Questionnaire on biological assessment methods used in national WFD monitoring programmes

Introduction

The European Water Framework Directive (WFD) requires to classify the quality status of rivers, lakes, coastal and transitional waters. The ecological status is evaluated by biological assessment methods using selected biological quality elements, i.e. phytoplankton, benthic flora, benthic invertebrate fauna and fish fauna. The 27 European Member States are in charge of developing these methods, and the classification of good ecological status is harmonised in a Europe-wide intercalibration exercise.

Purpose

Against this background there is a growing need for the exchange of information and data. Therefore, a joint activity was launched between the Intercalibration Steering Group and the EU research project WISER (http://www.wiser.eu) to collate consistent data about the national assessment methods used in WFD quality monitoring by the 27 Member States.

Information on the methods is collected by means of this questionnaire. Member States' delegates are asked to provide the requested data on screen and submit the questionnaire's content by email. The information will be collated by the University of Duisburg-Essen (Germany). By April 2010 the descriptions of the national methods can be queried from an online-database accessible via the WISER webpage.

Relevance to the intercalibration exercise

The method descriptions will be used as part of the intercalibration reporting procedure. The Geographical Intercalibration Groups can have access to the data as soon as they are available. Information will serve as the basis for WFD compliance and IC acceptance checking according to the new Intercalibration Process Guidance.

Content

The questionnaire is divided into three sections that cover the topics *A - General information, B - Data acquisition* and *C - Data evaluation*. This enquiry is mostly focussing on general aspects that all biological assessment methods have in common - irrespective of water category or biological quality element. However, the completion of the questionnaire requires good knowledge about the respective national method, thus it might best be undertaken by persons responsible for method development or implementation.

Technical information

This questionnaire was produced using the software *Adobe LiveCycle Designer*. It can be completed using the Adobe Acrobat reader. By pressing the email-button at the end of this document the filled-in data becomes converted into xml-format and attached to an email addressed to sebastian.birk@uni-due.de. You can also send the completed pdf-file itself via email. Sebastian is responsible for content and technical issues of this task. Please contact him in case of problems and further questions.

Please complete one questionnaire for each individual national assessment method[1] and send the information by December 1st, 2009.

[1] **Note 1:** Usually countries apply one assessment method per BQE and water category (like benthic invertebrate fauna in rivers), but in certain cases individual methods are using only parts of the full BQE (like angiosperms in coastal waters) or different habitat types (soft bottom benthic invertebrate fauna in coastal waters). A separate questionnaire shall be filled in for each of these.
Note 2: This request is also focussing on (future) methods that will be applied for the second River Basin Management Plan (and even beyond) (see A-16). Please deliver also information for these methods (if already available), this will help in intercalibration planning.

A - General information

A-01 Name of person completing this questionnaire

Example: *Max Mustermann*

A-02 Email address of person completing this questionnaire

Example: *max.mustermann@web.de*

A-03 Institution of person completing this questionnaire

Example: *Department of Environmental Protection, University of Berlin*

A-04 Name of assessment method (original full name)

Example: *Bewertungsverfahren von Fließgewässern auf Basis des Makrozoobenthos*

A-05 Name of assessment method (translated into English)

Example: *Assessment system for rivers using macrozoobenthos*

A-06 Abbreviation of assessment method

Example: *PERLODES*

A-07 EU Member State

Example: *Germany*

A-08 Water Category

- ☐ Rivers
- ☐ Lakes
- ☐ Coastal Waters
- ☐ Transitional Waters

Example: *Rivers*

A-09 If *Transitional Waters*, please specify

- ☐ Estuary
- ☐ Lagoon
- ☐ Fjord

Others:

A-10 Biological Quality Element

- ☐ Phytoplankton
- ☐ Macrophytes
  - Phytobenthos
    - ☐ Diatoms
    - ☐ Other phytobenthos
- ☐ Macroalgae
- ☐ Angiosperms
- ☐ Benthic invertebrate fauna
- ☐ Fish Fauna

