



What's Happening in... Environmental & Earth Science

This newsletter describes research that scientists in the Lancaster Environment Centre (LEC) are undertaking as part of a team helping to understand and improve water quality in our rivers, now and in the future.

Our future rivers under climate and land use change scenarios

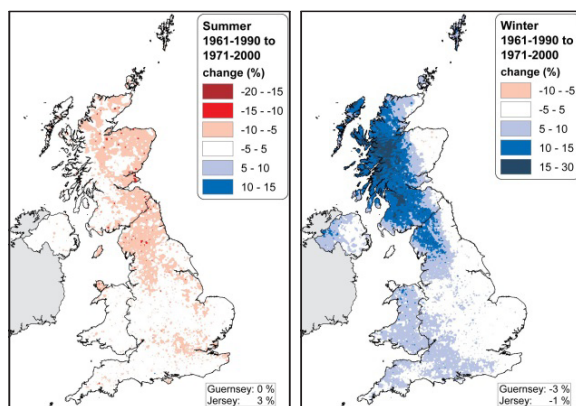
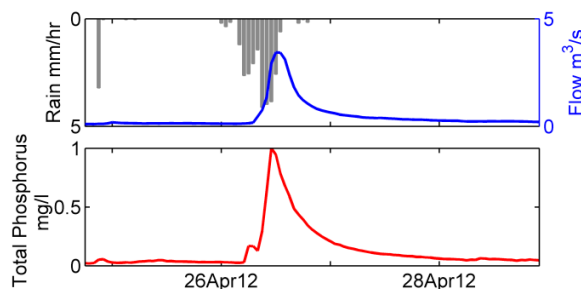
Nutrients, such as phosphorus and nitrogen, are essential for the plant and animal growth that supports food production. However, increases in nutrient concentration in our rivers and lakes can be problematic, for example leading to algal blooms that damage fish communities and increase treatment costs for drinking water. Fertiliser, manure and slurry washed off agricultural land following rainfall are major sources of nutrients, with latest estimates suggesting that more than 60% of the nitrogen and 25% of the phosphorus in UK rivers comes from agriculture. With warmer, wetter winters predicted in the future, nutrient export from agricultural land could increase unless we plan land management activities accordingly.

Researchers in LEC are currently working on the 'Nutrients in Catchments to 2050' (NUTCAT) project, funded by the Natural Environment Research Council. This project will develop a modelling framework for predicting nutrient runoff from agricultural land under future climate change and land use change scenarios. Field work, laboratory experiments and analysis of high frequency nutrient data are helping to improve understanding of how phosphorus moves in agricultural landscapes. This understanding will be used to develop and test computer models for predicting nutrient transport. Having tested the models for present day conditions, the project will then extend predictions into the future. Working with the Met Office to include the latest climate prediction methods, and with farmers, farm advisors and policy makers to decide on possible future land use scenarios, the project will predict nutrient export under likely climate change and land use change scenarios. Ultimately, this project will provide evidence to support future policies for sustainable agriculture.

Students in the Environmental and Earth Sciences within LEC can take a wide range of modules related to the NUTCAT project. These include modules focussed on soil erosion and approaches to quantifying erosion, understanding and modelling hydrological and atmospheric processes, and water quality management. A number of students are also able to gain direct experience of the research methods used in NUTCAT during their dissertation projects. This provides our students with training in cutting-edge research techniques and transferable practical skills for their future careers.

For more details about the reports above or about Earth Science and Environmental Science courses on offer at Lancaster University please contact the Environmental and Earth Science Admissions Staff,

Lancaster Environment Centre, Lancaster University, LA1 4YQ, UK
Email: lec.ug@lancaster.ac.uk or see our website: www.lancaster.ac.uk/lec



Images. **Top:** Overland flow from agricultural land into a stream after heavy rain. This flow is expected to carry a high concentration of nutrients, often washed into streams attached to soil particles. Graph below the image shows an example of data from a stream collected during a storm: rainfall (total 26mm, grey bars) resulted in an increase in streamflow (blue line) and a corresponding increase in total phosphorus in the stream (red line). **Middle:** Algal bloom in a water supply reservoir in England, likely driven by nutrient export to the reservoir from the surrounding landscape. **Bottom:** Observed changes in summer and winter rainfall over the UK showing drier summers and wetter winters, a trend which is predicted to continue into the future. Image credit: ©UK Climate Projections, 2009