

UKTAG – Biological Status Methods

Rivers – Phytobenthos

What do we use as an Indicator?

Phytobenthos (Microscopic plants that live attached to substrates such as rock/stone or large plants).

Why do we use Phytobenthos?

Phytobenthos are good indicators of nutrient enrichment and other pressures, and can be used to assess river water quality. Diatoms are the main plant groups that we use because their silica shells are easy to identify under the microscope. The method is based on the principle that different diatoms have different environmental preferences, so we record the species found, along with their relative abundance.

Sampling

The sampling method involves collecting samples of benthic diatom species by brushing or scraping the upper surface of cobbles or small boulders obtained from the river bed. This removes the thin coating known as the “biofilm” found on their surface. This biofilm contains the diatoms we need to sample.. Where there are no cobbles or small boulders present in the river at the sampling site, samples can be collected from submerged portions of emergent plants such as the common reed, *Phragmites australis*.



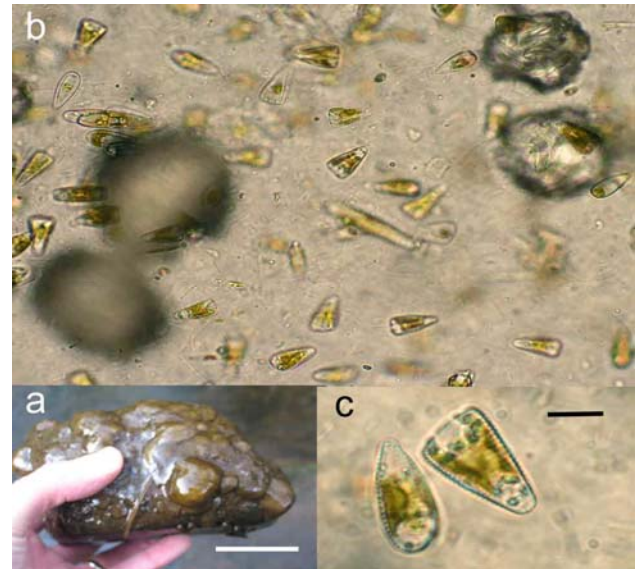
The samples are then analysed to identify the presence, and the number of each of the diatom taxa¹.

What do we measure?

We measure the **River Trophic Diatom Index**

This is the measure of the different number of species and their relative abundance identified as present in the river. The diatoms are assigned a nutrient sensitivity score depending on how sensitive a

particular diatom species is to nutrient pollution. For example, *Hannaea arcus*. has a low sensitivity to nutrient enrichment so will have a low nutrient sensitivity score whilst *Nitzschia palea* tends to be associated with polluted sites and has a high nutrient sensitivity score.



a. = macroscopic view of a thick biofilm on a rock
b. = the same biofilm under a microscope, showing the diatoms
c. = close-up of the diatoms; the scale bar is 10 µm

How do we decide the Biological Status?

The observed measures are then compared with the measures expected in undisturbed conditions. The outcome is expressed as an 'Ecological Quality Ratio' or EQR. An EQR close to 1 indicates that the phytobenthos are close to their natural state; those close to 0 indicate a high level of pollution or disturbance. To calculate the biological status the measure is divided into the 5 bands required by the Water Framework Directive; see the table below.

Biological Status Boundary Values

Status	EQR Values
High	0.93
Good	0.78
Moderate	0.52
Poor	0.26
Bad	<0.26

For more details see (UKTAG River Assessment Method, MACROPHYTES AND PHYTOBENTHOS - DIATOM ASSESSMENT for RIVER ECOLOGICAL STATUS (DARES) ISBN: 978-1-906934-08-8)

¹ taxon (pl.taxa) taxonomic unit e.g. family, genus, species