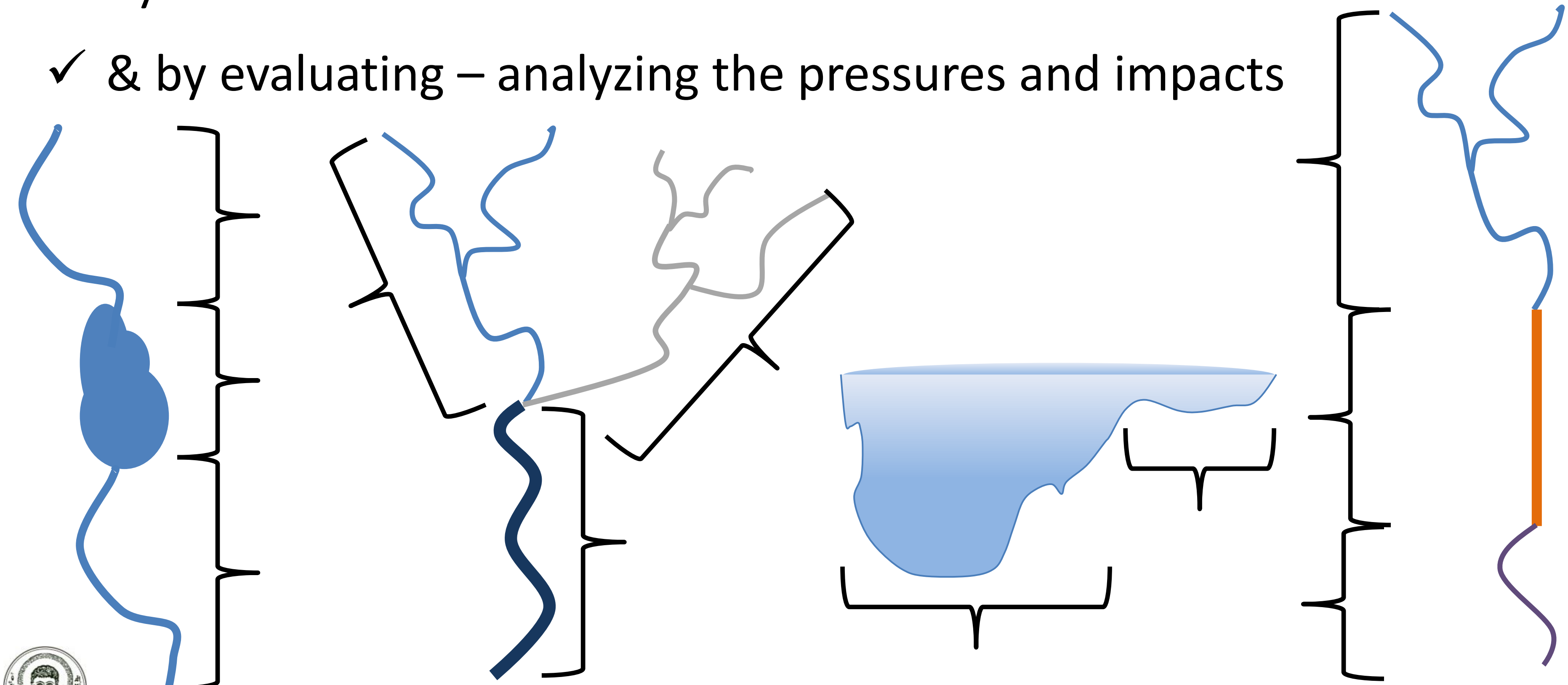
➢ System A: differentiated by the relevant ecoregions & then differentiated according to <u>obligatory</u> classified ranged descriptors

➢ System B: differentiated into types using A’s <u>obligatory</u> & <u>optional</u> descriptors, as are required to ensure that type specific biological reference conditions can be reliably derived. It must achieve at least the same degree of differentiation.

Characterization of Water Body Types

Defining water Bodies

- ✓ By its natural characteristics
- ✓ & by evaluating – analyzing the pressures and impacts



Typology

Why is typology necessary?

