A unique research Institute linking research on animal diseases, production and welfare with ecological and evolutionary approaches

Evolutionary analysis  Infectious diseases  Animal ecology and environmental change  Ageing, health and welfare

**Animal ecology and environmental change**

Climate change, habitat loss, renewable energy developments, increasing natural hazards, pollution and over exploitation of natural resources are having profound effects on biodiversity and human-animal health. Capitalising on a long history of laboratory and field research on the effects of environmental variability on growth and reproductive strategies we integrate studies at mechanistic and functional levels. This research is complemented by work on physiological and molecular processes that underpin life history variation.

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**Environmental change in marine ecosystems**

The example below is a major industry-science collaboration in which Glasgow researchers work with BP to monitor a deep-water oil field off Angola. The project is scheduled to last for the full 25-year life of the oil field and provides continuous monitoring data for a site amongst the wells and other infrastructures, and a “control” site at a distance of 14 km from the nearest sub-sea facilities. In this way we are able to track natural changes in this area over time and compare them to changes in the area impacted by drilling. As well as providing new insights into African marine ecosystems this sort of monitoring supports BP’s environmental monitoring requirements.

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**Aquatic environments provide important sources of revenue within Scotland and to UK businesses operating overseas. Natural communities are sources of food, and support recreation and tourism, while the physical environment provides sources of renewable energy. The growing offshore renewable industry builds on the expertise of the UK oil and gas sector.**

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**Environmental pollutants and fertility**

The global increase in population and industrialisation over the last 70 years has resulted in a significant increase in the number of pollutants, from anthropogenic sources, which are released into our environment. Such environmental pollutants can have adverse consequences on both human and ecosystem health and therefore present a real, current risk to environmental health. Our research focuses on how environmental chemical exposure can affect fertility (in any species), which is fundamental for the maintenance of a healthy population.

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**Assessing the impact of marine renewables on seabirds**

Up to a quarter of Europe’s marine renewable energy potential is in Scottish waters, but harnessing wind, wave and tidal energy must be sensitive to Scotland’s significant seabird populations. To address the potential conflicts between such developments and Scottish seabirds, renewable developers must perform Environmental Impact Assessments (EIA) before planning permission can be granted. These assessments require that those seabird species most at risk from such developments are identified, however, there has been a shortage of robust framework to guide such assessments.

Researchers in the Institute of Biodiversity, Animal Health & Comparative Medicine have helped develop clear, systematic and widely accepted frameworks that quantify the vulnerability of Scottish seabirds to offshore wind farms, tidal turbines and wave energy devices. These draw from past expertise on developing frameworks to assess the impacts of industrial sandeel fisheries on seabird breeding success.

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**By working with environmental consultancies and key statutory bodies, such as Scottish Natural Heritage and Marine Scotland, the framework produced by our researchers has expedited the early stage consenting processes for renewable developments. These have lessened the potential risks to seabirds, meeting conservation requirements while benefiting all those involved in renewable energy projects by reducing the risk of misjudgements in the impact assessment process.**

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**Can we predict impacts of environmental change from knowledge of behavioural decisions?**

One of the great environmental challenges of the 21st century will be to understand and predict how the natural world we all depend on for food, clean water and air will respond to climate and other environmental changes. It has long been established that declines in animal populations can indicate the presence of serious environmental problems before they begin to affect the human population.

Population sizes of our common birds are already used by the UK & Scottish Government as a national indicator for the health of our natural environments and so they make a good focus for evaluating new approaches to predicting impacts of change.

This project uses a ground-breaking combination of behavioural risk trade-off theory, field experiments at the Scottish Centre for the Ecology and the Natural Environment and existing large scale national data sets to develop our understanding of how behaviours of wild birds respond to changing environmental conditions and how changes in individual behaviours impact on populations and ecosystems. The results are improving our ability to advise and predict the course of future changes in our environments.