

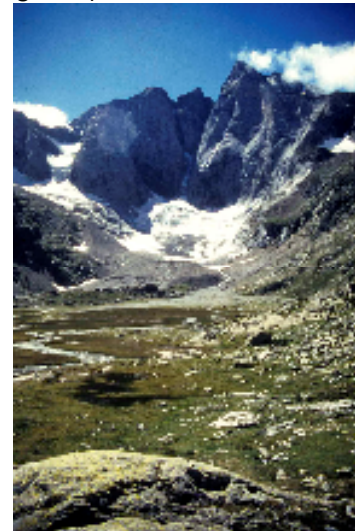
PhD studentship at the University of Birmingham, UK

Hydroecology of Alpine Streams in a Changing Climate

Supervisors: Professor Alexander Milner and Dr David Hannah (Birmingham), and Dr Lee Brown (University of Leeds).

This PhD studentship is funded by the EU-FP7 project **ACQWA** (**A**ssessing **C**limatic change and impacts on the **Q**uantity and quality of **W**ater; <http://www.acqwa.ch>).

In mountainous regions, climate change is likely to alter the balance between river basin water sources (rainfall, glacier-melt, snowmelt, and groundwater) and thus modify stream flow quantity and quality regimes (Hannah *et al.*, 2007). For example, decreasing groundwater recharge and elevated water temperature may disrupt flow permanency and increase occurrence of ephemeral river reaches. Modifications to key physico-chemical determinants of the diversity and composition of biota in alpine running waters are expected (Brown *et al.*, 2009). Aquatic organisms may be vulnerable to these changes and to avoid extinction must either adapt physiologically and/or genetically or migrate to more suitable habitats (Milner *et al.*, 2009). As a result, invertebrate biodiversity is highly likely to be impacted through changes in species distribution.



This PhD project includes fieldwork in the French Pyrenees. Measurements will be made across a number of Pyrenean streams to determine changes in water source dynamics, physico-chemical habitat and benthic communities that have occurred since streams were last studied by another EU project (AASER: Arctic and Alpine Stream Ecosystem Research) in the 1990s and subsequently by Brown, Hannah and Milner in the early 2000s. This approach will permit evaluation of ecological response to changes in hydrology that have occurred during the recent period of marked glacial recession. These data and associated ACQWA studies in the Swiss Rhone will allow the following aims to be achieved: (1) to improve understanding of alpine stream biodiversity changes under climate and hydrology change, (2) to use collected habitat and biodiversity data to develop further predictive models, and (3) to provide recommendations for conservation strategies of alpine stream ecosystems.

The PhD student will be involved fully in designing the field programme. S/he will work in a multidisciplinary team. The research programme will provide training in: hydrology; ecology; remote fieldwork and desk-based research methods; and analysis of environmental data. The student will benefit from being part of the ACQWA project through collaboration with specific partners and interactions with the wider research network. The student will participate in a large and active graduate research school within the School of Geography, Earth and Environmental Sciences and University of Birmingham. We encourage applicants with backgrounds in physical/environmental sciences (including geography) or ecology. The anticipated studentship start date is April 2010.

References: **Brown** L.E., Hannah D.M. and Milner A.M. (2009), ARISE: A classification tool for Alpine River and Stream Ecosystem management, *Freshwater Biology*, 54, 1357–1369; **Hannah** D.M., Brown L.E., Milner A.M., Gurnell A.M., McGregor G.R., Petts G.E., Smith B.P.G. and Snook D.L. (2007), Integrating climate-hydrology-ecology for alpine river systems, *Aquatic Conservation: Marine and Freshwater Ecosystems*, 17, 636–656; **Milner** A.M., Brown L.E. and Hannah D.M. (2009), Hydroecological response of river systems to shrinking glaciers, *Hydrological Processes*, 23, 62-77

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*** **Closing date for applications: 29 January 2010** ***