Example: *Benthic Invertebrate Fauna*

A-11 If *Angiosperms*, please specify

- ☐ Only Seagrass (specify species:)
- ☐ Other Angiosperms (specify groups:)

A-12 Scope of detected pressures

- ☐ Acidification
- ☐ Aquatic habitat destruction
- ☐ Catchment land use
- ☐ Eutrophication
- ☐ Flow modification
- ☐ General degradation (unspecific pressures)
- ☐ Heavy metals
- ☐ Hydromorphological degradation
- ☐ Impact of alien species
- ☐ Pollution by organic compounds (e.g. DDT, PCB)
- ☐ Pollution by organic matter
- ☐ Riparian habitat alteration

Other:

Example: *General degradation, organic pollution, hydromorphological degradation, acidification*

A-13 Has the pressure-impact relationship of the assessment method been tested?

If yes, please specify pressure and impact metrics, the amount of data used, statistical significance of the relationship.

Example: *Ecological data from 39 lakes (> 50 mg l^{-1} $CaCO_3$ alkalinity and 3-15 m mean depth) were examined to establish pressure-impact relationship between macrophyte metrics and eutrophication gradient. The relationship between four macrophyte metrics and TP (measured in spring or early summer) showed significant correlation (Spearman Correlation Coefficient ranging from 0.3 to 0.5).*

A-14 Is the assessment method applied to water bodies in the whole country?

If no, please specify region of application:

Example: *No, only ecoregion "Central Plains"*

A-15 If the method has been/is intercalibrated, please specify the relevant Geographical Intercalibration Group(s) and common intercalibration type(s).

- ☐ Alpine GIG (rivers and lakes)
- ☐ Central Baltic GIG (rivers and lakes)
- ☐ Eastern Continental GIG (rivers and lakes)
- ☐ Mediterranean GIG (rivers and lakes, coastal and transitional waters)
- ☐ Northern GIG (rivers and lakes)
- ☐ North East Atlantic GIG (coastal and transitional waters)
- ☐ Baltic Sea GIG (coastal and transitional waters)
- ☐ Black Sea GIG (coastal and transitional waters)

Common intercalibration type(s):

Example: *Central Baltic GIG; Siliceous mountain brooks (R-C3)*

A-16 Status of assessment method: Method (will be) used for …

- ☐ First RBMP[2] (2009)
- ☐ Second RBMP (2015)
- ☐ neither first nor second RBMP (probably later RBMP)

Example: *First River Basin Management Plan (2009) and Second River Basin Management Plan (2015)*

A-17 Web page describing national method

Example: *http://www.fliessgewaesserbewertung.de*

A-18 Name of responsible person having developed the assessment method

Example: *Erwin Entwickler*

[2] River Basin Management Plan

A-19 Email address of responsible person having developed the assessment method

Example: *erwin.entwickler@web.de*

A-20 Institution of responsible person having developed the assessment method

Example: *Department of Environmental Protection, University of Chisinau*

A-21 Pertinent literature of mandatory character (e.g. official note, national standard)

Example: *LAWA-AO, 2006. RaKon Monitoring Teil B. Arbeitspapier III: Untersuchungsverfahren für biologische Qualitätskomponenten. Ständiger Ausschuss "Oberflächengewässer und Küstengewässer" der Bund/Länder-Arbeitsgemeinschaft Wasser (LAWA-AO).*

A-22 Scientific literature (preferably quote references written in English)

Example: *Hering, D., J. Böhmer, P. Haase & J. Schaumburg, 2004. New methods for assessing freshwaters in Germany. Limnologica 34: 281-282.*

A-23 Comments

B - Data acquisition

B-01 Which guidelines are followed for the sampling/surveying and sample processing?

