The development of a national typology for High Nature Value farmland in Ireland based on farm-scale characteristics

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ABSTRACT

High Nature Value farmland (HNVf) plays an important role in delivering biodiversity and has the capacity to deliver many important environmental public goods such as clean air, clean water, climate regulation and aesthetic landscapes. A lack of information on what exactly characterises a HNV farm is a major impediment to the application of policy supports for the conservation of HNVfs. For the first time in Ireland, the diversity of HNV farms and the characteristics that distinguish the different types from one another is described. The typology methodology employed incorporates farm-scale land cover and management data based on a national sample of HNV farms. We identified six HNVf types and describe them here; five correspond to existing broad EU HNVf types and another 'Aggregate HNVf', which has not been previously described. There is a clear diversity of HNVf in Ireland and this can be captured and described in a broad typology that includes selected farm structural characteristics, management variables and basic habitat attributes. Similar farm types occurred across geographically disparate parts of Ireland, indicating the need for policy supports that target each of the HNVf types rather than address specific geographic locations. The identification of 'Aggregate HNVf' highlights the need for HNVf to be considered at multiple scales and not at farm-scale only. This typology can facilitate better understanding of HNVf at farm-scale for policymakers and farm advisors and thereby aid the development of national policies and measures that better target, support and conserve HNV farmland. The approach developed in this study could be adapted and applied in other European countries or regions to describe the diversity of HNVf from areas with known high HNVf potential.

1. Introduction

Almost half of the European Union's (EU) territory is dominated by agriculture, which has a significant influence on the conservation of the EU's natural resources (CEC, 2006a). Managing these resources for the maximum delivery of environmental public goods and ensuring the sustainability of agriculture in Europe is vital (Guerry et al., 2015). The intensity of agriculture within Europe ranges from very intensive production systems on fertile land with high inputs, to very extensive High Nature Value farmland (HNVf) systems on marginal land with low inputs (Beaufoy, 2008). HNVf occurs in every country in Europe (Oppermann et al., 2012) and has an important role in delivering biodi-

versity and other public goods such as clean air, clean water, climate regulation and aesthetic landscapes (Cooper et al., 2009; Lefebvre et al., 2012). Thus, the identification, monitoring and support of HNVf systems has been a policy requirement for EU countries since 2003 (Beaufoy et al., 2010). Given the ongoing threats to farmland biodiversity (Keenleyside and Tucker, 2010; Terres et al., 2015) and the increased importance of the provision of ecosystem services (CEC, 2011a, 2011b), the protection of HNVf systems is likely to increase in importance in future EU and national policies.

HNV farming and forestry systems are included as one of seven headline environmental indicators of the Rural Development Programme of the CAP. The guidance document for Member States on

applying the Common Monitoring and Evaluation Framework (CMEF) for Rural Development describes four key steps for the inclusion of HNVf in RDP policy, to be adopted by Member States, national agencies and others involved in protecting HNVf (Beaufoy et al., 2009; Beaufoy and Cooper et al., 2009; Keenleyside et al., 2014). These steps are regarded as best practice, and the first of these emphasises the characterisation of HNV systems as the first in a clear sequence:

- Characterise the main types of HNV farming and forestry
- Conduct quantitative assessments of their extent (using ground-truthing and sensitivity assessments)
- Develop indicators for monitoring changes
- Incorporate extent and condition assessments into the Rural Development Programmes of Member States.

The above sequence of steps is important; if mapping of HNVf (quantitative assessment of extent) is to serve its purpose, there should first be a full inventory of the types of HNVf and the characteristics associated with them, which should only then be followed by mapping. There are a number of challenges to characterising HNVf, which include a lack of availability of suitable data, inappropriate spatial resolution of available data (Lomba et al., 2014), and difficulties in the selection of suitable HNV farming characteristics at local or national level due to the variety of systems (Strohbach et al., 2015; Oppermann et al., 2012). To design and implement effective policy instruments for HNVf, there needs to be an effective methodology to identify their variety. This methodology needs to strike a balance between a) characterising the main types of HNVf at such a general level that nationally important types are overlooked, and b) providing an excess of information that is too detailed and comprehensive for practical use and application of general principles. For this purpose, farm typologies have been widely used in agricultural research (Ribeiro et al., 2016; Daskalopoulou and Petrou, 2002; O'Rourke et al., 2012; Mądry et al., 2013). Typologies typically assesses farm-scale attributes as an integrated set, rather than as single indicators, and can identify linkages among the different indicators (Andersen et al., 2007). Typologies are especially useful for creating groupings with similar characteristics such as using selected farm-level data to characterise upland farming in a region of Ireland or to infer key practices of high conservation importance (O'Rourke et al., 2012; Ribeiro et al., 2016).