- To group sites with similar biology in human disturbance absence (reference conditions)
- To compare site conditions with the aforementioned
- To enable detection of human disturbance effects
- To have smaller variability of biological parameter within the same type than between types

Typology

System A *for rivers* (WFD)

Fixed Typology	**Descriptors**
Ecoregion (e.g. T°C, Pluviosity+Altitude)	**Ecoregions shown on Map A in Annex XI**
Type	**Altitude typology** high > 800 m mid-altitude 200 to 800 m lowland < 200 m **Size typology based on catchment area** small 10 – 100 km2 medium > 100 to 1.000 km2 large > 1.000 to 10.000 km2 very large > 10.000 km2 **Geology** calcareous siliceous organic

Typology

Ecoregions-WFD

1	Iberic – Macaronesian region
2	Pyrenees
3	Italy, Corsica & Malta
4	Alps
5	Dinaric Western Balkan
6	Hellenic Western Balkan
7	Eastern Balkan
8	Western highlands
9	Central highlands
10	The Carpathians
11	Hungarian lowlands
12	Pontic province
13	Western plains
14	Central plains
15	Baltic province
16	Eastern plains
17	Ireland & Northern Ireland
18	Great Britain
19	Iceland
20	Borealic uplands
21	Tundra
22	Fenno-Scandian shield
23	Taiga
24	The Caucasus
25	Caspic depression

Typology

System B *for rivers* (WFD)

Alternative Characterisation	**Physical and chemical factors that determine the characteristics of the river or part of the river and hence the biological population structure and composition**
Obligatory factors	**Altitude** **Latitude** **Longitude** **Geology** **Size of the catchment area**
Optional factors	**Distance from river sources** **Energy of flow (function of flow and slope)** **Mean water width** **Mean water depth** **Mean water slope** **Form and shape of main river bed** **River discharge (flow) category** **Valley shape** **Transport of solids** **Acid neutralising capacity** **Mean substratum composition** **Chloride** **Air temperature range** **Mean air temperature** **Precipitation**

Reference Conditions

- Ecological status is defined as deviation from the reference conditions which form the basis of ecological classification
- The undisturbed (natural) status serves as reference (identification of reference biological communities for each type of water body)

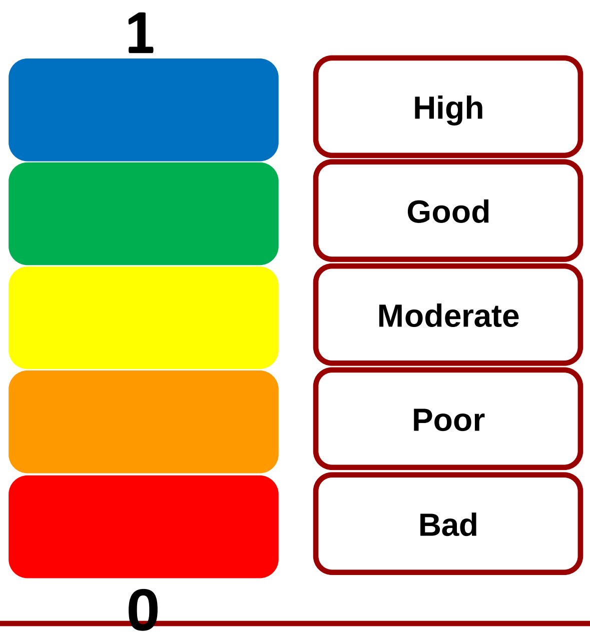
How are they determined?

