

# Manual for completing the AQEM /STAR site protocol

version 11/6/02

## Document history:

- Source 1: AQEM site protocol and AQEM site protocol manual, version 23/11/00 (used in the AQEM project)
- Source 2: AQEM manual (version 1.0) chapter 6, annexes 2 and 3 (simple site protocol for applied water management)
- All parameters from source 2 have been overtaken for the AQEM/STAR site protocol as obligatory parameters.
- All STAR partners have been asked, which additional parameters from source 1 they would like to include. These parameters have been included as optional parameters (April/May/June 2002)
- Additional parameters to be recorded for macrophyte, diatom and fish sampling have been integrated and adapted. While the parameters for fish and macrophyte survey have already been covered by sources 1 and 2, the phytobenthos-specific parameters resulted in two additional pages (May/June 2002).
- A final adaptation to limit redundancy has been performed by the University of Essen in a dictatorial way (June 2002).
- The parameter numbers are taken from source 1. Since many of the original parameters from source 1 have been deleted, the parameters of this site protocol are not consecutively.

**Box 1:** Parameters given in a shaded boxes in the protocol form are optional.

## **Purpose of the site protocol**

A site protocol describes a sampling site. It contains both site and sample related information. It serves the following purposes:

- to give an impression of river and floodplain morphology, hydrology and vegetation
- to ensure that the site can be precisely re-located in the field
- to document the process of biological sampling (sample related information)

### *Equipment*

Besides the sampling gear for the biological sampling the following equipment is necessary to complete the site protocol:

#### Obligatory:

- soft-leaded pencil and/or a waterproof pen
- clip board
- paper
- meter rule
- tape measure
- (digital) camera, films

#### Optional:

- stopwatch
- flow meter
- Polaroid glasses (sometimes helpful to assess the substrate types)
- binoculars (to observe features on the opposite river bank and in the floodplain)
- Global Positioning System (GPS)

#### Equipment necessary for recording physico-chemical parameters:

- conductivity meter
- oxymeter
- pH-meter

The latter devices must be calibrated before use in accordance with the manufacturer's instructions. Please note that most data can be recorded from the riverbanks. Those site protocol data, which require wading in the streambed, must be collected after the biological sampling in order to avoid disturbing the fauna. The only exception is the estimation of microhabitat composition, which is a prerequisite for sampling. It is generally highly recommended not to wade in the stream before the biological sampling has been completed.

### ***Running headline***

#### *Site name*

e.g. 'Orke near Reckenberg' or 'Isar at km 247.2'

#### *Date*

date of the sampling

#### *Sample number*

Every sample is to be identified by a number composed of 8 digits:

- digit 1: country abbreviation
- A = Austria
- C = Czech Republic
- D = Germany
- H = Greece
- I = Italy
- N = The Netherlands
- P = Portugal
- S = Sweden
- digit 2 and 3: stream type number in the country (e.g. 01 for 'small sand bottom stream in the lowlands of Northern Germany, ecoregion 14'). These numbers are given by the co-ordinator after receiving the final list of stream types.
- digit 4-7: sampling site number (e.g. 0001 for the first sampling site). Every partner should number the sampling sites for the stream types investigated consecutively.
- digit 8: sampling season
- 1 = spring
- 2 = summer
- 3 = autumn
- 4 = winter

Example: the spring sample taken in Germany at stream type no 01 (small sand bottom stream in the lowlands of Northern Germany, ecoregion 14) at sampling site no 0001 will be identified by: D 01 0001  
1

#### *investigator*

- person
- agency

**Parameters 1 to 30: site related information (to be recorded just once)**

**Box 2:** The parameters 1 to 67 should predominantly be recorded from maps and/or GIS information. They are only related to the catchment, the upstream and the downstream reach. To answer these questions, field investigations are not required. Exception: parameter 26a.

*1 map (scale)*

Preferably deliver a digital/scanned map of the stream section investigated (file name: sample no map.jpg). Scale: preferably 1:50,000; if not available, 1:25,000 is also possible. If not possible to obtain a digital map, please use a copy of the map and mention the scale.