Example: *Meier, C., Haase, P., Rolauffs, P., Schindehütte, K., Schöll, F., Sundermann, A. & D. Hering, 2006. Methodisches Handbuch Fließgewässerbewertung. Handbuch zur Untersuchung und Bewertung von Fließgewässern auf der Basis des Makrozoobenthos vor dem Hintergrund der EG-Wasserrahmenrichtlinie. University of Duisburg-Essen, Essen.*

B-02 Sampling/survey device

Phytoplankton

- ☐ Plankton net
- ☐ Water sampler
- ☐ Multiple Opening/Closing Net and Environmental Sampling System (MOCNESS)

Other:

Macrophytes

- ☐ Rake
- ☐ Grapnel
- ☐ Dredge

Other:

Phytobenthos

- ☐ Scraper
- ☐ Spoon
- ☐ Brush

Other:

Benthic macroinvertebrate fauna

- ☐ Hand net
- ☐ Surber or Hess sampler
- ☐ Corer
- ☐ Airlift sampler
- ☐ Grab
- ☐ Dredge
- ☐ Artificial substrate

Other:

Fish fauna

- ☐ Fyke net
- ☐ Gill net
- ☐ Beam trawl
- ☐ Otter trawl
- ☐ Seine netting
- ☐ Electrofishing gear
- ☐ Echo sounder (hydroacoustics)

Other:

Example: *Grab*

B-03 Please specify sampling/survey device

Example: *Van Veen Grab (short arm, warp rigged)*

B-04 Minimum size of organisms sampled and processed

Example: *500 µm (mesh-size of hand net)*

B-05 Sampled/surveyed habitat

Example: *All available habitats per site (Multi-habitat)*

B-06 If *Single habitat(s)* are sampled/surveyed, please specify habitat(s)

Example: *soft bottom, hard bottom, phytal fauna (e.g. seagrass)*

B-07 Which zone is sampled/surveyed in areas with tidal influence (only coastal and transitional waters)?

Example: *Both tidal zones*

B-08 How many sampling/survey occasions (in time) are required to allow for ecological quality classification of sampling/survey site or area?

Example: *One occasion per sampling season*

B-09 Sampling/survey month(s)

Example: *Brooks: February to April, Streams: May to August*

B-10 Which method is used to select the sampling/survey site or area?

- ☐ Random sampling/surveying
- ☐ Stratified sampling/surveying
- ☐ Expert knowledge (e.g. sites most representative of water body)

Other:

Example: *Expert knowledge (e.g. sites most representative of water body)*

B-11 How many spatial replicates per sampling/survey occasion are required to allow for ecological quality classification of sampling/survey site or area?

Example: *20 replicates (one per stream microhabitat >5% coverage)*

B-12 Total sampled area or volume, or total surveyed area, or total sampling duration on which ecological quality classification of sampling/survey site or area is based

Example: *Sum of 20 spatial replicates à 0.0625 square-metres = 1.25 square-metres of stream bottom in total*

B-13 Short description of field sampling/survey procedure

Example: *Multi-habitat sampling designed for sampling major habitats in proportion to their presence within a sampling reach is carried out. A sample consists of 20 "sampling units" taken from all habitat types at the sampling site with a share of at least 5 % coverage. A "sampling unit" is a stationary sampling performed by positioning the net and disturbing the substrate in a quadratic area that equals the frame-size upstream of the net (0.25 x 0.25 m). Sediments must be disturbed to a depth of 15-20 cm (where possible) depending on substrate compactness.*

B-14 Sample processing

Example: *Sample is divided (sub-sampling) and organisms of a sub-sample are identified*

B-15 If *Sub-sampling* is performed, please describe procedure

Example: *One/sixth of sampling material is separated from which 350 organisms are analysed.*

B-16 Record of biological data: Level of taxonomical identification

- ☐ Species/species groups level
- ☐ Genus level
- ☐ Family level
- ☐ Other level

Example: *Species level, Family level, Other level*

B-17 If level of taxonomical identification differs (multiple answers on B-16), please specify what groups are mainly identified to which level.

