



**Research recommendations of the Agriculture,
Grasslands and Soil Working Group of the National
Platform for Biodiversity Research**

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Summary

At a time when conservation budgets are limited in comparison to the number of habitats and species threatened with degradation and extinction, identifying conservation priorities is crucial. At an international level, concern over widespread loss of biodiversity has resulted in laws and policies in favour of environmentally sound development and biodiversity conservation (UNEP, 1992). In Ireland, the majority of legislation that aims to halt biodiversity loss is EU driven (Habitats Directive, Birds Directive, Water Framework Directive and so on). In order to implement these legislative requirements, research and active policy engagement is vitally important.

In October 2009, a working group of scientists (see Section D) that included senior policy representatives drawn from the NPBR was formed. The purpose of this working group was to examine the Biodiversity Knowledge Programme for Ireland (EPA, 2006) with a view to revising this document, prioritising research needs to help inform policy and to further establish knowledge gaps that hinder Ireland in meeting national biodiversity objectives in relation agriculture, soils and grasslands. This review identified six priority areas essential to implement our legislative requirements and to meet the challenge of halting the loss of our national biodiversity in this sector of the landscape. Section A of this document deals with enabling actions necessary to facilitate biodiversity research, while Section B deals with the most urgent research priorities required in the area of agriculture, soil and grasslands (hereafter referred to as “agriculture”).

A. Enabling actions

1. Integration of the policy environment

A number of EU Directives and national legislation dictate how we manage our national biodiversity. While responsibility for the implementation of these Directives falls into the brief of different government departments, the reality is that the majority of these issues are cross cutting and simply cannot be implemented by any one department without the cooperation of other related departments.

Currently biodiversity research support across different government departments is fragmented, scattered and largely uncoordinated. This has led to a lack of coherence between departments attempting to implement the various Nature Conservation Directives and conduct the necessary research required for their implementation. This lack of coherence is a hindrance to fulfilling our legislative requirements and is an extremely inefficient use of government funding. It has resulted in an overlap of research projects and a lack of awareness across departments of where the knowledge gaps actually lie.

Policies are often developed without sound scientific evidence. This is a direct result of a lack of communication between policy makers and scientists. There is a lack of awareness among scientists of the policy time frames and a lack of coordination of research efforts to meet needs of policy makers. This is particularly evident in the development and implementation of the CAP in Ireland. To improve the development and implementation of agricultural policies relating to biodiversity scientific delivery timeframes must be linked to policy timeframes.

Drivers: Maximum value for money for the funding of biodiversity research relating to agriculture to deliver maximum impact of the research results. Multiple legislative drivers in this regard include: Agri-environment Regulation, Birds and Habitats Directives, The Planning and Development (Amendment) Bill 2009, the 2010 Regional Planning Guidelines (forthcoming) and existing and proposed planning guidelines under S 28 of the Planning and Development Act 2000

Overarching need: A clear and coordinated inter-departmental infrastructure to facilitate targeted biodiversity research programmes, designed to facilitate the implementation of legislative requirements.

To facilitate the coordination of inter-departmental structures the following specific measures are required:

The establishment of an inter-departmental working group, including the relevant key technical experts to:

- Ensure coordinated research effort and knowledge sharing between departments and agencies to maximise efficiencies and research effort of direct relevance to the implementation of legislative requirements.
- Evaluate impacts, compatibilities and conflicts between government policies and biodiversity objectives and economic practice. This review should be based around the relevant sectors.
- Identify policy blind spots and suggest methods that might be used to resolve policy conflicts. This should also include developing the required actions from existing research recommendations e.g. responsibility for dealing with invasive non-native species.
- Identify more effective ways of integrating existing knowledge from both fundamental and applied research thereby facilitating evidence-based policy making.
- Identify, develop and demonstrate appropriate policy implementation tools (e.g. recommend methodologies for habitat identification, prioritisation and assessment, monitoring, use of indicators and evaluation tools).
- Identify how Government policies can be used as opportunities for biodiversity enhancement.

2: The coordination and dissemination of biodiversity data (including metadata)

The work of both policy and scientists is frequently hindered by the lack of access to, or knowledge of, previously generated national biodiversity research. The National Biodiversity Data Centre has assisted greatly in providing access to biodiversity datasets on species. However biodiversity research data is still housed in a disparate manner. There should be a co-ordination of research funding agencies to ensure that data arising from such projects are available in a central location. A working group drawn from the National Platform for Biodiversity Research and the National Biodiversity Data Centre should work together to develop a framework for the collation of all data and metadata and the establishment of a user friendly and fully comprehensive portal for access to this data. In addition, a standardisation of the approach to metadata entry needs to be agreed and disseminated.

