Combining science and community involvement for public and private benefits from catchment management in lowland England

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Abstract: *A combination of multidisciplinary science and social learning through a community heritage project in the 67 km^2 Eye Brook catchment in Leicestershire (England) explores a number of environmental issues with a view to achieving public and private benefits simultaneously.*

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Background

Current focus on river basin management in Europe is driven largely by the regulatory requirements of the Water Framework Directive. Economic drivers, for example those associated with cultivation technology and fertiliser use, also play a part in reducing environmental impact on watercourses in agricultural catchments, but it is increasingly recognised that the combination of regulation and market forces alone is not sufficient to deliver public goods such as biodiversity or water quality and quantity.

There is increased recognition of the integration of multiple processes in delivering 'ecosystem services' such as flood mitigation, maintenance of summer flows, and carbon sequestration, that have both private and public benefits. However, multiple objectives for private and public benefits can lead to conflict between the multiple stakeholders responsible for them. Similarly, the application of a 'hard science' approach alone to environmental issues provides essential guiding information, but often fails to accommodate the diverse values of the people involved in management. A 'social learning' approach engages people at the catchment community level and encourages convergence of attitudes, increased coherence of dialogue, and increased social capital through improved collective knowledge and the local communication of it. Shared local knowledge contributes to shared local identity and enhanced 'ownership' of environmental problems and opportunities. Cultural values are often embedded in historical processes and knowledge of those processes and an increased historical awareness can enhance interest in and ownership of environmental issues. This project combines science and social learning in the 67 km^2 Eye Brook catchment, a tributary of the River Welland in Leicestershire, England. Details of methodological approaches and scientific publications can be found through the 'Allerton Project' web pages at www.gct.org.uk . Both science and community approaches aim to build an improved understanding of environmental issues at the catchment scale, for dissemination more widely, often building on very localised experiment or experience.

Science

A major issue in terms of diffuse pollution, and one for which research funding has been released because of Water Framework Directive objectives, is that of sedimentation and eutrophication associated with elevated phosphorus concentrations. Sedimentation arises from transport of soil from arable land and phosphorus is adsorbed to fine particles in suspension. At the Allerton Project research and demonstration farm at Loddington (in the centre of the Eye Brook catchment), research at the erosion plot scale has identified a role for minimum tillage in reducing soil erosion and associated loss of soil and nutrients. This erosion plot scale research has also identified the high contribution of soil and phosphorus in surface runoff associated with 'tramlines' running across contours and mitigation measures are being investigated. At the field scale, riparian buffer strip pool sequences have been shown to halve phosphorus loss to water while also providing wildlife habitat for aquatic and terrestrial invertebrates, and for birds, and providing opportunities for recreational shooting. In response to suggestions from visiting farmers, smaller field corner constructed wetlands are being investigated in terms of their nutrient management potential and conservation value. Some

of this work is being undertaken on neighbouring farms, enabling the evaluation of these features by the local farming community.

Physical, chemical and biological processes associated with sediment and nutrients in first order streams are also being investigated at the catchment scale, comparing a low input pasture tributary with a primarily arable tributary. Contributions of suspended solids and nutrients are generally much higher under arable than pasture. However, the study also identifies a phosphorus contribution from domestic septic tanks. While regulatory policy concentrates on the agricultural contribution, our research therefore highlights the need for wider community involvement in addressing this issue. Brown trout (*Salmo trutta*), valued by local people, are present throughout the catchment but survey data reveal low breeding success because of sedimentation. The potential of this species to contribute to the fishery in the reservoir at the base of the catchment, or in the stream, is therefore low.

Issues associated with ancient semi-natural woodland in the catchment are also being investigated. Damage by alien muntjac deer (*Muntjac reevesii*) to woodland ground flora varies more within woods than between them, necessitating a landscape scale approach to their control, but motivation for doing so is low and determined by socio-economic considerations (see below).

Social learning

A workshop for local people held in 2003 as part of an EU-funded social learning project (http://slim.open.ac.uk/page.cfm?pageid=slimhome) highlighted the importance attached to the catchment as an attractive place in which to live and work. Participants also identified threats and opportunities associated with living in a low population density area between two urban centres (Leicester and Corby). A subsequent community heritage project involves local people in the development of a shared understanding of the evolution of the catchment landscape. Information on the historical management and use of land and other natural resources is investigated through historical maps, census data, photographs and the recorded memories of elderly members of the catchment community. Such shared knowledge, together with results from scientific research, is disseminated locally through an annual publication and through site visits and other events. This work enhances both local knowledge and communication of it within the catchment, including discussion of implications for future management and use of natural resources. Workshops to discuss such issues more formally will be held.

A GIS map of the catchment has been developed, including watercourses, buildings, woods, field boundaries and current land use. This provides a focus for dialogue with and between local people and an opportunity to create historical land use maps for periods where data are available. Such visualisations provide evidence of historical land use change in what is often perceived to be a ‘timeless’ landscape. The maps can also be used to develop land use scenarios for future management of the catchment. In a survey of residents in the upper part of the catchment in which four future land scenarios were presented, 62% of respondents claimed that the maps had improved their understanding of local land use issues, suggesting that the GIS maps could serve an awareness raising role for local people as well as for researchers. There were gender differences between the ranking of favoured land use scenarios, with women favouring biofuel cropping intended to address climate change.

Issues associated with the role of muntjac and other game species as food are being explored in the catchment by researchers and practitioners. The study is expected to throw some light on the motivations for controlling muntjac and the social networks involved in the harvesting, processing, sale and consumption of this and other species. This process will complement and integrate with other social learning relating to management and use of other natural resources within the catchment.

Conclusions

This ongoing project is demonstrating how experimental and experiential knowledge can combine to inform the development of plans for catchment scale integrated management that will deliver private and public benefits. The wider application of this is communicated to practitioners and policy makers through dissemination at the Allerton Project’s demonstration farm, publications etc.