Example: *Most insecta and hirudinea to species level except for chironomids and simuliids; chironomids and simuliids to family level; oligochaets to level of order.*

B-18 Record of biological data: How is the biota's abundance within the sample/survey measured?

- ☐ Individual counts
- ☐ Percent coverage
- ☐ Abundance classes (ordinal scale)
- ☐ Relative abundance (i.e. one species relatively to other species)

Other:

Example: *Individual counts*

B-19 Record of biological data: Abundance is related to …

- ☐ Area
- ☐ Volume
- ☐ Time

Other:

Example: *Area*

B-20 Please specify unit in which the biota's abundance is expressed

Example: *Number of individuals per one square-metre*

B-21 If biomass is measured, please specify how it is quantified.

- ☐ Determination of chlorophyll-a concentration by spectrophotometric analysis
- ☐ Determination of fresh weight by microscopic counting, cell size measurement and cell volume calculation (Utermöhl technique)

Other:

Example: *Determination of fresh weight by microscopic counting, cell size measurement and cell volume calculation (Utermöhl technique)*

B-22 Other records of biological data (e.g. organism length, plant growth form, shoot density)

Example: *Length of individual specimens*

B-23 Special cases, exceptions, additions

Example: *Non-wadable rivers are sampled only at the banks, i.e. multi-habitat-sampling is confined to the river margin habitats.*

B-24 Comments

C - Data evaluation

C-01 Complete list of biological metric(s) used in assessment (including formulae, where necessary)

Example: *Relative abundance of taxa with oligosaprobic valence, Relative abundance of Ephemeroptera, Plecoptera and Trichoptera taxa, Number of Trichoptera taxa, Weighted average of specific indicator taxa (WA = Sum of (Indicator Taxa Abundance * Indicator score) / Sum of all Taxa)*

C-02 Data basis for metric calculation: From which biological data are the metrics calculated?

- ☐ Data from single sampling/survey occasion in time (see B-08)
- ☐ Aggregated data from multiple sampling/survey occasions in time (see B-08)
- ☐ Data from single spatial replicate (see B-11)
- ☐ Aggregated data from multiple spatial replicates (see B-11)

Other:

Example: *Data from single sampling/survey occasion in time (see B-08), Aggregated data from multiple spatial replicates (see B-11)*

C-03 Does the selection of metrics differ between types of water bodies (e.g. different metrics to assess lowland brooks compared to mountain streams)?

Example: *Yes*

C-04 Combination rule for multi-metrics

- ☐ Average metric scores
- ☐ Weighted average metric scores
- ☐ Worst metric score
- ☐ Mean quality class
- ☐ Worst quality class

Other:

- ☐ Not relevant

Example: *Average metric scores*

C-05 Scope of reference conditions

Example: *Surface water type-specific*

C-06 Key source(s) to derive reference conditions

- ☐ Existing near-natural reference sites
- ☐ Modelling (extrapolating model results)
- ☐ Expert knowledge
- ☐ Historical data
- ☐ Least Disturbed Conditions

Other:

Example: *Existing reference sites, modelling, expert knowledge*

C-07 Number of sites used to derive reference conditions

Example: *26 Aegean sites in the Mediterranean Sea*

C-08 Geographical coverage of sites used to derive reference conditions

Example: *Only reference zones in natural parks from Corsica and Balearic Islands considered representative for the entire Mediterranean Sea.*

C-09 Location of sites used to derive reference conditions

Example: *Façade maritime du Parc Naturel Régional de Corse (France), Parc Natural de Ses Salines (Balearic Islands, Spain) and Reserva Marina del Nord de Menorca (Balearic Islands, Spain).*

C-10 Time period (months + years) of data of sites used to derive reference conditions

Example: *Historical data before 1980s covering 5 years.*

C-11 Reference community description

Example:

1. *Macroalgal communities of high diversity should be dominated quantitatively by brown algae mainly of the order Fucales in high irradiance sites and red algal Corallinales in vertical cliffs.*
2. *Dense well-developed macroalgal communities thriving in the upper infralittoral zone with most characteristic species belonging to the genera Cystoseira, Sargassum, Lithophyllum, Peyssonnelia, Corallina and Padina. Other common species belong to the genera Halopteris, Stypocaulon, Dictyota, Dictyopteris, Laurencia, Cladophora and Jania.*
3. *In shadow zones (exposed steep vertical cliffs) Lithophyllum byssoides develops, forming important organogenic structures (trottoir). In marine caves with scarce light conditions a sciaphilic vegetation of red and green algae dominant.*

C-12 Reference sites' criteria

Example: *The absence of pressures had to be illustrated. The communities at the sites had to correspond with the description of the reference community description. Spatio-temporal variability had to be taken into account of the community's composition and abundance affected by hard substrata availability, intense and frequency of natural disturbances, e.g. hydrodynamism, grazing, by seasonal cycle of light period and intensity, and by limiting factors like nutrients.*

C-13 Are the assessment results expressed as Ecological Quality Ratios (EQR)?

If no, please specify how the results are expressed:

Example: *Yes*

C-14 Setting of ecological status boundaries

- ☐ Using discontinuities in the relationship of anthropogenic pressure and the biological response.
- ☐ Using paired metrics that respond in different ways to the influence of the pressure (e.g. % sensitive taxa compared to % of impact taxa for benthic invertebrates in rivers and lakes).
- ☐ High-good boundary derived from metric variability at near-natural reference sites (e.g. 5th percentile value).
- ☐ Equidistant division of the EQR gradient (e.g. boundary setting at 0.8, 0.6, 0.4, 0.2).
- ☐ Calibrated against pre-classified sampling sites (e.g. pre-classification based on expert judgement).
- ☐ Boundaries taken over from the intercalibration exercise.

Other:

Example: *Equidistant division of the EQR gradient (e.g. boundary setting at 0.8, 0.6, 0.4, 0.2), Calibrated against pre-classified sampling sites (e.g. pre-classification based on expert judgement)*

C-15 Please describe the boundary setting procedure in relation to the pressure.

Example: *Macrophytes were placed into four nutrient response groups using empirical analysis (highly sensitive, sensitive, tolerant and highly tolerant). The ratio of the relative cover of these response groups was then related to the macrophyte nutrient score (LMNI) itself an index of nutrient pressure. Boundary values for HG and GM were determined from this relationship:*

- *The HG boundary was identified as the point at which all tolerant species were on average <10% of cover.*
- *The GM boundary was the point at which the lower confidence limits of the sensitive and upper confidence limit of the tolerant species intersect. At this point there is still a high probability of having >50% cover of sensitive species and no more than 50% cover of tolerant species. This would be indicative of slight change, the community could still easily recover to its original status. The highly sensitive species are still present (10-50% cover) and highly tolerant (undesirable) species would be <20% cover.*
- *The MP boundary was set where the lower confidence limit of the sensitive and upper confidence limit of the tolerant species intersect. At this point there is a low probability that sensitive species would be at 50% cover, but a high probability that tolerant species would be at 50% cover. Very sensitive species are still present, but the community has thus undergone a moderate change.*
- *The PB boundary is a point at which highly sensitive species are extinct and there are very few sensitive species. Here the community is dominated by tolerant species.*

C-16 Good status community description

Example: *At good status stands of the sensitive taxa (large isoetids, Littorella, Lobelia, Isoetes in low alkalinity lakes or Chara spp. in high alkalinity lakes) are well developed, but significantly decreasing at good-moderate boundary ("sudden drop") and replaced by tolerant taxa.*

C-17 Has the uncertainty of the method been quantified and is it regarded in the assessment?

Example: *No (to be done)*

C-18 If the uncertainty has been quantified and regarded, please specify how this is done.

C-19 Comments

Submit by Email