Drivers: It is essential that the results of nationally funded biodiversity research is publically available to assist in both the formulation of biodiversity policy, delivering legislative requirements and on-going research needs. Previously conducted biodiversity research will provide “added value” if accessible.

Overarching need: The coordination and dissemination of biodiversity data (including metadata).

To facilitate the coordination and dissemination of biodiversity data the following specific measures need to be undertaken.

- All existing biodiversity data resources need to be collated and centralised.
- Develop protocols for data exchange & data sharing.
- National biodiversity metadata entry should be agreed and standardised.
- Development & co-ordination of national database standards.
- Dissemination of information is a two-way process. Both policy makers and scientists should disseminate biodiversity research outputs in the most effective format to facilitate key recommendations.
- Conducting integrated analysis of newly available biodiversity data sets relating to Agriculture, Grasslands & Soils that have been collated by the National Biodiversity Data Centre and other organisations.

3: Funding of biodiversity research

Biodiversity research in relation to agriculture is currently funded through two separate mechanisms. These are;

(1) priority targeted research identified by government departments and agencies (e.g. Teagasc, Department of Agriculture, Fisheries and Food, National Parks and Wildlife Service, the Environmental Protection Agency and the Heritage Council) that is necessary to implement legislative requirements and

(2) open-call, competitive, peer-reviewed funding for biodiversity research in the University and NGO sectors, generally funded by the Department of Agriculture, Fisheries and Food (Research Stimulus Fund), the Environmental Protection Agency (STRIVE), Science Foundation Ireland and the Irish Research Council for Science, Engineering and Technology (IRCSET). Additionally EU funding programmes have contributed large research grants in this area.

The funding of agricultural related biodiversity research is largely uncoordinated amongst the various funding agencies and departments that fund biodiversity research. Often departments are unaware of projects and their outputs that are being funded by other departments, which can lead to inefficiencies, overlap and a lack of prioritised research funding. There is a need to establish a mechanism for coordinated research funding and dissemination of research results. The McCarthy Report (McCarthy, 2009) indicates coordination and efficiencies in research funding might be best achieved through a single stream of funding. However, it would be more appropriate if funding for targeted research remained with the relevant department to ensure research needs for legislative requirements will be delivered. The development of an interdepartmental/agency group is necessary to ensure that research referred to in (1) and (2) above is targeted at previously agreed research priorities.

Drivers: Maximum value for money and efficiency for the funding of agricultural biodiversity research to deliver maximum impact of the research results through coordinated funding mechanisms.

Overarching need: A clear and coordinated funding mechanism to ensure the most urgent research needs are delivered.

To facilitate coordination of the funding of biodiversity research, the following specific measures are required:

- Establish an interdepartmental/agency group (referred to in section A. 1) to coordinate agricultural biodiversity research to:
- Maximise efficiencies and ensure research is targeted in a prioritised manner
- Identify a funding mechanism that has the capacity to manage competitive research calls on the themes identified in section B.
- Establish a mechanism to ensure funders discuss proposed research funding with policy and scientific experts, for example through a funding referral officer, who should also be a member of the NPBR, available to assist in devising and evaluating research proposals.

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B. Urgent research priorities

4: Areas of high biodiversity value

Areas of high biodiversity value, many of which lie outside of the current Natura 2000 network of designated sites, including biodiversity hotspots are areas that support natural ecosystems that are largely intact and where native species and communities associated with these ecosystems are well represented. As the natural values of such areas are assumed to be largely intact, undertaking action now to identify these areas and to maintain favourable conservation status within these areas has the potential to provide value-for-money by optimising resources for conservation and maximising current research effort. The current, planned or potential anthropogenic activities in areas of high biodiversity value place their natural values at risk and it is likely this risk will increase in the future in the absence of active conservation management.

The protection of areas of high biodiversity value is a cross-cutting issue that will require the engagement and commitment of a number of government departments and can only be achieved by the implementation of the measures in Section A.

Drivers: The identification and conservation of areas of high biodiversity value will facilitate Ireland's legal requirements under numerous EU Directives and National legislation (Habitats Directive, Birds Directive, Flora Protection Orders, targeted agri-environmental schemes, the CBD, Agri-Environment Regulation, Water Framework and Landscape Directives)

Overarching research need: The identification of biodiversity hotspots, the evaluation of threats to these areas and the production of effective conservation management plans to protect their conservation interests.