Data availability for each type		Approach
Minimally impacted sites available	Yes →	Spatial network & predictive models
No ↓ Minimally impacted sites available elsewhere	Yes →	Use borrowed data in spatial network & predictive models
No ↓ Historical or Palaeo-ecological data	Yes →	Site-specific data, paleoreconstruction, hindcasting
No ↓ NO relevant sites or data	Yes →	Use expert judgement

Determination of reference conditions according to data availability.
Based on Heiskanen et al. 2004

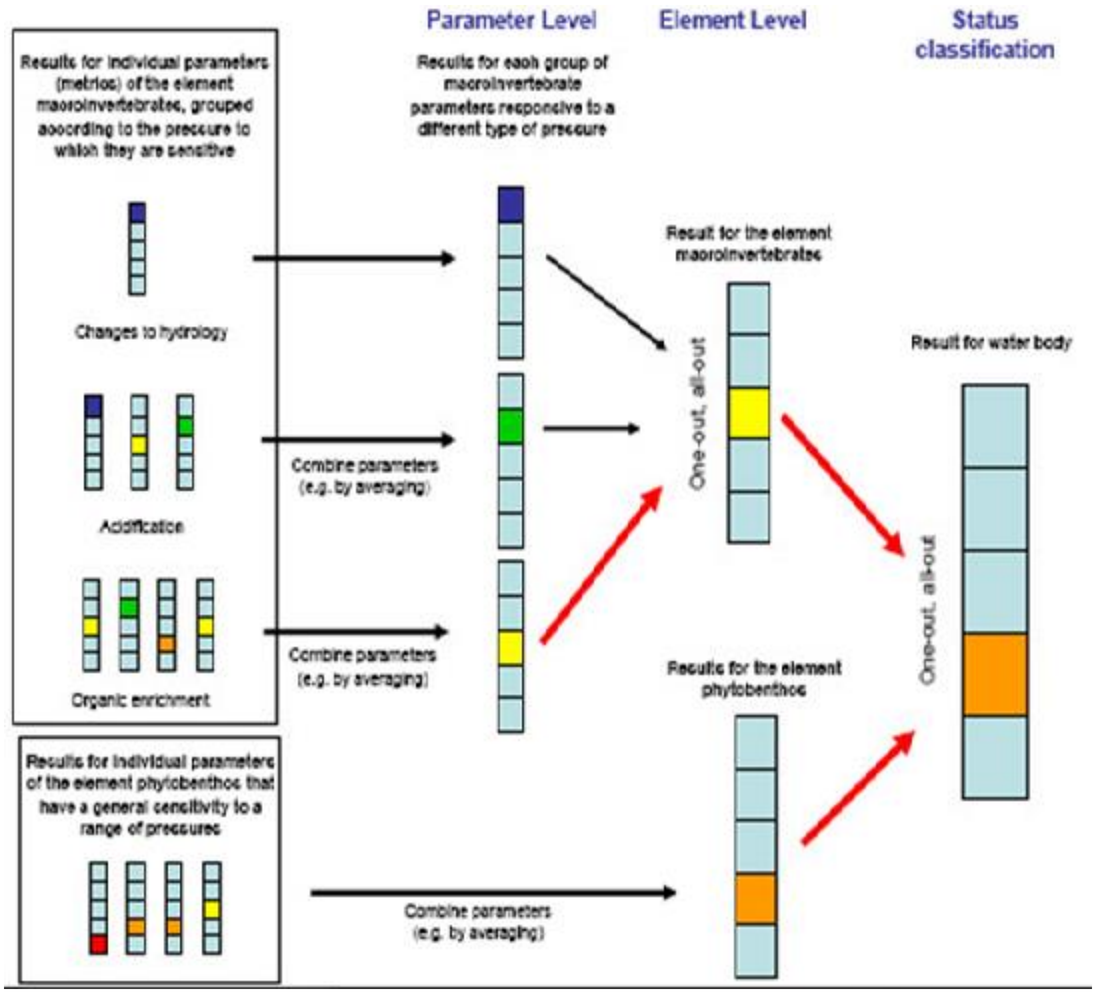
Classification of Ecological Status

- Ecological Quality Ratio (EQR): Ratio of Observed Parameter Value to Expected Parameter Value
- 5 categories-levels for classification of quality status
- Ecological status represented by the lower of the EQR-values (biological, physical-chemical & hydromorphological monitoring results) for the assessed quality elements (One out → All out principle)
  - Intercalibration is necessary to ensure comparability on the biological elements.
  - Important to select indicators for the biological quality elements ensuring practicability and cost-effectiveness)



Classification of Ecological Status

One out – All out



Presentation of monitoring results

- Results of ecological status are presented in maps for each River Basin District, colour coded according to the 5 class system
- Results of chemical status are **good** when water complies with all environmental quality standards (Annex IX., Art. 16, & national legislation) or if it doesn‘t, it is categorized as **Failing to achieve good status**

Commentary

Challenges

- Assess existent information, resources and tools
- Remodel of existing networks
- Decide on most
  - cost-effective
  - practicable
  - best environmental solutions

Commentary

Whom the guidance for monitoring (Working group 2.7) concerns?