*2 country*

EU member state the site is located in.

*3 federal state (optional parameter)*

Province or federal state the site is located in.

*4 map no.*

Registration no. of the map used for 1.

*5 stream name*

Name of the stream, preferably taken from map used for 1.

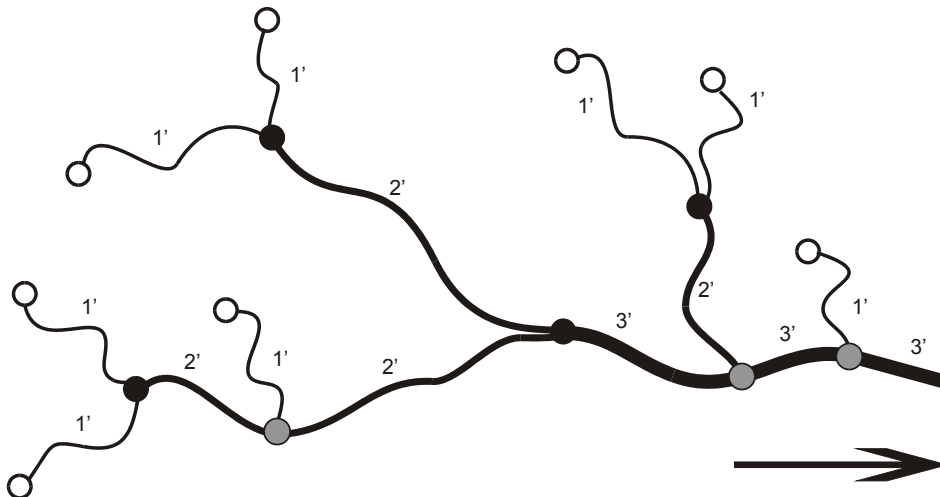
*6 stream type*

According to the top-down stream typology applied for AQEM. E.g. 'small streams in Central European lowlands'.

*7 stream order (Strahler system)*

Preferably based on map 1:50,000; please indicate, if you have used another map.

Stream order is based on confluence points (see figure). The so-called 'blue line method' is to be used: all streams shown on a map 1:50,000 as a blue line upstream of the first confluence are regarded as 1<sup>st</sup> order streams (these should usually be streams with a mean annual discharge of > 32 l/s). Stream sections upstream of this point are neglected.



*8 distance to source [km]*

Preferably taken from a map 1:50,000 or from Geographical Information Systems (GIS). If a map is used: the stream starts at the point where it is shown as a blue line.

*9 longitude (degree, minutes, seconds)*

*10 latitude (degree, minutes, seconds)*

*11 altitude [m above sea level]*

Preferably taken from a map 1:50,000 or from Geographical Information Systems.

*12 ecoregion and ecoregion no*

According to Illies and the Water Framework Directive (Annex XI, map A).

- 1 Iberian Peninsula
- 2 Pyrenees
- 3 Italy
- 4 Alps
- 5 Dinarian Western Balkans
- 6 Hellenic Western Balkans
- 7 Eastern Balkans
- 8 Western Sub-alpine Mountains
- 9 Central Sub-alpine Mountains
- 10 Carpathian
- 11 Hungarian Plain
- 12 Pontian Province
- 13 Western Lowlands
- 14 Central Lowlands
- 15 Baltic Province
- 16 Eastern Lowlands
- 17 Ireland
- 18 England
- 19 Iceland
- 20 Boreal highlands
- 21 Tundra
- 22 Northern Sweden
- 23 Taiga
- 24 Caucasus
- 25 Caspian Lowlands
- X North African Palearctic region
- Y Asia Minor

*13 sub ecoregion (optional parameter)*

For those countries, which have generally accepted subunits ("sub-ecoregions", "aquatic landscape units").

*14 stream system (river flowing into the sea)*

The main river catchment the stream belongs to (e.g. Rhine, Danube, Loire).

