

SUMMARY OF THE FUTURE OF FRESHWATER BIOLOGY CONFERENCE ON 19 OCTOBER 2006

In the first paper of the day, Steve Ormerod presented the evidence that led the *Review* to conclude that there had been a significant decline in research on aspects of freshwater ecology in both the Universities and the Research Council institutes. The number of researchers peaked in the early 1980s and has now roughly halved, and the UK contribution to the literature has also fallen at a time when the total production of papers on freshwater topics has been rising. The *Review* may have missed some researchers and covered only a part of the literature but the broad conclusion appears inescapable. The decline appears to have been caused partly by the increasing popularity of molecular biology and partly by a switch in emphasis towards physical sciences which dominate recent NERC grants to 'freshwater ecology'. In universities, much ecology is now done in geography departments. The freshwater science community appears to have been bad at making a case for its field. The consequence is a serious shortfall in capacity, for example to implement the EU Water Framework and Habitats Directives and to take the right decisions about how management should respond to climate change.

Stephen Maberly pointed out that freshwater scientists in the United Kingdom were fortunate in having a number of long-term data series. In Cumbria, FBA data on four lakes extended back to the 1940s and in Dorset data on two rivers commenced in 1961. The Environmental Change Network covered 16 lakes and 28 rivers. Much of the recent data had been collected by government agencies, and especially the NERC Centre for Ecology and Hydrology. There were also some well-documented University sites, and both FBA and Universities owned experimental facilities which, while not foremost in Europe, were valuable and if once lost would be almost impossible to replace. The long-term data were valuable for analyses which contributed to the development of ecological theory and allowed insight into ecosystem response to changes in catchment processes, pollution, variations in the North Atlantic oscillation, climate change and the advent of invasive species.

The analysis of responses to the *Review*, presented by Roger Sweeting, confirmed general support for its conclusions although some respondents felt that the coverage had not been broad enough. It was generally agreed by respondents that there had, indeed, been a real decline in freshwater research even though it was asserted that much recent work was included in consultancy reports that did not find their way into the published literature. There was broad welcome for the concept of a Cooperative Research Partnership, but to succeed it must have independence, strong leadership and above all good communications. Industry and other potential users of the information must articulate their needs clearly and be satisfied that the CRP would be an efficient mechanism for meeting them.

Ralph Ogden provided a fascinating account of how the Cooperative Research Centres worked in Australia. They accounted for only a tiny fraction of the Government science budget, though this was increasing. They relied on cooperation between Government, Government agencies (CSIRO), industry and universities. Trust between the partners was at the heart of success. Communication between researchers and the users of research data, was fundamental. Managers of natural resources needed information, while researchers needed funds. The managers had to define their needs and be satisfied that the funds they allocated would be used in a cost-effective way while the scientists had to deliver useful outputs. Problems arose where research failed to generate knowledge that managers could apply. While the existing CRCs, like CRC Freshwater Ecology and CRC Catchment Hydrology had generated numerous PhDs and research papers, scientists needed to recognise that scientific papers were of little direct use to managers. The key was in the translation of results into decision tools managers could use.

It was clear that a central issue for the Conference was whether the CRC model could be translated to the UK in the shape of a new *partnership*, as a means of enhancing freshwater science and also as a way of attracting enhanced funding.

The discussion after the first series of papers brought up six major issues:

1. the problem of fragmentation, which was one reason why the freshwater science community was currently punching below its weight;
2. whether better cooperation would lead to a more persuasive case for a greater allocation of resources, so arresting the decline;
3. how to ensure inclusiveness in any CRP, involving ecologists who work in geography departments and in consultancies as well as those in Research Councils, FBA, Government agencies and Universities;
4. the value of having a comprehensive database on freshwater ecologists: their locations and fields of interest (it was suggested that FBA might be supported to compile and maintain this);

5. the need for a parallel database on long term data series – what they covered, where they were held, who owned them and how far they were accessible to researchers (the Environment Agency pointed out that they held a great deal of information on rivers);
6. the potential value of a CRP in translating scientific knowledge into decision tools that resource managers, consultants and policy advisers could apply.

There is already a database on long term series, held by NERC-CEH, whose coverage might be reviewed in the light of this discussion.

In the afternoon session, Rick Battarbee looked at the new challenges to freshwater research. The development of insights and models that might allow prediction of the impacts of climate change was widely agreed to be essential. Here long-term data series at well-documented sites were invaluable, and at many sites recent runs of measurement could be extended over thousands of years by palaeoecological data. Such research was highly relevant because the EU Commission was already considering how the Water Framework Directive might be adjusted to ensure water quality in a changing climate. But science was also needed as a basis for framing sensible new laws, directives and management procedures. This depended on interaction between scientists and decision makers, and demanded an end to the fragmented, under-resourced, state of the scientific community. Creation of an effective two-way communication between researchers and users would be the best way of generating more resources for the discipline.

Against all this background, Alan Hildrew returned to the case for a Cooperative Research Partnership set out in the Review. It would be a virtual centre, linking the various research teams and individuals in a network. It would cover freshwater science as a key area, and would need some core funding, although much of the cost would need to come from users, who would support studies that they judged would meet their needs (as was pointed out several times, this was the essence of Lord Rothschild's 1971 report that articulated the 'customer-contractor principle'). The CRP would embrace the whole freshwater community, and was not primarily an FBA matter although the Association would contribute its unique facilities and the Rivers Centre in Dorset could be a good place to start, as a base for visiting scientists. The FBA sites could also be used as places for professional training.

This latter point was picked up in the final discussion. It was agreed that something needed to be done to strengthen the 'supply chain' for freshwater biologists. Communication with teachers in schools as well as at university level was important. Links with natural history societies, whose members included some skilled amateur taxonomists, and with conservation organizations who were enthusiastic defenders of freshwater habitats, should be strengthened. There was a need to convince people that freshwater science was exciting as well as important. The FBA might consider re-establishing its Easter Courses and making its facilities available to visiting school and university groups as part of this process.

Success would depend on demonstrating the relevance of freshwater science to policy. This was one way the Australian rivers project had worked. A CRP was seen as a way forward, both in curing the current malaise and in strengthening freshwater science in future. But success would depend on demonstrating that the approach really worked – really paid off for users and managers, and was not just a device for siphoning money into academic science. Dialogue with users was crucial. But the science community should look forward and demonstrate its value in defining a sound scientific base for future EU and national regulatory action (as had been attempted by a Royal Society group in the 1980s). There had to be a business case for collaboration, and a CRP needed a clear focus and a strong 'centre of gravity'. This might be provided by the Water Framework Directive, looking at the role of a CRP in its implementation and especially at the way climate change must affect the implementation of the 'no deterioration' obligation.

Concluding the discussion it was agreed that the next step ought to be the preparation of a proposal for a Cooperative Research Partnership defining what it might do, how it would be structured, how it would be financed and how the crucial two-way communication between researchers and managers/users would be assured. The development of this plan would need a dedicated person or group. Freshwater management and resource conservation in the face of climate change might be the focus. The plan must demonstrate a sound, cost-effective business base. There ought then to be another round of dialogue with key users and key agencies such as NERC-CEH, the Environment Agency, Natural England and DEFRA. Assuming this led to consensus, Ministerial backing should then be sought, for this process was a political as well as a scientific one. Ministers would be interested if it could be shown that this was a 'win-win' approach that could deliver both an improved response to climate change and a saving of money!

Sir Martin Holdgate
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