- Undertaking the monitoring programmes yourself;
- Leading and managing experts undertaking the monitoring;
- Using the results of the monitoring for taking part in the policy making process; or,
- Reporting on the results of monitoring to the European Union as required by the Directive.

Commentary

What one can find in this Guidance document?

- 1.3.1 Common understanding of concepts and terms
  - The term ‘supporting’
  - The term ‘water body’
  - The concepts of risk, precision and confidence;
  - Monitoring of wetlands
  - The 3 types of monitoring of surface waters;
- 1.3.2 Guidance on the selection of Quality Elements
- 1.3.3 Best Practices and Tool Box
- 1.3.4 Best practice examples of current national monitoring
- 1.4 Guidance on monitoring – a framework approach

Commentary

What one cannot find in this Guidance document?

The Guidance Document focuses on the monitoring requirements of the Directive. The Guidance does not focus on:

- Determination of reference conditions;
- Development of assessment and classification Systems and intercallibration systems;
- Monitoring wetlands; or,
- Data analysis and reporting.

RIVERS

Key features of each biological quality element (QE) for rivers

Aspect/feature	Benthic invertebrates	Macrophytes	Benthic Algae	Fish	Phytoplankton
Measured parameters indicative of QE	Composition, abundance diversity, and presence of sensitive taxa.	Composition and abundance , and presence of sensitive taxa	Composition and abundance, , and presence of sensitive taxa	Composition and abundance, sensitive species diversity, age structure,	Composition, abundance and planktonic blooms, and presence of sensitive taxa
Supportive/interpretative parameters measured or sampled at the same time	Morphology, physico-chemical parameters (e.g. Temp/DO, nutrients, pH etc), river flow, substrate/habitat sampled	Morphology, river flow, depth, transparency	Substrate/habitat sampled, morphology, nutrients (N, P, Si), TOC, pH, hydrological regime, light conditions	Substrate/habitat sampled, river size (depth/width), river flow, temp, oxygen	Chlorophyll *a*, flow, physico-chemical parameters (e.g. temp, DO, N, P, Si)
Pressures to which QE responds	Mainly developed to detect organic pollution or acidity, can be modified to detect full range of impacts.	Mainly used to detect eutrophication, river dynamics including hydropower effects.	Mainly used as an indicator of productivity. Can be used to detect eutrophication, acidification, river dynamics.	Can be used to detect habitat and morphological changes, acidification and eutrophication.	Used as indicator of productivity/eutrophication.
Mobility of QE	Low, although unfavourable conditions may cause drift	Low. Generally fixed position.	Low	High. Tendency to avoid undesirable conditions (e.g. low oxygen conditions).	High. Drifting with river water
Level and sources of variability of QE	High seasonal variation in community structure. Influenced by climatic events e.g. rainfall/flooding	High seasonal variation in community structure and abundance.	High seasonal variation in community structure. Limited by light and nutrient availability and available substrate for colonisation. Influenced by climatic events	High seasonal variation in community structure (e.g. spawning/migration) and abundance. High interannual variation due to age structure.	High inter and intra-seasonal variation in community structure and biomass. Influenced by climatic events, light, nutrient availability, stability and residence time
Presence in rivers	Abundant	Abundant if suitable habitat. Limited in fast flowing streams.	Abundant if suitable habitat. Limited in large, deep rivers with poor habitat	Abundant	Generally low. May be abundant if conditions conducive to growth
Sampling methodology	ISO 8265, 7828, 9391 (surber sampler, handnet, grab)	CEN –standard under development	CEN –standard under development	Depending on habitats – nets, electrofisher	Integrated sample (3-4m), depth sampler
Habitats sampled	Riffle, pool (rocks/logs), edge (littoral), macrophytes,	Littoral, deposition areas (eg pools)	Benthic substrate/artificial substrate	All habitats	Water column
Typical sampling frequency	6 monthly/Annual	Annual/6 monthly	Quarterly/6 monthly	Annual	Monthly/Quarterly
Time of year of sampling	Summer and winter. Spring and autumn in Scandinavia.	Mid to late summer.	All seasons/summer and winter. Summer & autumn in Nordic countries.	Varied	Should cover all seasons. Only during ice free periods in Nordic countries.
Typical sample size	Variable depending on sampling methodology and habitat	Variable, may be standardised	Variable, may be standardised	Variable, may be standardised	Single integrated sample
Ease of sampling	Relatively simple. Difficulties in deep or fast flowing rivers.	Simple due to fixed position and general proximity to banks	Relatively simple. Difficulties in deep or fast flowing rivers. Observations and % cover	Requires specialised sampling equipment (e.g. electrofisher).	Simple using integrated hosepipe (or grab sample in shallow water)
Laboratory or field measurement	Field collection and sorting. Microscopic identification in laboratory	Field collection and identification	Field collection, microscopic identification in laboratory	Field collection, measurement and identification	Field collection, laboratory preparation followed by microscopic identification
Ease and level of Identification	Relatively simple to Genus. Requires expert identification to species level for some (e.g. chironomids). May be damaged during sampling/preservation	Simple to identify to species, except some genera (e.g. potamogeton)	Requires expert identification for majority of species (see phytoplankton)	Simple to identify to species, except some cyprinids which require expert knowledge	Requires expert identification of majority of genera and species. Some small unicellular species (e.g. unicellular greens) difficult to identify unless under high power microscopy

