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## Special Issue

# Sustainability of UK upland forestry: contemporary issues for the protection of freshwaters

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### Preface

Over the last hundred years, a major expansion in plantation forestry in the United Kingdom has reflected the national need for timber. Throughout that time, the nature of forestry and the goals of forest management have evolved, as has the perception of the role of forestry in relation to environmental and ecosystem health, amenity value and social and economic resource. Today, the emphasis is on achieving sustainable development and the need for forests to make a positive multi-functional contribution to sustainable environmental management. The protection of freshwaters is a key requirement of sustainable forestry and high priority has been given to the development of guidelines of best practice. These have been drawn up to tackle a range of water issues associated with forest development in the past.

In this volume, the effect of the recent changes in forestry practice are assessed in relation to water quality, habitat integrity, ecological processes and aquatic ecosystem health, in the context of over twenty years of hydrological, chemical and biological research. This is undertaken to show what has been achieved, where uncertainties remain, and the scope for further improvement to meet future environmental challenges.

Within this special issue, 26 papers are brought together to cover different aspects of UK forestry issues with regards to the freshwater environment. The volume begins with an overview of forest management and change in respect of environmental protection (Farmer and Nisbet, 2004), the effects of riparian forest management on the freshwater environment (Broadmeadow and Nisbet, 2004) and the implications of continuous forest cover in relation to surface water acidification (Reynolds, 2004). This work is complemented by a review of forest and aquatic environmental issues in an Irish context (Giller and O'Halloran, 2004). Issues of hydrology, then, relate to the

measurement of rainfall to forest canopies (Robinson *et al.*, 2004), groundwater flows in forested systems (Haria and Shand, 2004) and the linkages between geomorphological, hydrological and water quality attributes for the Plynlimon catchments within a GIS framework (Brandt *et al.*, 2004). To deal with water quality aspects of forestry, important issues that need evaluating as linked to atmospheric deposition of pollutants, particularly in upland areas. Regarding the atmospheric issues, two papers deal with critical loads for acidity (Langan *et al.*, 2004) and the need to incorporate factors connected to episodicity (Bridcut *et al.*, 2004). Two papers then describe manipulation experiments characterising the impacts of acidity and nitrogen loading on Sitka Spruce and runoff water quality (Sheppard *et al.*, 2004; Stutter *et al.*, 2004). A paper by Ness *et al.* (2004) bridges changes in water quality in the Plynlimon catchments of upland Wales with atmospheric deposition associated with the North Atlantic Oscillation, while two papers examine long-term changes in water quality for upland areas in Scotland (Langan and Hirst, 2004) and in Wales (Reynolds *et al.*, 2004). A paper then deals with the effects of riparian woodland on water temperature in an upland salmon stream (Malcolm *et al.*, 2004). Three papers assess the effects of felling and replanting on water quality for the Plynlimon catchments in mid-Wales (Neal *et al.*, 2004a,b,c). The 'Plynlimon papers' are completed with an overview of the processes that link soil and groundwater hydrology to runoff chemistry with the impacts of harvesting Spruce forest on surface water quality (Neal, 2004) and the modelling of upland and lowland forested systems (Whitehead *et al.*, 2004). Several of the earlier papers listed connect indirectly to biology, but direct linkages are provided through five specialist papers in this area. These cover the subject of riparian forestry management and stream insects (Briers and Gee, 2004), leaf transport and retention

within high-energy streams (Pretty and Dobson, 2004a) and the response of macroinvertebrates to artificially enhanced detritus levels in plantation streams (Pretty and Dobson, 2004b). The other two papers address the processing of leaf materials in the Cairngorms (Collen *et al.*, 2004) and the effects of riparian forestry on invertebrate drift and brown trout in upland streams (Ormerod *et al.*, 2004). The volume closes with a chapter that summarises, in a broader UK context, the findings of the papers presented within the volume (Neal *et al.*, 2004d).

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