To facilitate the identification of national terrestrial biodiversity hotspots the following specific measures are required:

- 4.1 The production of national inventories of species.
- 4.2 The national spatial and temporal patterns of Annex I species and Annex II habitats within agricultural and grassland ecosystems.
- 4.3 The establishment of the status and distribution of rare or threatened species in agricultural and grassland ecosystems.
- 4.4 The undertaking of nationwide surveys of agricultural and grassland habitats of national and European importance that have not been the subject of previous surveys or where such surveys have delivered insufficient information.
- 4.5 The undertaking of nationwide surveys of those species of national and European importance in agricultural and grassland ecosystems that have not been the subject of previous surveys or where such surveys have delivered insufficient information.

- 4.6 National surveys of species listed in the EU Birds Directive. Specifically, to undertake national surveys of the distribution and status of declining farmland habitats to enable early identification of necessary remedial actions to protect associated threatened species.
- 4.7 'Pre-emptive' national surveys of 'amber-list' taxa within agricultural and grassland ecosystems to enable early identification of necessary remedial actions.

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5: Habitat management and restoration

One of the major factors in the loss of biodiversity in Ireland has been habitat loss, fragmentation and degradation caused by changes in management. Biodiversity on farms is under constant threat from the dual forces of abandonment and intensification. This can often take place on the one farm due to on farm polarisation of management, with concentration of agricultural activity on the improved agricultural land with abandonment of more marginal areas. Lack of understanding of the management requirements of species and habitats is a contributing factor with certain measures under current agri-environmental schemes advocating fencing off and zero management in the absence of clear management information.

Ireland has a diverse landscape shaped by differences in climate, geology, soils and topography. The vast majority of this landscape is managed by farming to some extent. The biodiversity of our grassland, arable land, field boundaries, wetland and freshwater habitats, scrub, woodland, mires, heaths and coastal areas are influenced by management activities. This poses a significant challenge for conservation as to how to manage this diverse landscape to retain and enhance its biodiversity value.

Much of the current conservation management of these areas is based on traditional techniques. These did not originally develop to maximise biodiversity value but rather as a requirement to provide for the needs of people within the prevailing regional environmental constraints. The effectiveness of traditional management practices in conservation management needs urgent investigation before the traditional knowledge is lost. Where management practices for conservation have been investigated in detail (e.g. BurrenLIFE), a marrying of science with traditional knowledge have proven very effective in the development of conservation techniques that meet both the socio-economic and biodiversity requirements of regions.

Drivers: Multiple legislative requirements under Birds and Habitats Directive, Water Framework Directive. Policy commitments of government to international biodiversity targets revised in wake of failure to meet 2010 targets. New EU headline target: Halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss.

Overarching research need: Research to improve the design and effectiveness of agri-environment schemes.

To facilitate research into the management requirement of agri-environmental schemes and habitat management the following specific measures are required:

- 5.1 Research to investigate the environmental consequences of different habitat management techniques such as grazing, cutting, burning, targeted herbicide use in unwanted vegetation control.
- 5.2 Research to better understand the socio-economics of biodiversity production e.g. support

- requirements, labour inputs, etc.
- 5.3 Research to develop farming for conservation systems to meet the needs of High Nature Value farmland areas in Ireland.
 - 5.4 Research to Investigate the environmental impacts of alternative landuses in marginal agricultural areas and its impact on biodiversity e.g. wind turbines, biofuels, recreation etc.
 - 5.5 Methodology for the objective identification of HNV farmland and the agricultural systems that support the maintenance of biodiversity in HNV areas.
 - 5.6 Research on large-scale ecological restoration of the Irish uplands, with emphasis on quantifying sustainable grazing levels to maintain and enhance biodiversity.
 - 5.7 A series of biodiversity management reviews required for key habitats starting with priority habitats and species under the EU Habitats and Birds Directive.
 - 5.8 Initiate a programme of national habitat mapping, both within and outside designated areas to include habitat types, and classify these habitats into their soil, elevation, vegetation type and overall habitat rating. Such a mapping system needs to take cognisance of mapping programmes already completed and underway to ensure best use of available data and a standardised approach.
 - 5.9 Identify and prioritise specific agri-environment objectives for farmland wildlife, to ensure that agri-environmental schemes contribute to halting biodiversity loss
 - 5.10 Investigate innovative habitat restoration and conservation practices within landscapes affected by anthropogenic factors. This should be a support to the development of the High Nature Value model and should be underpinned by basic classification of HNV status, extent and condition.
 - 5.11 Develop targeted and validated measures for implementation in agri-environment schemes. In addition, baseline information needs to be collected to allow for monitoring of environmental effectiveness of agri-environmental schemes at farm and scheme level.

