

Biological Techniques of Still Water Quality Assessment Phase 2

The Environment Agency has a statutory duty under the Environment Act 1995 to monitor the extent of pollution in all controlled waters and a duty to promote the conservation and enhancement of natural beauty of inland and coastal waters.

R&D Project E1-012 “Biological Techniques of Still Water Quality Assessment Phase 2” describes a biological classification method, which has been developed for application for all still waterbody types. This method, termed PSYM (Predictive System for Multimetrics), has been field tested and demonstrated using ‘regional’ datasets for ponds and canals

The method enables the unimpaired fauna and flora to be predicted for any given site; assesses the extent to which sites are degraded below the unimpaired baseline using a number of biological attributes (metrics); and uses a combined metric score to provide a single value which summarises the overall ecological quality of the waterbody.

In this phase of the project, the predictive multimetric approach was tested by developing the PSYM method for use in canals and ponds. In canals the method was developed using one biotic assemblage (macroinvertebrates). In ponds both macrophyte and macroinvertebrate assemblages were tested. Phase 2 was also used to classify a small number of lakes, including some used in the Agency Lake Classification project. (R&D i 721)

The databases used to develop the system included (i) high quality reference sites which were used to make predictions for expected biotic assemblages and (ii) degraded sites which were used to identify biotic metrics that could be used to track environmental degradation.

The pilot project results, which were based on single season, regional, databases (covering approximately 30% of the land area of England and Wales) showed that:

- A small number of physico-chemical variables could be used to make predictions of the plants and invertebrates which should occur in canals and ponds.
- Successful degradation metrics (e.g. invertebrate taxa richness, EPT, ETO, plant richness and rarity) could be developed, by correlating biological and physico-chemical data from sites which varied in the extent to which they were degraded.
- For invertebrates, family-level and species-level metrics showed similarly strong relationships with degradation. This indicates that family-level invertebrate metrics will be able to successfully track environmental degradation.
- It was possible to identify metrics which could independently track different forms of environmental degradation (e.g. water quality degradation as opposed to poor bank structure in canals).

Phase 2 also progressed the development of diatom and fish assemblages for use in PSYM. However, for these assemblages, the method still needs to be tested in practice. Phase 3 of the still waters project (currently in progress) will complete the development of the pond (and, optionally, canal) methodologies to make them available for operational use. This will

enable Agency staff to classify still waters, assess degradation and use the information in state of the environment reporting.

Phase 2 of the project is reported in R&D Technical Report E56, the Project Record contains lists of all the sites surveyed, the raw data (physical, chemical, biological (species)) and all the correlations between environmental and biological variables.

This R&D Technical Summary relates to information from R&D Project E1-012 contained in the following outputs:

R&D Technical Report E56 Biological Techniques of Still Water Quality Assessment Phase2

Internal status: Released to Regions

External status: Released to Public Domain

R&D Project Record E1/012/1 Biological Techniques of Still Water Quality Assessment Phase 2

Internal status: Released to Regions

External status: Released to Public Domain

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Copies of the reports are available externally from WRc plc (Tel: 01793 511711; Fax 01793 511712)

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