*15 catchment area [km<sup>2</sup>] of stream at sampling site*

Use GIS or hydrologic atlas if available. Indicate the catchment area at the sampling site, not the total catchment area of the stream.

*16 size typology according to Water Framework Directive*

(according to Annex II, 1.2.1, system A)

- small: 10-100 km<sup>2</sup> catchment area
- medium sized: > 100-1,000 km<sup>2</sup> catchment area
- large: > 1,000-10,000 km<sup>2</sup> catchment area
- very large: > 10,000 km<sup>2</sup> catchment area

*18 catchment geology (at 10% steps)*

Information should be taken from geological maps or GIS (preferably 1:50,000 or 1:100,000), if available. The catchment area at the sampling site, not the total catchment area of the stream, should be considered.

- acid silicate rocks = magmatic and metamorphic silicate rocks, e.g. granites, granodiorites, monzonites, gneisses, schists, quartzites incl. volcanics i.e. rhyolites, dacites, andesites, trachytes, tuffites; also Karbon, Devon, red sandstone 'Buntsandstein'
- mafic silicate rocks = mafic and ultramafic magmatic and metamorphic rocks, e.g. amphibolites, diabases, peridotites, dunites, pyroxenites, gabbros, spilites, pillow lavas, ophiolites in general, incl. volcanics i.e. basalts
- carbonate rocks = marbles, limestones and dolomites, karst

- flysch and molasse = post-tectonic sediments in Alpine rock regions: Eocene – Oligocene conglomerates, sandstones, clays, marls
- alluvial deposits
- lacustrine deposits = Quaternary and neogene
- terrestrial deposits (Moraines) = Pleistocene
- terrestrial deposits (Sander) = Pleistocene
- marine deposits = Quaternary and neogene
- organic formations, e.g. marshland, peat = Holocene
- loess = Quaternary and neogene

*18a Geology class (geological typology according to Water Framework Directive, Annex II, 1.2.1, system A)*

Indicate the most abundant catchment geology.

Coherence of the categories of parameter 18 and the categories of the Water Framework Directive:

- calcareous:
  - carbonate rocks
  - flysch and molasse (in parts)
  - flysch and molasse (in parts)
  - alluvial deposits (in parts)
  - terrestrial deposits (in parts)
  - marine deposits (in parts)
  - loess
- silicious:
  - acid silicate rocks
  - mafic silicate rocks
  - flysch and molasse (in parts)
  - alluvial deposits (in parts)
  - terrestrial deposits (in parts)
  - marine deposits (in parts)
- organic:
  - organic formations

*19 land use in catchment area (optional parameter)*

Information to be taken from maps or GIS; only categories covering > 10 % of the catchment area are considered. The catchment area at the sampling site, not the total catchment area of the stream, should be considered. For categories see site protocol.

'Corine land cover' system can be used to analyse/describe land use in the catchment area. The following table describes how categories should be transferred.

<i>Corine land cover category</i>	<i>AQEM site protocol category</i>
1. Artificial surfaces	
1.1 Urban fabric	
1.1.1 Continuous urban fabric	Urban sites
1.1.2 Discontinuous urban fabric	Urban sites
1.2 Industrial, commercial and transport units	
1.2.1 Industrial or commercial units	Urban sites (industrial)
1.2.2 Road and rail networks and associated land	Others
1.2.4 Airports	Urban sites
1.3 Mine, dump and construction sites	
1.3.1 Mineral extraction sites	Others
1.3.2 Dump sites	Others
1.3.3 Construction sites	Urban sites
1.4 Artificial non-agricultural vegetated areas	
1.4.1 Green urban areas	Urban sites
1.4.2 Sport and leisure facilities	Urban sites
2. Agricultural areas	
2.1 Arable land	
2.1.1 Non-irrigated arable land	Crop land
2.1.2 Permanently irrigated land	Crop land
2.1.3 Rice fields	Crop land