6: Long-term studies and the development of a network of long-term study sites

Long-term ecosystem research, including the establishment of a network of long-term study sites, is an essential mechanism to better understand ecosystem structure, function, and response to environmental, societal and economic drivers. While numerous long-term study sites (and others which could be established as such) exist in Ireland, largely because of previous research projects such as Ag-Biota and Biochange, there is no overall coherence between these sites or the research data being collected from them.

Drivers: The establishment of a network of long-term study sites related to agricultural ecosystems will greatly enhance our ability to understand ecological processes and favourable conservation status on a national scale. The study of these sites will help address many legislative requirements (under the Habitats, Birds, Water Framework, Agri-Environment Regulation, impending Soil Framework Directive, Nitrates Directive and other targeted agri-environmental schemes) through the evolution of monitoring guidelines, identification of indicators of change and definitions of thresholds.

Overarching research need: The development of a co-operative, inter-institutional research programme to support the establishment of a long-term experimental infrastructure and the development of an integrated research model incorporating the conservation and utilisation of biological diversity in the development of sustainable grass-based agriculture.

To facilitate and optimise the establishment of a network of agricultural long-term study sites the following specific measures are required:

- 6.1 Establishment of a working group to identify a suitable network of sites, while taking into account existing long-term study sites and the research data gathered from them.
- 6.2 Within these study sites conduct a programme of research within agricultural and grassland ecosystems to better understand:
 - The impacts of agricultural activities and practices (e.g. fertilizers, pesticides and disturbance) on habitat, species and soil biodiversity.
 - The impacts on soil and surface-active invertebrates of poaching (trampling of flooded soil by livestock) and soil compaction at different stocking levels.
 - The long-term impacts of depositing sewage sludge and other organic wastes on to agro-ecosystems.
 - The consequences of biofuel production for biodiversity at field, landscape and regional levels.
 - How soil carbon can be retained and and further carbon sequestered in the soil.
 - Landscape analysis of the extent and impact on biodiversity and ecosystem services due to abandonment of traditional patterns of land use and farming systems in economically marginal areas.
 - The development of tools for monitoring the effects of changing farm practice, by development of an index-based method for the quantification of farmed landscape structure and quality and the development of indicators.

7. Functions and processes

There is a need to improve our basic understanding of how genetic, species and ecosystem ecology and processes influence the development and maintenance of biodiversity across a gradient of managed and natural ecosystems; this should include the processes underpinning the relationship between biodiversity and ecosystem services e.g. food production, maintenance of soil fertility, pollination and natural pest control. This will increase our understanding of the significance of biodiversity in agricultural and grassland systems and its relationship with ecosystem function and well-being. It will also allow predictions of the possible consequences of environmental change on biodiversity and the likely impacts on ecosystem function. The renewed policy target of halting biodiversity loss and degradation of ecosystem services (ES) by 2020 will be a significant challenge for Ireland. Research to identify and prioritise the ecosystem services that are provided, and the specific threats to them are urgently required to fulfil this target. Significant work remains for Ireland to adequately identify and implement policy to support High Nature Value (HNV) farmland.

Drivers: Better understanding the functions and processes that influence biodiversity and ecosystem goods and services will help address and better implement many legislative requirements (under Agri-Environment Regulation, impending Soil Framework Directive, Nitrates Directive and other targeted agri-environmental schemes) by understanding the relationship between biodiversity and ecosystem health and providing the knowledge required to allow the development of sustainable environmental policies and effective conservation strategies.

Overarching research need: The development of a co-operative, inter-institutional research programme to investigate the relationship between biodiversity and ecosystem functions and processes.

To facilitate research into the relationship between biodiversity, ecosystem function and ecosystem services the following specific research is required:

- 7.1 Quantifying the ecosystem services provided by land with different agricultural land use intensities and biodiversity levels, in particular pollination, carbon sequestration, water storage and purification.
- 7.2 Research to halt degradation of ecosystem services. Including the identification and prioritisation of ecosystem services, specific threats to them and the development of restorative measures to mitigate identified threats.
- 7.3 The environmental consequences of farming patterns ranging between the extremes of widespread extensification vs. complete segregation of agricultural production and conservation areas.
- 7.4 Interaction of biodiversity effects across habitat and ecosystem boundaries through nature corridors.
- 7.5 Species interactions (such as pollination, predation and competition).
- 7.6 Relationships between diversity and ecosystem functioning in major agricultural systems. Including intensive versus extensive agricultural practices.

- 7.7 The role of field boundaries and associated field margins in mitigating the effects of habitat fragmentation within farmed landscapes, e.g. with respect to maintenance of small mammal and associated populations.
- 7.8 The extent of functional plasticity of species, in particular those species listed under Annex II of the Habitats Directive and the Annex I of the Birds Directive.
- 7.9 Minimum viable areas of species of conservation importance.

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C. References

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