Proposed R&D framework for the Freshwater Collaborative Research Partnership

1. Introduction

The FW CRP aims to put in place strategic R&D on ecological and biological processes necessary to support management decisions relating to the freshwater environment, explicitly integrating this research with the development of ecological models and decision support tools that relate specifically to decision-making processes. A better knowledge of these systems and a fuller understanding of these processes is necessary if we are to manage ecosystems effectively at a catchment scale. It is also central to designing restoration and mitigation measures and predicting their effectiveness

Such strategic R&D has to date been beyond the means of individual funding bodies but is essential if the UK is to fulfil its obligations under the Water Framework Directive, the Habitats and Species Directive, the UK Biodiversity Action Plan, and commitments towards nationally designated wildlife sites. It is also vital in developing mitigation programmes that combat the effects of climate change.

2. The work of the FW CRP in context

Central to the work of the CRP will be discrimination between natural variability and anthropogenic influence in the abiotic and biotic components of the freshwater environment, so that acceptable limits of human influence can be defined that are robust in management terms. These acceptable limits may be defined in terms of:

- acceptable *biological* change, i.e. change within, or an acceptable distance from, the natural variability of biological processes); or

- acceptable *environmental* change (i.e. change induced by human activity that does not result in an unacceptable biological change).

It is important to note that whilst some biological and environmental limits have been set based on best available information, most require underpinning from strategic, process-based R&D. This can only realistically be delivered by the type of partnership funding envisaged for the FW CRP.

Figure 1 outlines the sequence of environmental processes occurring in catchments, the collective study of which is commonly termed Integrated Catchment Science. The R&D focus of the FW CRP lies in the quantitative characterisation of relationships between those boxes shaded green, along anthropogenic pressure gradients from natural/undisturbed to heavily impacted. Clearly, such work needs close collaboration with researchers working on the unshaded boxes.
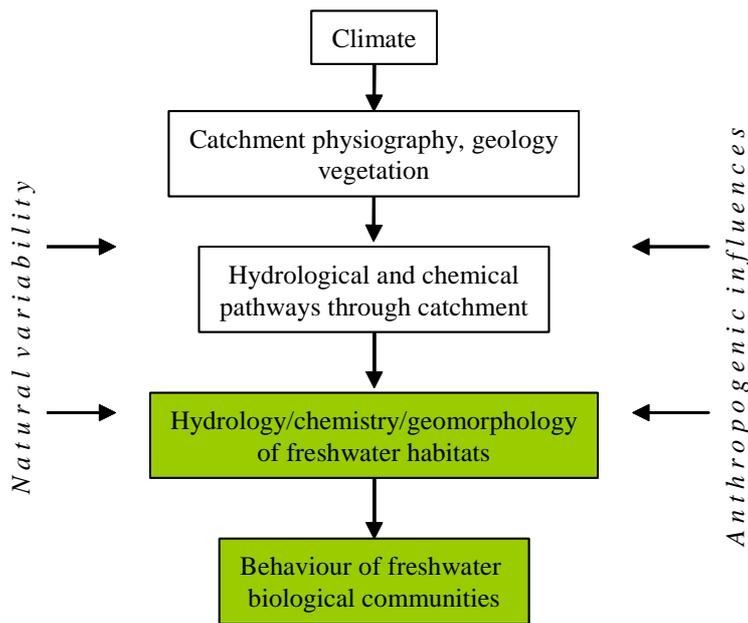
Figure 1. Sequencing of environmental processes in catchments.

The structuring of R&D projects will be critical to the development of management-orientated products. A suitable mode of working may be as follows:

- develop a conceptual ecological process model of the environmental issue;
- undertake field and mesocosm investigations of key processes along the chosen pressure gradient, factoring out natural variability and confounding variables as far as possible;
- examine/quantify biological change in both directions along the pressure gradient;
- quantify natural limits of biological variation;
- develop quantitative process model and where necessary Decision Support Tool.
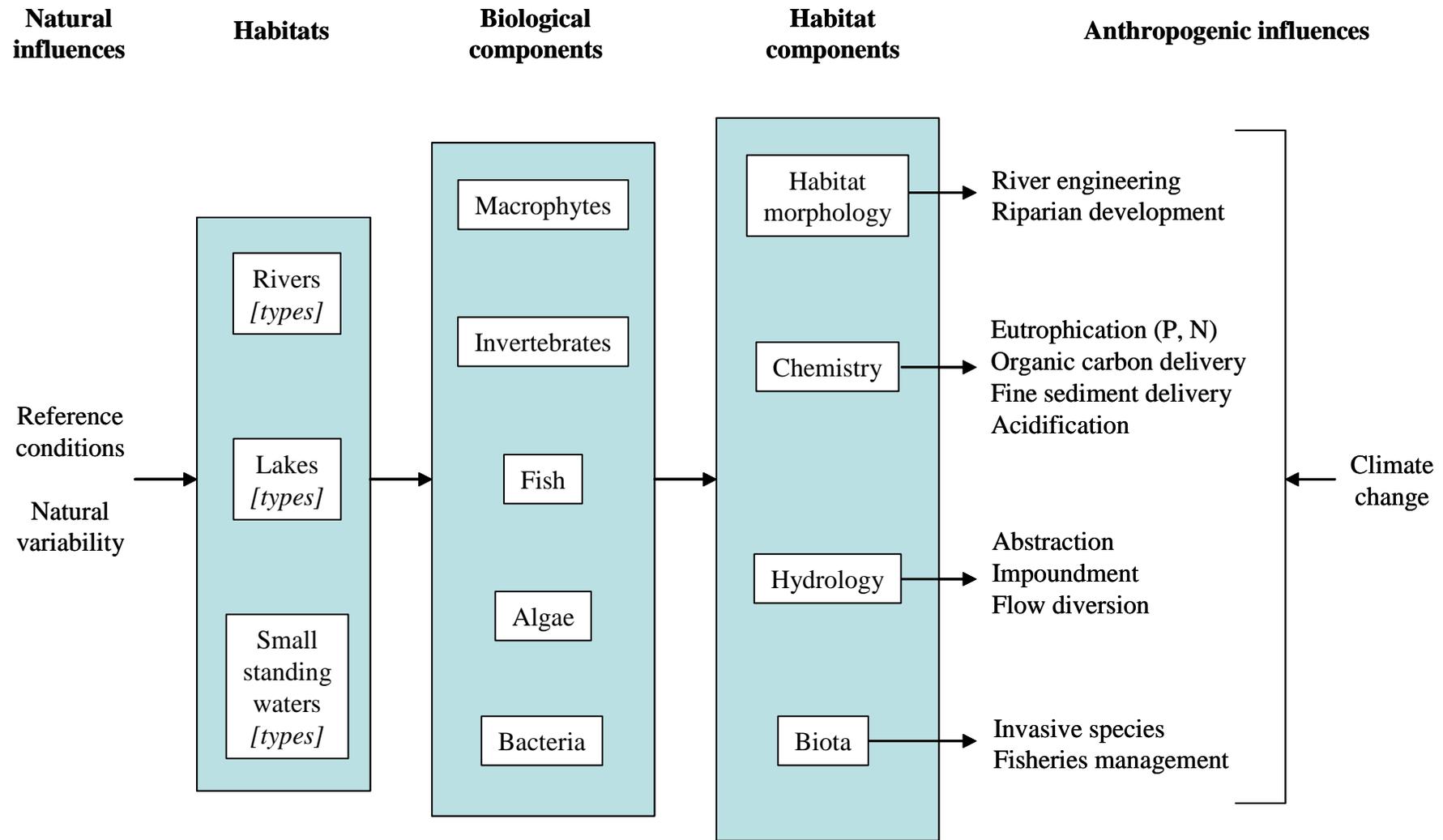
3. R&D framework

Figure 2 takes a closer look at the green boxes in Figure 1 to try and scope out the range of research topics that the CRP could address. The possible combinations of anthropogenic pressures, habitat types, and habitat and biological components are numerous, and there is a need to prioritise within this. A key part of the work of the CRP will be to reach consensus on what parts of this framework deserve most attention.

4. Other research areas

This paper outlines research that will enable freshwater science in the UK to address more closely the pressing management issues facing the freshwater environment. Beyond this, there remains a fundamental need to maintain research areas that have a less overt link to environmental management, including taxonomic research.

Chris Mainstone/Bill Brierley, 11/03/07

Figure 2. R&D Framework