<i>Corine land cover category</i>	<i>AQEM site protocol category</i>
2.2 Permanent crops	
2.2.1 Vineyards	Crop land
2.2.2 Fruit trees and berry plantations	Crop land
2.3 Pastures	
2.3.1 Pastures	Pasture
2.4 Heterogeneous agricultural areas	
2.4.1 Annual crops associated with permanent crops	Crop land
2.4.2 Complex cultivation patterns	Crop land
2.4.3 Land principally occupied by agriculture, with significant areas of natural vegetation	Crop land
2.4.4 Agro-forestry areas	Non native forest
3. Forests and semi-natural areas	
3.1 Forests	
3.1.1 Broad-leaved forest	Deciduous native forest
3.1.2 Coniferous forest	Coniferous native forest
3.1.3 Mixed forest	Mixed native forest
3.2 Shrub and/or herbaceous vegetation association	
3.2.1 Natural grassland	Alpine heath
3.2.2 Moors and heathland	Grass- and bushland
3.2.3 Sclerophyllous vegetation	Grass- and bushland
3.2.4 Transitional woodland shrub	Grass- and bushland
3.3 Open spaces with little or no vegetation	
3.3.1 Beaches, dunes, and sand plains	Naturally unvegetated
3.3.2 Bare rock	Naturally unvegetated
3.3.3 Sparsely vegetated areas	Others
3.3.4 Burnt areas	Others
3.3.5 Glaciers and perpetual snow	Naturally unvegetated
4. Wetlands	
4.1 Inland wetlands	
4.1.1 Inland marshes	Wetland
4.1.2 Peatbogs	Wetland
5. Water bodies	
5.1 Inland waters	
5.1.1 Water courses	Others
5.1.2 Water bodies	Standing waters

*20 mean annual discharge (MQ) (optional parameter)*

If gauging sites are available close to the section examined, from which discharge data are available over a period of years. If the gauging site is remote from the study section, you may calculate the parameters based on the catchment area (in geological homogeneous areas). The period to be considered for calculations should cover 5 years or 10 years if data are available

*24 Hydrologic stream type*

categories:

- permanent = not drying out or only in extreme years
- periodic/intermittent summer dry = in 'normal' years drying out in summer
- periodic/intermittent winter dry = in 'normal' years drying out in winter
- episodic = drying out in intervals, which beginning, end and length are not predictable

*25 presence of lakes in the stream continuum upstream of the sampling site (optional parameter)*

Only the presence of lakes significantly influencing the sampling site (e.g. by providing seston or by altering the temperature regime) should be mentioned. The occurrence of lake outflow communities will be explained with these data.

*26b cross section*

- a) Width of the floodplain: Only applicable if a distinct floodplain is present (not applicable for many types of lowland streams). In mountainous areas the edges of the floodplain can usually be obtained from maps, otherwise, it should be measured or estimated in the field. 'Floodplain'

is defined as the area regularly inundated under natural conditions (without the influence of dams and impoundments).

- b) Flood prone area width: Only applicable, if distinct edges of the embankment are present.
- c) entrenchment depth
- d) average stream width: measured from the actual shorelines (water table).
- e) mean depth water body
- f) maximum depth water body

### *27 Mean slope of the valley floor [%]*

Data should be taken from maps. The length of the floodplain stretch considered should be reasonable, but not shorter than 1 km. The sampling site should be located in the centre of the floodplain stretch considered. The distance between two elevation lines must be measured without considering the course of the stream (e.g. meanders) in the floodplain mid.

### *29 valley form*

Valley form can sometimes be obtained from maps; if not, field data should be used.

- canyon: the stream is deep-cutting; hillslopes are almost vertical.
- V-shaped valley: no floodplain existing. Sediment arising from the hillslopes is not completely transported by the stream (small streams only).
- trough ('Muldenttal'): Sediment arising from the hillslopes is only partially transported by the stream.
- meander valley: a distinct floodplain is present. The valley itself is meandering.
- U-shaped valley ('Sohltal'): a distinct floodplain is present accompanied by hillslopes.
- plain floodplain: (partly) in lowlands: no valley present.