Key features of each biological quality element (QE) for rivers

Aspect/feature	Benthic invertebrates	Macrophytes	Benthic Algae	Fish	Phytoplankton
Nature of reference for comparison of quality/samples/stations	Yes: UK, France, Germany, Austria, Denmark, Sweden, Norway	No but underway in some European institutions	No	Yes: UK (HABSCORE) and France.	No
Methodology consistent across EU?	No	No	No	No	No
Current use in biological monitoring or classification in EU	Austria, Belgium, Denmark, Finland, France, Spain, Germany, Italy, Ireland, Luxembourg, Portugal Netherlands, Sweden, Norway and the UK	Austria, Belgium, France, Germany, Ireland, Netherlands and the UK	Austria, Belgium, France, Germany, Ireland, Norway, Sweden, Finland, Spain, Netherlands and the UK	Austria, France, Belgium, Ireland, Norway and the UK	None
Current use of biotic indices/scores	Yes. UK (BMWP), France (IBGN), Germany (Saprobic), Austria (Saprobic), Spain (SBMWP), Belgium (BBI), Netherlands (K-value)	No but some indices under development/calibration (Austria)	Yes. Sweden (developing). Norway and Germany – Index of occurrence of sensitive taxa	Yes. UK (HABSCORE).	No
Existing monitoring system meets requirements of WFD?	No	No	No	No	No
ISO/CEN standards	ISO 7828:1985 ISO 9391:1993 ISO 8265: 1988	CEN-Standard under development	CEN-Standard under development	CEN-Standard under development	
Applicability to rivers	High	Moderate	High	High	Low-Moderate
Main advantages	• Currently most common biological indicator used for ecological classification. • Existing classification systems in place • Possibility of adapting existing systems to incorporate requirements of WFD. • Less variable than physico-chemical elements	• Easy to sample and identify. • Low interannual variability	• Easy to sample (in shallow water) • Some existing methods developed • Less variable than physico-chemical elements • Responds quickly to changes in environmental and anthropogenic conditions • Possibility of adapting existing systems to incorporate requirements of WFD.	• Existing river classification systems in place • Possibility of adapting existing classification systems to incorporate requirements of WFD.	• Easy to sample • May be relevant in rivers where residence times enough to sustain growth (e.g. lowland rivers, upstream of impoundments)

