



## **Forestry and water quality – Investigating scenario modelling as a tool to explore the implications of the Water Framework Directive.**

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The Water Framework Directive (WFD) aims to bring significant changes to the management of the water environment. Successful implementation will require the co-ordination of efforts of both public and private bodies, of those with direct interests in the water environment and those whose activities impact on the potential to achieve the “good ecological status” demanded by the directive. An understanding of the interactions between these stakeholders is needed to understand how the directive will take place in practice.

This paper presents results from a joint NERC/ESRC (Natural Environment Research Council/ Economic Social Research Council) project that investigates water quality in acid sensitive river basins. The paper attempts to marry methods from both social and natural sciences by following a dual approach that aims both to build on existing knowledge of acid waters and pollution of the physical environment and explore how the relationships among stakeholders within a river basin impact on the potential to achieve the WFD’s aims.

Galloway Forest District in southwest Scotland provides an ideal case study to investigate this approach. It is an area where the natural occurrence of acid geology, soils and vegetation are exacerbated by the scavenging of airborne pollution by conifer plantations. This has led to acidification of freshwaters becoming acidified with significant impacts on biota including salmon fisheries. The area has a long history of data collection Nisbet *et al.*, 1995; Pühr *et al.*, 2000; Helliwell *et al.*, 2001;) and regular water chemistry and fisheries data continue to be collected on a regular basis by the Scottish Environmental Protection Agency (SEPA) and the Galloway Fisheries Trust (GFT) respectively. Furthermore the key stakeholders in the area have experience of working

together as a group; in 2002 they completed an EU Life project focussing on water quality issues in relation to forestry (Cree Valley EU Life project, 2002).

This paper follows work by the European Environment Agency (Nakicenovik *et al.*, 2000; Alcamo, 2001; Nakicenovik, 2002) by describing a scenario modelling process in which a stakeholder panel has been constructed with the aim of:

1. Identifying how the different aims and priorities of the stakeholder organisations impact on the management scenarios identified.
2. Collecting and collating existing datasets from the panel members with contemporary water quality data and predictive models.
3. Holding a workshop to discuss the decision making process and allow stakeholders to express any contested views through best available data.

The approach aims to illuminate both the relationships between the stakeholders, highlighting power relationships, issues of trust, or lack of data –and also how the decisions made will impact on the ability of the study area to meet the needs of the WFD.

### **.Bibliography**

Alcamo, J. (2001). "Scenarios as Tools for international environmental assessments", *Environment Issue Report* 24. Experts Corner report Prospects and Scenarios No 5 (Report for European Environment Agency).

Helliwell, R.C., Ferrier, R.C., Johnston, L., Goodwin, J. and Doughty, R. (2001). "Land use influences on acidification and recovery of freshwaters in Galloway, south-west Scotland." *Hydrology and Earth System Sciences*, **5**(3): 451–458.

Nakicenovik, N. (2002). "*Participatory integrated assessment methods - An assessment of their usefulness to the European Environmental Agency*", Wissenschaftszentrum Bonn, Germany: UNFCCC Workshop on the IPCC Third Assessment Report.

Nakicenovik, N., Davis, G. and deVries, H.J.M. (2000). "Intergovernmental Panel on Climate Change (IPCC) special report on emission scenarios", *IPCC Website*. <http://www.ipcc.ch/pub/sres-e.pdf>. Accessed: 2004/04/06

Nisbet, T., Fowler, D. and Smith, R.I. (1995). "An Investigation Of The Impact Of Afforestation On Stream-Water Chemistry In The Loch Dee Catchment, Sw Scotland." *Environmental Pollution*, **90**(1): 111-120.

Puhr, C.B., Donoghue, D.N.M., Stephen, A.B., Tervet, D.J. and Sinclair, C. (2000). "Regional Patterns of Streamwater acidity and catchment afforestation in galloway, SW Scotland." *Water, Air and Soil Pollution*, **120**: 47-70.