### *30 land use in the floodplain (1 km length)*

Information to be taken from maps or GIS, 'Corine land cover' can be used (compare to 19). Especially for small catchments it can be roughly estimated in the field. Only categories covering > 10 % of the catchment area are considered. The sampling site must be located in the centre of the floodplain stretch considered. Lowland streams: 'floodplain' = riparian zones = 10 x stream width. For categories see site protocol.



**Parameters 69 to 102: sample related information (to be recorded just once)**

**Stream morphology and hydrology**

**Box 3:** general remarks for parameters 69-102. The 'sampling site' is defined as follows:

definition of 'sampling site'

- small streams (< 100 km<sup>2</sup> catchment area): 250 m upstream and downstream of sampling point
- medium sized streams (> 100 - 1000 km<sup>2</sup>): 500 m upstream and downstream of sampling point
- large and very large streams (> 1000 km<sup>2</sup>): 1000 m upstream and downstream of sampling point.

*69 shading at zenith (foliage cover)*

Seen as a projection from the mid of the streambed at times of full foliage cover (20 % steps).

*70 average width of woody riparian vegetation*

Woody riparian vegetation is significantly affecting habitat composition through roots, leaves and wood. Indicate the width; if the width is > 20 m indicate just '> 20m'. If there is a forest reaching to the banks of the stream, the width is > 20 m; also a forest in mountainous areas reaching from the valley flanks down to the stream will lead to '> 20 m'. It has to be estimated from the average width of those parts of the site where riparian vegetation is found.

*71 channel form*

For categories and figures see protocol form.

*73 presence of standing water bodies in the floodplain* (for the complete sampling site, see definition in box 2).

- side arms connected to the river/stream
- temporary side arms recently disconnected from the river/stream
- permanent side arms recently disconnected from the river/stream
- side arms abandoned years/decades ago in the process of silting up
- standing water bodies located in the floodplain and fed by tributaries
- other types (please specify)
- no standing water bodies present

Side arms, which are connected with the stream only during floods and isolated or dry most of the year belong to type I, 'side arms connected to the river system'.

*74 number of debris dams (POM accumulations > 0.3 m<sup>3</sup>)*

Frequency of debris dams/accumulations [no/sampling site]; debris dam defined as POM-accumulations > 0.3 m<sup>3</sup> (estimated by width, length, and height) or POM-accumulations occupying more than half of the stream width (for the complete sampling site, see definition in box 2).

*75 number of logs (> 10 cm diameter)*

Logs > 10 cm maximum diameter at least partly located in the active channel (for the complete sampling site). Only single logs (> 10 cm diameter) lying separately (at least partly) in the stream bed have to be counted.

*76 left/right shoreline covered with woody riparian vegetation at sampling site*

Indicate, to which degree the shorelines are accompanied by woody riparian vegetation (10 % steps). Mean value of right and left shoreline must be given separately. If the vegetation is shading the stream and is protecting it at least partly from non-source pollution and/or erosion it should be regarded as a 'woody riparian vegetation'

- right shoreline
- left shoreline
- (10% classes)

## **Human impacts on sampling site**

### *77 dams (no and cumulative height)*

Indicate, if dams/weirs obstructing migration and/or retaining sediment are present in the study reach.

### *78 other transverse structures (no and cumulative height)*

Indicate, if other transverse structures (e.g. sills) are present in the study reach.

### *79, 80 bank and bed fixation (at 10% intervals)*

Indicate, to which degree the banks and the stream bed at the study site are fixed by artificial or living materials (separately for right and left shoreline).

Categories:

- concrete without seams: a solid concrete structure without interstices
- concrete with seams: concrete plates with interstices
- stones: e.g. riprap
- stone plastering with interstices
- stone plastering without interstices
- wood: dead wood
- trees: if trees (e.g. alders) have apparently been planted to prevent stream movements.
- other materials
- no bank fixation

### *81 stagnation*

Indicate, if the stream at the study site is artificially stagnant (usually, if a dam is present downstream).

### *82 torrent modification*

Only applicable for alpine areas.