Key features of each biological quality element (QE) for rivers

Aspect/feature	Benthic invertebrates	Macrophytes	Benthic Algae	Fish	Phytoplankton
Main disadvantages	• Methods require adaptation to meet requirements of WFD • Some require specialist expertise to identify to species • High substrate-related spatial variability and high temporal variability due to hatching of insects and variation of water flow • Time consuming and expensive • Presence of exotic species in some EU rivers.	• Not commonly used in EU • Lack of information for comparison to reference • Methodology needs to be adapted to incorporate requirements of WFD	• Not commonly used in EU • Lack in information for comparison to reference • Methodology needs to be adapted to incorporate requirements of WFD. • Difficult to sample in deep rivers • High substrate related spatial variability • High seasonal variation • Requires specialist expertise for species identification	• Requires specialist sampling equipment • High mobility • Horizontal and vertical distribution patters (differs between species)	• Not routinely used in river quality assessment in EU • Not generally present in flowing rivers • High variability requires frequent sampling • Difficult to establish dose-response relationships due to flow-related variability.
Conclusions/ Recommendations	This QE is best developed in EU and hence it is recommended as one of the key elements for monitoring especially for organic pollution.	Under certain hydrological conditions this QE is not suitable. However, in good conditions it can give a robust assessment.	Recommended, particularly for assessment of trophic status.	It is recommended as one of the key elements for monitoring for habitat and morphological changes. Further work required for assessing the impact of pollution on fish populations.	Only recommended for large, slow flowing rivers.

Key features of each hydromorphological quality elements for rivers

Aspect/feature	Quantity and dynamics of water flow	Connection to groundwater bodies	River Continuity	River depth and width variation	Structure and substrate of the river bed	Structure of the riparian zone
Measured parameters indicative of QE	Historical flows, modelled flows, real-time flow, current velocity	Water table height, surface water discharge	No and type of barrier and associated provision for fish passage	River cross section, flow	Cross section, particle size, presence and location of CWD	Length, width, species present, continuity, ground cover
Pressures to which QE responds	Used to detect impact of water storage, abstraction and discharge on biota, hydropower regulation	Provides information on surface-groundwater relationship	Used to detect impact on upstream migration of fish	Used to detect impact on biota from changing flows and habitat availability	Determines impact on biota from changing habitat availability	Influences structure of banks, provides habitat and shading for biota, filters diffuse runoff
Level and sources of variability of QE	Highly variable depending on geographical and climatic conditions. Variations reduced as response to barriers	Moderate variability	Low variability. Based on presence/modification of infrastructure	Moderate variability. Influenced by hydropower regulation	Variable depending on particle size and flow (e.g. gravel/sand scour/sedimentation prevalent following high flows)	Variable. Possibility of physical clearing, accessibility from livestock, erosion etc
Sampling methodology	ISO standard for current velocity. No common methodology for dynamics	No common methodology	No common methodology	No common methodology	No common methodology	No common methodology
Typical sampling frequency	In-situ, real time	6 monthly, depending on climatology and geology	Every 5-6 years	Annual	Annual	Annual
Time of year of sampling	All year	Winter and summer	varied	varied	varied	varied
Typical "sample" size or survey area	Common standard for No of monitoring points in cross sections developed	Not defined	Entire reach	No common agreement	No common agreement	50m in headwaters 100m in middle and lower reaches
Ease of sampling /measurements	Simple using in-situ flow gauging stations in small rivers. Greater effort required for large rivers.	Simple. Measurement of groundwater height (boreholes) and river flow	Simple. Survey to determine location and type of structures and abstraction sites/volumes	Can be simple using observation and measurement or detailed using laser survey equipment	Simple following minimal training	Simple following minimal training. Collection and laboratory identification of species may be required
Basis of any comparison of results/quality/stations e.g. reference conditions/best quality	No	No	No	No	No	No
Methodology consistent across EU?	No	No	No	No	No	No
Current use in monitoring programmes or for classification in EU	Yes. Belgium, France, Sweden, UK, Finland and Norway	Yes. Belgium, UK	Yes. Belgium, Germany, France	Yes. Belgium, Germany, France, UK and Norway	Yes. Belgium, Germany, France, UK and Norway	Yes. Belgium, Germany, France, Italy , UK
Existing monitoring systems meet requirements of WFD?						

