Impact Case Study

UoA 7: Earth Systems and Environmental Sciences

<u>**The development of evidence based biodiversity policy and practice in Northern Ireland**</u>

Summary

Research to quantify the ecological structure and spatial dynamics of terrestrial habitats in Northern Ireland (NI), and to assess the effects of recent land use change, has enabled the Northern Ireland Environment Agency (NIEA) to develop and implement a science-based strategy for landscape-scale biodiversity management and conservation. It has directly facilitated the integration of NIEA and the Department of Agriculture for NI (DARD) biodiversity management strategies and their monitoring of the implementation of European Community biodiversity legislation (and cross-compliance).

The science information-base and time-series change models developed from the research have allowed NIEA to lead inter-governmental department discussion on biodiversity and land use issues. It has also guided the development of an NI habitat biodiversity management strategy. Specifically, the statistically structured field and analytical methods developed by the research for assessing terrestrial habitats at the regional landscape-scale have been adopted by NIEA as key to reporting on the biodiversity outcomes of implementing the European Community conservation Habitats Directive.

The research has provided a common ecological framework within which NIEA, DARD (including Forest Service) and non-government organisations (Ulster Wildlife Trust and Northern Ireland Environment Link) have been able to discuss and agree on biodiversity and agri-environment management practices in designated statutory conservation sites and the farmed countryside. It has also been key in guiding a NI assessment of the socio-economic value of habitats (ecosystem services).

Research and Impact

In 1986 Dr Alan Cooper, a lecturer / senior lecturer at the University of Ulster from 1974 – 2012, began a statistical sampling-based field ecological study to assess the types, structure, species composition, extent (spatial structure) and management of terrestrial habitats in the Mournes Area of Outstanding Natural Beauty (AONB) (Cooper et al., 1996). The aim was to quantify and understand environment/land use interactions and contribute to the development of the AONB management plan. The research, which became known as the Northern Ireland Countryside Survey (NICS) was extended to all four AONBs in NI, two Environmentally Sensitive Areas (DARD funded) and then, in 1992 (NI Department of Environment funded), to the whole of NI (Cooper et al., 2003). It contributed to the development of the then growing field of European landscape-scale ecology and its applications to countryside management (Cooper et al., 1996).

In 1998, a second NICS (NIEA funded) assessed the extent of change and showed that the main land use drivers were agricultural intensification, industrial forestry and rural development (Cooper et al., 2003). For the first time, a NI scientific evidence base linking land use change to terrestrial habitat biodiversity loss in NI was available to policy-makers. The research also showed, again for the first time, that habitat sampling intensity influences the structure of numerical habitat classifications and that area-proportional sampling design linked explicitly to landscape structure is required to avoid biased environmental decision-making based on such classifications (Cooper et al., 2006).

A third phase of NICS, initiated in 2007 (NIEA funded), developed hypothesis-based habitat monitoring and completed a 20-year time-series data set quantifying trends in habitat biodiversity and ecological condition (Cooper et al., 2009). Key findings were that seminatural habitat conversion

to agricultural grassland and forestry, the scrubbing-up of marginal farmland and the removal of hedges and earth banks had occurred and that there had been a large increase in the rate of rural building over a wide range of seminatural habitats. (McKenzie et al., 2011). The research demonstrated the over-riding influence of land-use practice on terrestrial habitat biodiversity and showed that the European-wide trends of land use intensification in the farmed countryside and land abandonment in the marginal uplands also applied to NI.

Methodological developments of the NICS research programme (Rogers et al., 2012) were landscape-scale field survey, recording and analysis techniques as well as field survey equipment and associated GIS and statistical analytical procedures based on cost-efficient, pragmatic and flexible electronic hand-held data logging PDA (personal data assistant) equipment loaded with a real-time global positioning system (GPS), an Ordnance Survey NI vector map and colour aerial photographs linked to a laboratory-based GIS (geographical information system).

Adoption of the Northern Ireland Countryside Survey habitat research methodology by NIEA across the whole of the rural countryside and upland landscapes was key to the development by NIEA of regional biodiversity management strategies. NICS habitat monitoring protocols were also adopted by DARD to assess the ecological status of the Mourne and Antrim Glens Environmentally Sensitive Areas (ESA). This research provided data on habitats for DARD to restructure their guidelines (in partnership with NIEA[3]) for implementing European Agri-Environment schemes. Prior to this, guidelines for habitat management were based largely on qualitative assessments of the agricultural landscape guided by land use rather than scientifically based habitat metrics and definitions.

Completion by Dr Cooper's team of the NICS research programme across NI gave a reliable time-series data on the types, structure, species composition, extent (spatial structure) and management of terrestrial habitats and habitat change. This enabled NIEA to develop (for the first time) a scientific ecological basis and context within which structured discussion with other government departments could take place on the effects of land use (primarily agriculture, forestry, peat extraction and rural building) on biodiversity, and on effective strategies for biodiversity management at the landscape-scale[5]. The NICS research also provided essential data that enabled NIEA to collaborate with DEFRA on delivering UK biodiversity assessments.

NICS research was a key source of information for the development, by the NI Biodiversity Group (a consortium of non-governmental conservation organisations led by DoE), of recommendations to government for a NI Biodiversity Strategy (subsequently adopted by NIEA). The provision of reliable habitat data for the whole of NI, by NICS, was a key element in NIEA implementation of the Biodiversity Strategy. Prior to this, information on habitats was available only for designated statutory conservation sites, with ecologically limited data on agriculture, forestry and built land cover across NI as a whole provided by DARD and government planning authorities.

Evidence from NICS research also provided a common focus within which NIEA could engage with non-government organisations (primarily the Ulster Wildlife Trust and the Royal Society for the Protection of Birds) on land use issues and biodiversity management. None of these organisations previously had access to scientifically structured habitat data at an NI scale.

By 2007, the NICS 20 year time-series dataset was used by NIEA to: a) carry out evidence-based reporting on the NI implementation of the European Habitats Directive (previously, data were available only for statutory conservation sites; b) construct an NI assessment of the socio-economic value of ecosystem services (previously, reliable habitat metrics to enable this were not available); c) develop a partnership with DARD to monitor the effectiveness of Common Agricultural Policy agri-environment implementation (previously partnership was constrained by reliance largely on agricultural land use data) and d) develop a NI land management policy response to changing CAP.

More recently, NICS data has facilitated the integration of NIEA and DARD approaches to implementing European CAP reform through the 2014-2020 Rural Development Programme.

Effective progress on integration has focussed assessing the biodiversity outcomes of implementing European Community biodiversity legislation (in particular cross-compliance) in NI, with NICS providing reliable time-series metrics of outcomes.

The methodological developments from the NICS field and analytical research programme (integrated field mapping and data recording protocols, equipment and software programmes, associated GIS and statistical analytical procedures) have been adopted by NIEA for in-house habitat assessment, monitoring and audit, resulting in a lasting impact[5,6]. The NICS stratified random sample archive of over six hundred geo-referenced 25ha grid square field maps, linked in a GIS to the NICS habitat database, will allow NIEA to carry out future biodiversity monitoring more effectively by integrating field survey with remote sensing technology.

References

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