On a European scale, generic categories of HNVf have been developed to be broadly applicable across large geographical scales These categories are based on land use intensity, proportions of semi-natural vegetation and other semi-natural features (field margins, hedgerows, patches of uncultivated land etc.), and diversity of land cover (Samoy et al., 2007; Beaufoy, 2008; Cooper and Beaufoy, 2008; Klimek et al., 2014; Lomba et al., 2015). Three types of HNVf were initially described by the European Environment Agency (Anderson et al., 2003; EEA, 2004) with the aim of being applicable across the EU:

- Type 1 HNVf which is dominated by semi-natural vegetation;
- Type 2 HNVf which has a mosaic of low intensity agriculture and natural and structural elements, such as field margins, hedgerows, stone walls, patches of woodland or scrub, small rivers.
- Type 3 HNVf which supports rare species or a high proportion of European or world populations of plant or animal species.

The EEA descriptions have been further contextualised in Europe with the descriptions of Whole, Partial and Remnant HNVf that place additional emphasis on the structural characteristics of farming systems associated with HNVf (Keenleyside et al., 2014), as follows:

- Whole farm HNV where the entire farm is a low intensity system;
- Partial HNV systems with low intensity management of some land, alongside intensive practices; and
- Remnant HNVf where there is HNV land but its land management is irrelevant to main farm business which is based on the intensive agricultural production with some abandonment or management for cross-compliance, nature conservation or Agri-Environment Scheme (AES) payments (Keenleyside et al., 2014).

Both of these classifications (EEA, 2004; Keenleyside et al., 2014) are designed for a European-scale context and necessarily use broad classification criteria. The EEA classification in particular has proved very useful in developing policy objectives and including HNVf in the Rural Development Plans (CEC, 2006a, 2006b). Nevertheless, HNVf characteristics still need to be described at the national scale if policymakers are to have a clear understanding of the characteristics and needs of different types of HNVf when trying to detect and support these farms with relevant national policies (Paracchini et al., 2007; Beaufoy, 2008; Opperman et al., 2012; Pe'er et al., 2014). In recognition of the need for national and sub-national differentiation, Keenleyside et al. (2014) provided specific examples of Whole, Partial and Remnant HNVf in various countries, with the aim of aiding the development and application of national policies. There has been a paucity of information on what exact features and characteristics signify a HNV farm and, in the absence of more differentiated national classifications of HNVf, there still remains a distinct risk that more specific or context-dependent types of HNVf may be overlooked or ineffectively targeted. For these reasons, the appropriate inventory and characterisation of the main types of HNVf systems is an important initial action to properly capture the national or regional types and variants of HNVf (Beaufoy and Cooper, 2009); this will almost inevitably require more detail than evident in the high-level EU categories indicated above.

As part of the IDEAL-HNV project, we investigated the diversity of HNVf in Ireland and the extent to which a typology of Irish HNVf corresponded to the broad-scale descriptions of HNVf for an EU context. This study aimed to:

- develop a national typology to describe the diversity of HNVf from a variety of geographical areas in Ireland with known high HNVf potential.
- describe the characteristics that distinguish the different main types of HNVf, using farm-scale land cover and management data.
- examine the extent to which the Irish typology corresponds with the existing broad-scale EU descriptions

We discuss the benefits of developing typologies for HNVf conservation. We also consider some of the implications of the types of HNVf identified from a conservation and public policy point of view. Finally, we discuss how the typology can contribute to improved policy development and targeting of policy supports across Europe.

2. Methods

2.1. Site selection

A draft map of the likely distribution of HNVf (Fig. 1) was developed using established indicators (Beaufoy, 2008); land cover (indicates presence of semi-natural vegetation), stocking density (indicates land-use intensity) and hedgerow density (indicates presence of landscape mosaic). Following K-means clustering anlayses, a map was produced with five categories where a value of 1 indicated low nature value likelihood and a value of 5 indicated high nature value likelihood.