Key features of each hydromorphological quality elements for rivers

Aspect/feature	Quantity and dynamics of water flow	Connection to groundwater bodies	River Continuity	River depth and width variation	Structure and substrate of the river bed	Structure of the riparian zone
Existing classification systems meet requirements of WFD?	No	No	No	No	No	No
ISO/CEN standards	ISO/TC 113 CEN?TC 318 under development	No	No	No	No	No
Applicability to rivers	High	High	High	High	High	High
Main Advantages	• Possibility of adapting existing systems to incorporate requirements of WFD.	•	• Methodology needs to be developed to incorporate requirements of WFD.	• Methodology needs to be developed to incorporate requirements of WFD.	•	•
Main disadvantages	• Not commonly used	• Not commonly used	• Not commonly used	• Not commonly used	• Not commonly used	• Not commonly used
Conclusions/ recommendations	Simple to monitor. Key supporting parameter for interpretation	Can not be commonly used. Only relevant under certain conditions when groundwater plays a major role in water balance. Methodology must be elaborated.	Very relevant for some species. One extensive survey is sufficient – supplied when necessary	Not applicable for all rivers such as rivers with high natural variation. Methodology needs further elaboration	Essential for interpreting the biological quality elements and possibility of sediment accumulation	Applicability depends on the shape, size etc. of the riparian zone. Methodology must be further elaborated

Key features of each chemical and physico-chemical quality element for rivers

Aspect/feature	Thermal Conditions	Oxygenation Conditions	Salinity	Acidification Status	Nutrients
Measured parameters indicative of QE	Temperature	Dissolved oxygen (mg/L and % sat)	Conductivity, ca concentration	pH, ANC, Alkalinity	TP, TN, SRP, NO_3 + NO_2, NH_4
Pressures to which QE responds	Inflows, water releases, industrial discharges	Organic pollution, industrial discharges	Agricultural runoff, industrial discharges	Industrial discharges, acid rain	Agricultural, domestic and industrial discharges
Level and sources of variability of QE	Variable. Influence d by climatic conditions	Moderate. Diel changes due to respiration. Lower variation in fast flowing rivers.	Low variability although influenced by water flow	Variable depending on buffer capacity, water flow etc	Variable depending on landuse, buffer capacity, temp/DO, presence of binding metals etc
Monitoring considerations	Seasonal stratification and mixing (in deep water), cold water releases	Diel/diurnal variations	Seasonal stratification and mixing in deep waters	Seasonal variations	Sources (diffuse/point), sufficient speciation to enable source discrimination
Sampling methodology	In-situ using submersible probe	In-situ using submersible probe, or sample collection and Winklers titration	In-situ using submersible probe	In-situ using submersible probe, sample collection	Sample collection in field followed by laboratory analysis
Typical sampling frequency	Fortnightly-monthly	Fortnightly-monthly	Fortnightly-monthly	Fortnightly-monthly	Fortnightly-monthly. More frequently during flooding.
Time of year of sampling	All seasons.	All seasons	All seasons	All seasons. Special attention when sea salt or snow melt episodes.	All seasons. Particularly following inflow events. Not during ice cover.
Typical "sample" size	Single measurement or water column profile	Single measurement or water column profile	Single measurement	Single measurement	Single sample, or profile in deep waters
Ease of sampling /measurements	Simple using in-situ submersible probe	Simple using in-situ submersible probe, or sample collection followed by Winklers titration	Simple using in-situ submersible probe	Simple using in-situ submersible probe. Sample collection followed by laboratory analysis	Simple. Surface water sample or profile using depth sampler (e.g. van dorn)
Methodology consistent across EU?	No	No	No	No	No
Current use in monitoring programmes or for classification in EU	All	All	All	All	All
Existing monitoring systems meet requirements of WFD?	Yes	Yes	Yes	Yes	Yes
Existing classification system meets requirements of WFD?	No	No	No	No	No
ISO/CEN standards	Yes	Yes	Yes	Yes	Yes
Applicability to rivers	Moderate. Stratification may be present in deep, slow flowing rivers. Can help detect thermal pollution.	Moderate. Oxygen depletion may be present in deep, slow flowing rivers or upstream of impoundments	High	Low. Problem in stagnant waters.	High