### *83 channelling for navigation*

Only applicable for large rivers, which are (or have been historically) used for navigation.

### *84 straightening*

E. g. indicated by cut-off meanders, channel form or known from local/historical sources

### *85 removal of CWD*

Removal of CWD (coarse woody debris) may significantly alter habitat composition. May be indicated by a low number of logs inside the channel, existing data or be directly observed.

### *86 cut-off meanders*

Presence of cut-off meanders (either intact or filled) in the floodplain.

### *87 scouring [m below surface]*

Indicate, if the channel is significantly deep-cut (depth should be given as the average over the stretch). Scouring may limit the channels ability to move and its habitat composition. Natural incision (e.g. at sand stretch) is not to be considered. Note only if characteristic for the whole site, not an exceptional short and scoured reach e. g. after a bridge

### *88 culverting*

Indicate if the channel is partly culverted in the sampling site section.

### *89 pulse releases*

Indicate, if the sampling site is affected by pulse releases of upstream weirs.

### *91 water abstraction*

Indicate, if the site is affected by abstraction of water for irrigation, hydropower or other purposes.

### *93 removal/lack of natural floodplain vegetation*

Indicate, whether or not the floodplain vegetation has been (at least partly) removed. 'At least partly' means 'significantly' (> 20 %).

*94 non-native woody riparian vegetation*

Indicate, whether or not the woody riparian vegetation is (at least partly) replaced by non-native species. 'At least partly' means 'significantly' (> 20 %).

**Pollution at sampling site**

**Box 4:** parameters 77-102 (pollution at sampling site)

parameters 95-102: addressing obvious alterations of water quality affecting the biocoenosis. To be taken from field observations, existing data sets or the results of 121-130.

In general, the 'sampling site' is defined in the same way as in box 3:

definition of 'sampling site'

- small streams (< 100 km<sup>2</sup> catchment area): 250 m upstream and downstream of sampling point
- medium sized streams (> 100 - 1000 km<sup>2</sup>): 500 m upstream and downstream of sampling point
- large and very large streams (> 1000 km<sup>2</sup>): 1000 m upstream and downstream of sampling point.

However, you should always take into account, whether or not the 'sampling site' is affected by a certain parameter. For example, a pollution source might be located 2 km upstream of the sampling site and nevertheless impact the sampling site. Also in this case, the answer for 'source pollution' is 'yes'.

*95 source pollution*

E.g. purification plants, combined sewage overflow, sewage dumps, sometimes single houses in rural areas, industrial sources e. g. from animal production upstream.

*96 non-source pollution*

E.g. intense agriculture in catchment.

*97 sewage overflows*

*98 eutrophication*

E.g. caused by purification plants or intense agriculture.

*99 acidification*

May be indicated by pH-measurements (110) or existing data. Make sure that the stream is not naturally acid (e.g. peat bogs, organic stream beds with Sphagnum).

*100 liming*

Liming activities at sampling site.

*101 mining*

Mining activities affecting the sampling site.

*102 toxic substances*

Note only if data are available and/or the water chemistry has been examined by e.g. biotests (not presumed).

**Parameters 103 to 130: Sample related information (to be recorded at each sampling date)**

*103 (mineral substrates) and 104 (biotic microhabitats): microhabitat composition*

The data recorded in 103 and 104 are crucial for the sampling procedure and are describing the microhabitat composition, on which the sampling is based.

The microhabitat composition in the channel must be estimated according to the microhabitat list given in 103 and 104. The coverage of all microhabitats with more than 5% cover is estimated to 5%, the appearance of other microhabitats (< 5% cover) is indicated by a cross. The stretch, for which the microhabitat composition is estimated, must be representative for the stream section and should cover at least a riffle-pool sequence or 25 to 50 metres (whichever is longer).

