

Our Principal Areas of Research

- **Impacts:** understanding the effects of climate change on fundamental ecosystem functions
- **Human responses:** understanding how people's behaviour may change in response to climate change, both in reducing greenhouse gas emissions, and in adapting to the consequences of climate change
- **Ecosystem services:** assessing how these human responses will affect the tradeoffs and synergies between ecosystem services, and in turn, how these may influence future human decisions

We aim to provide evidence for sound and robust decision-making by policy-makers, communities, and land-managers.

For more information on our research activities, please visit:

macaulay.ac.uk/climatechange

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Climate Change

@ the Macaulay Land Use Research Institute



Nationally Important

Climate change is an issue that has an impact on all aspects of society, the economy and environment.

The Scottish Government has ambitious targets for responding to climate change. Science can help to inform the actions and activities needed to meet these targets. Our research brings the scientific insights from different disciplines and on different aspects of society, environment and economy together in order to provide an evidence based that can be used to develop the 'joined up' approaches needed.

Climate change research at Macaulay Land Use Research Institute includes making projections of future climatic and weather conditions based on global change model outputs, and understanding the implications of change for agriculture, the natural heritage, and people's lives and livelihoods.

Internationally Relevant

The role and potential of land to contribute to reducing greenhouse gas emissions is particularly important.

The land, both in vegetation and soils, stores and can capture considerable amounts of carbon. This may help to mitigate against climate change. Many of the goods, services and benefits society enjoys are based on our use of the land. Land use and management themselves change as environmental conditions change leading to continued access to goods, services and benefits. Better understanding of possible climate changes and their land use and land management implications can help us to adapt to new conditions.

Our goals are to improve understanding of the interrelationships between changes in climate, land use, natural resources, and human communities, and to provide information at a range of spatial, temporal, and organisational scales that can assist policy-makers and practitioners in developing mitigation and adaptation mechanisms to ensure sustainable development.

Climate Change Modelling

Simulation models play an increasingly important role in analysing the likely impacts of climate change on natural resource systems, and on evaluating options for mitigations of greenhouse gas emissions and the implications of the way that society will adapt.

Simulation models we are currently using for our climate change research:

- **LADSS** (the Land Allocation Decision Support System) - simulating processes at the individual farm level
- **FEARLUS** (Framework for Evaluation and Assessment of Regional Land Use Scenarios) - an agent-based model of land use change and rural communities
- **PALM** (the People And Landscapes Model) - a coupled human-environment model for analysing the complex interactions between humans and their environment
- **MERES** (Methane Emissions from Rice Ecosystems) - a process-based model of methane emissions from rice agriculture in Asia