Environment

Centre for Environmental Research and Training (CERT)

The Centre for Environmental Research and Training (CERT) at the University of Birmingham offers a broad spectrum of multi-disciplinary research expertise, and provides a focus for the University of Birmingham's extensive environmental activities. CERT also acts as a gateway for external organisations enabling this expertise to be made more widely accessible.

The University of Birmingham has an international reputation for excellence for research and teaching in environmental science, engineering and policy. There are currently around 130 academic staff from across the five colleges on campus actively investigating the scientific, technical and socio-economic aspects across a broad range of environmental disciplines, including:

- **Sustainable energy (http://www.cert.bham.ac.uk/research/energy.shtml)**
- **Environment and health (http://www.cert.bham.ac.uk/research/health.shtml)**
- **Environmental impacts of nanotechnology (http://www.cert.bham.ac.uk/research/nanotech.shtml)**
- **Management of water resources (http://www.cert.bham.ac.uk/research/water.shtml)**
- **Development of sustainable urban environments (http://www.cert.bham.ac.uk/research/sustain.shtml)**

Training

The University offers a wide range of training programmes at undergraduate and postgraduate levels for those interested in furthering their knowledge of environmental issues. The Centre also has extensive experience of developing and providing in-house client-specific courses for large and small businesses. Recent topics have included air quality management and contaminated land management. **Search for related courses in Course finder (/undergraduate/courses/index.aspx)**

Case studies

Open all sections

Assessing particulate matter toxicity

Human exposure to airborne particles is now well-established as a cause of increases in hospital admissions and mortality on high pollution days, and loss of life expectancy associated with long-term exposures. Consequently, abatement measures are being vigorously pursued around the world but there is only a very poor understanding of how the toxicity and hence potential to damage health differs according to the source and the chemical composition and size of the particles.

This project (within the School of Geography, Earth and Environmental Sciences) is based upon the concept that the main mechanism by which airborne particle exposure damages health is through oxidative stress, a process by which chemicals with an oxidising nature set up inflammatory reactions in body tissues.

This is a collaborative project in which the University of Birmingham's role is to collect samples of particles from the atmosphere and to characterise them for their chemical composition and size with a view to evaluating those factors which most influence the oxidative stress potential. This image shows an experiment in a Birmingham pub. The project partners at Kings College, London are providing the oxidative stress tests, using a range of techniques which they have developed. The research is supported by the NERC Environment and Human Health Programme.

Urban Futures

Development of sustainable urban environments

Growing urban populations, climate change, problems with transportation systems and basic infrastructure drive concerns about the long-term sustainability of urban areas.

Research at Birmingham brings together engineers, physical and biological scientists, along with planners and social scientists, to focus on the urban and built environment, water and land management, transport infrastructure and risk managment and decision-making.

Urban Futures is a four-year research project, which started in 2008, funded by the Engineering and Physical Sciences Research Council (EPSRC). The programme is headed by the University of Birmingham, working in collaboration with the Universities of Exeter and Lancaster and Birmingham City University. The research team includes civil engineers, scientists and social scientists, planners and landscape architects, economists and industrial ecologists.

The approach utilises a wide range of methodological approaches and novel techniques to envisage how variability in city form occasioned by redevelopment may become manifest in a range of alternative city futures. In particular, emphasis will be placed on the variability in the physical cityscapes and its affect on the sustainability of its ecological function, environmental pollution, social cohesion, economy and politics and the possibility for mitigation and future proofing urban design for tomorrow's city dwellers. Research teams at Birmingham are focussing on a number of key sustainabiity areas for research, including biodiversity; sub-surface built environment and open spaces; organisational behaviour and innovation; social needs and aspirations; and planning policy.

Read more about **Urban Futures (http://www.urbanfutures.org/)** .

Management of Water Resources

High climatic sensitivity and lack of significant antrhopogenic impacts make glacierized river basins important environments for examining hydrological and ecological response to global change.

Acquatic ecosystems in high latitude and altitude environments are influenced strongly by cryospheric and hydrological processes due to links between atmospheric forcing, snowpack/glacier mass-balance, river discharge, physico-chemistry and biota. In the current phase of global climate warming, many glaciers are shrinking. Loss of snow and ice-masses will alter spatial and temporal dynamics in bulk basin runoff with important changes in the relative contributions of snowmelt, glacier melt and groundwater to stream flow. Accordingly, altered water source contributions will be accompanied by changes to fluvial solute, sediment and thermal regimes and, thus, channel stability and habitat. The projected reduction in sediment load, warmer water temperatures and increased channel stability will drive significant shifts in the floral and faunal composition of glacier-fed rivers.

It is hypothesised that glacier shrinkage and associated changes in runoff amount and timing, water sources contributions and physicochemical habitat will be a major driver of biodiversity changes in stream communities in cold environments with the potential loss of endemic and cold stenothermic species. Changes in runoff will also

have a major influence on fish populations.

Researchers in the School of Geography, Earth and Environmental Sciences have conducted extensive field research on this topic in the French Pyrenees, New Zealand, Alaska, Himalayas and Swedish Lappland, funded from a variety of sources including the EU seventh framework programme (EU-FP7), the European Centre for Arctic Environmental Research (ARCFAC) and NERC.

The School is one of 35 partners in a successful EU-FP7 large-scale integrated project entitled 'Assessing climatic change and impacts on the quantity and quality of water (ACQWA)' under the Topic 'Climate Change Impacts on Vulnerable Mountain Regions'. This consortium grant is worth over 6.5M Euros and aims to assess the impact of climate change on the quantity and quality of water in mountain regions, particularly where snow and glaciers serve as a major hydrological stores. ACQWA has a 5-year research programme and is co-ordinated by the University of Geneva. ACQWA will continue research in the French Pyrenees (where investigations have been on-going for over a decade) and also establish new field sites in the Swiss Alps. in addition, an ARCFAC grant, in collaboration with NERC, looked at extending hydroecological research in a further Arctic site through a summer 2009 campaign in NyAlesund on Svalbard. Research will also continue in Lappland, examining longitudinal hydroecological changes in a catchment with a shrinking glacier, a complex extra-glacial hydrology and a number of lakes. The image above shows the installation of a gauging station in a stream in Swedish Lapp.