Key features of each chemical and physico-chemical quality element for rivers

Aspect/feature	Thermal Conditions	Oxygenation Conditions	Salinity	Acidification Status	Nutrients
Main advantages	• Simple to sample in-situ • Able to implement standard methodology	• Simple to sample in-situ • Able to implement standard methodology	• Simple to sample in-situ • Able to implement standard methodology	• Simple to sample in-situ • Able to implement standard methodology	• Can provide information as to pollutant sources • Simple to sample in-situ • Able to implement standard methodology
Main disadvantages	• Does not provide long-term indication	• Diel variations may require frequent monitoring • Does not provide long-term indication	• Does not provide long-term indication	• Does not provide long-term indication • May require intensive monitoring following rainfall events	• Does not provide long-term indication • May require intensive monitoring following rainfall events
Recommendations	Basic determinand for assessment of biocenosis.	Basic determinand for assessment of biocenosis.	Recommended in rivers in semi-arid climate and/or with high salinity.	Recommended in rivers with risk of acidification	Very important indicator for human activity/ eutrophication. Total N and P, nitrate and orthophosphate should be monitored as a minimum. Ammonia monitored where concentrations are expected to be problematic e.g. exceedences of limit values over a specific limit.

References

Chave, P. A. (2001) The Eu Water Framework Directive: An Introduction. IWA Publishing, London. ISBN 1900222124

Heiskanen, A.-S., W. Van de Bund, A.C. Cardoso & P. Nõges (2004): Towards good ecological status of surface waters in Europe – Interpretation and harmonisation of the concept". Water Science and Technology 49 (7), 169-177.

Water Framework Directive (2000/60/EC)

Priority Substances Decision (2455/2001/EC)

Directive containing measures included in the programme of measures (annex VI, Part A)

Bathing Water Directive (76/160/EEC)

Birds Directive (79/409/EEC) amended in Directive (97/49/EC)

Drinking Water Directive (80/778/EEC as amended by Directive 98/83/EEC)

Environment Impact Assessment Directive (85/337/EEC)

Habitats Directive (92/43/EEC)

Integrated Pollution Prevention Control Directive (96/61/EC), amended by Directive (98/15/EC)

Major Accidents Directive (96/82/EC)

Nitrates Directive (91/676/EEC)

Plant Protection Products Directive (91/1414/EEC) amended by Directive (98/47/EEC)

Sewage Sludge Directive (86/278/EEC)

Urban Wastewater Treatment Directive (91/271/EEC), amended in directive (98/47/EC)

Directives that establish emission limit values and environmental quality standards (Annex IX)

Cadium Discharge Directive (83/513/EEC)

Dangerous Substances Directive (76/464/EEC),

Dangerous Substance Discharges Directive (86/280/EEC)

Hexachlorocyclohexane Discharge Directive (84/491/EEC)

Mercury Directive (84/156/EEC)

Mercury Discharges Directive (82/176/EEC)

Other related directives

Directive (79/869/EEC) concerning the methods of measurement and frequencies of sampling and analysis of surface water intended for the abstraction of drinking water

Exchange of Information Directive (77/795/EEC)

Fish Life Directive (78/659/EEC)

Groundwater Directive (80/68/EEC),

Shellfish Waters Directive (79/923/EEC), amended by Directive (91/692/EEC)

Surface Water Abstraction Directive (75/440/EEC)

Council Decisions and regulations

Technical guidance document in support of Commission Directive (93/67/EEC)

End of Section 1

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Ευρωπαϊκή Ένωση
Ευρωπαϊκό Κοινωνικό Ταμείο
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