The estimation of microhabitat composition comprises the following steps:

- Estimation of the cover of mineral substrates; the sum of the coverage of the individual mineral microhabitats must be 100% (1<sup>st</sup> column, upper part).
- Estimation of the cover of biotic microhabitats (seen as an additional layer); the sum of the coverage of the individual biotic microhabitats is variable (0 to 100%) (1<sup>st</sup> column, lower part).
- For step 3) (distribution of sample replicates) mineral and biotic microhabitats together are regarded as just one layer. The sum of the cover of **all** microhabitats (mineral and biotic) must be 100% (2<sup>nd</sup> column).
- Distribution of the 'sampling units' according to the share of habitats using the data in the 2<sup>nd</sup> column. E.g.: 50% mesolitoral, 25% psammal, 25% CPOM means 10 sampling units mesolitoral, 5 sampling units psammal, 5 sampling units CPOM. The number of sampling units in the individual microhabitats must be indicated in the 3<sup>rd</sup> column.
- Column 'comments on units allocation...' you may mention, how many of the sampling units are located in lentic or lotic areas, and near the margin or in the stream bed, respectively.
- For the mineral substrates it must be indicated, whether they are artificial (e.g. 'technolitoral' = riprap) (4<sup>th</sup> column).

*105a relation lentic/lotic zones*

Estimated for a stretch 20 x average stream width or 100 m, whichever is longer. Lentic and lotic zones should be distinguished by the appearance of the water surface (visual impression).

*106 discharge (estimated)*

Only to be applied, if parameter 116 is not completed (in this case, the discharge is calculated automatically).

*107 colour*

Indicate natural occurring colours e. g. brownish by humic acids as well as artificial altered colours e. g. like whitish by organic pollution.

*108 odours*

Odours indicating pollution, e.g. H<sub>2</sub>S, sewage, phenolic substances

*109 foam*

Only foam indicating pollution must be mentioned, not foam resulting from humic acids or other natural sources like pollen, rotten exuviae.

*110 pH*

To be measured in the field with a pH-meter.

*111 conductivity [ $\mu$ S/cm]*

To be measured in the field with a conductivity-meter.

*112 reduction phenomena (ferrosulfides below stones)*

Indicate if a black layer indicating reduction phenomena is present on the lower site of stones or other coarse matter in the streambed.

*113 litter*

Indicate if waste is affecting the sampling site.

*114 dissolved oxygen content [mg/l]*

To be measured in the field with an oxi-meter.

*115 oxygen saturation [%]*

To be measured in the field with an oxi-meter.

*116 Sample replicates (optional parameter)*

For the macrobenthos sample 20 sampling units must be taken (compare 103 and 104). In field 116 some additional information on each of the 20 replicates can be given:

- the microhabitat (according to the list given in 103/104)
- the depth
- the current velocity in 0.62 x maximum depth
- whether the replicate is located in a pool or a riffle.

Depth and current velocity should preferably be measured prior to the sampling without disturbing the site. Alternatively, the current velocity might be measured after sampling in the undisturbed vicinity of the replicate sites.

*119 mean current velocity (optional)*

To be calculated from the 20 replicates measured in 116.

*120 maximum current velocity (optional)*

To be calculated from the 20 replicates measured in 116.

**Chemistry (optional)**

*121 – 130 chemistry:*

**Box 6:** Parameters 121 to 130: preferably to be measured in the lab. If sampling sites are located in remote areas, the parameters may be measured in the field (especially during the summer months), e.g. using field-photometers.

*121 alkalinity [CO<sub>3</sub><sup>2-</sup>] [mmol/l]*

Should be measured in the field.

*122 total hardness [mmol/l]*

*123 chloride [mg/l]*

*124 biological oxygen demand [BOD<sub>5</sub>] [mg/l]*

*125 ammonium [mg/l]*

*126 nitrite [mg/l]*

*127 nitrate [mg/l]*

*128 ortho-phosphate [µg/l]*

*129 total phosphate [µg/l]*

*130 chlorophyll [µg/l] (optional parameter)*

*133 E. coli (UFC/100 ml)*

*131 comments (optional)*

Page 6 and 7 of the site protocol are related to the phytobenthos sampling and should only be completed for those sites, where phytobenthos samples are taken.