Ecological Indicators 69 (2016) 859–872

Contents lists available at ScienceDirect

Ecological Indicators

journal homepage: www.elsevier.com/locate/ecolind

An indicator framework to help maximise potential benefits for ecosystem services and biodiversity from ecological focus areas

J. Tzilivakis [a,*], D.J. Warner [a], A. Green [a], K.A. Lewis [a], V. Angileri [b]

[a] Agriculture and Environment Research Unit (AERU), School of Life and Medical Sciences, University of Hertfordshire, United Kingdom
[b] European Commission, Joint Research Centre, Institute for Environment and Sustainability, Ispra, Italy

ARTICLE INFO

Article history:
Received 6 January 2016
Received in revised form 20 April 2016
Accepted 25 April 2016

Keywords:
Ecological focus areas
Ecosystem services
Biodiversity
Indicator framework

ABSTRACT

Ecological focus areas are one of three greening measures that were introduced into the European Common Agricultural Policy by the reform in 2014, with the aim of enhancing the ecological function of agricultural landscapes. However, there are concerns that they will provide little or no additional ecological benefit (enhanced biodiversity and ecosystem services) as those that are declared may already exist and/or any new areas will be implemented on the basis of farm management burdens rather than ecological criteria, such as those which are the easiest or least costly to implement. To implement ecological focus areas to achieve greater benefits requires taking account of numerous spatial and management parameters, scientific understanding of ecosystem services, and the needs and behaviour individual and communities of species. Such an approach is not readily practical or feasible for many farm and land managers. This paper describes the development of an indicator framework which aims to distil this complex scientific information to aid decision making with regard to the implementation of ecological focus areas to enhance and increase benefits for ecosystem services and biodiversity. It involved collating scientific evidence from over 350 papers, reports and guides and then structuring this evidence to form the indicator framework. 230 impacts were identified for 20 land uses and landscape features, and these are characterised using 138 parameters and attributes, containing 708 descriptive classes. The framework aims to help land managers identify the potential benefits and burdens of different options for the specific spatial and management context of their farm, and thus select those with greatest benefits and least burden for their circumstances. Ecological focus areas are part of the first evolution of greening measures, so there is scope to improve them to make their implementation more ecological and more focused. Tools, such as the indicator framework presented herein, have the potential to support this process by educating and raising awareness of potential impacts, facilitating the transfer of scientific knowledge, and resulting in a more ecological aware industry.

© 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

1. Introduction

The Common Agricultural Policy (CAP) has been one of the most longstanding and important elements of common policy in the European Union (EU). The need for it was established in the Treaty of Rome in 1957 (European Community, 1957), when it was realised that interventions in agricultural markets by national governments (to ensure food security) needed to be harmonised and transferred to the European level as they were an obstacle to the Common Market. The CAP came into force in 1962 and since then it has inevitably been subject to many reforms to meet changing demands. Food security now sits alongside other socio-economic and environmental objectives. The most recent reform of the CAP, covering the period 2014–2020, introduced new "greening measures" to enhance the environmental performance of agricultural holdings (EC, 2013a,b,c,d). These measures include rules on maintaining permanent grassland, crop diversification and Ecological Focus Areas (EFAs). The reformed CAP came into force during 2014 (the transition period) and the greening measures came into force in 2015.

EFAs are land uses and landscape features that have the potential to deliver ecological benefits (in the context of this paper, ecological benefits refer to enhanced biodiversity (in terms of diversity and populations of species) and enhanced positive ecosystem services). They are a response, alongside other policies and initiatives, to concerns such as the decline in populations of birds, mammals and

* Corresponding author.
E-mail address: J.Tzilivakis@herts.ac.uk (J. Tzilivakis).

http://dx.doi.org/10.1016/j.ecolind.2016.04.045
1470-160X/© 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Table 1
Ecological focus areas and their land and feature components.

Ecological Focus Areas (Article 46 of Regulation 1307/2013)	Land and feature components
Land lying fallow	Fallow land
Terraces	Terraces
Hedges or wooded strips	Hedges or wooded strips
Isolated trees	Isolated trees
Trees in line	Trees in line
Trees in groups and field copses	Woodland
Field margins	Land strips (adjacent/parallel to water)
	Land strips (other)
	Hedges or wooded strips
	Ditches
Ponds	Ponds
	Land strips (adjacent/parallel to water)
Ditches	Ditches
Traditional stone walls	Traditional stone walls
Other landscape features under Good Agricultural and Environmental Condition (GAEC) or Statutory Management Requirement (SMR)	Ancient monuments
	Ancient stones
	Archaeological sites
	Garrigue
	Hedges or wooded strips
	Isolated trees
	Natural monuments
	Ponds
	Terraces
Buffer strips	Land strips (adjacent/parallel to water)
	Land strips (other)
Hectares of agroforestry	Agroforestry
Strips of eligible hectares along forest edges – no production	Land strips (other)
Strips of eligible hectares along forest edges – with production	Land strips (other)
Areas with short rotation coppice	Short rotation coppice
Afforested areas	Woodland
Areas with catch crops or green cover	Catch crops or green cover
Areas with nitrogen fixing crops	Nitrogen fixing crops

invertebrates (Chamberlain et al., 2000; Cresswell, 2010; Donald et al., 2001; Goulson et al., 2008; Newton, 2004; Temple and Terry, 2007). There are 19 available EFAs (see Table 1) from which Member States (MSs) have chosen a selection for implementation intended to meet their own requirements. Some MSs have selected as little as 2 EFAs and others up to 18, with the scope to amend this in future (Ciaian et al., 2015; EC, 2015). The rules require farms with an arable area larger than 15 ha (i.e. excluding permanent crops and permanent grassland) to declare and maintain 5% of the arable area as EFAs (which may increase to 7% in 2017). Farmers in each MS can select one or more EFAs that they intend to declare to meet the 5% target. Failure to comply with this rule, or the other greening measures, can result in an administrative penalty and in a reduction of the payments that the farm can receive.

The implementation of EFAs clearly aims to bring about ecological benefits. However, there are concerns (Pe'er et al., 2014; Siriwardena, 2014) that simply maintaining existing areas as EFA or even creating completely new EFAs will do little in terms of additional ecological benefit. There is no consideration, for example, of having the right habitat in the right place or managing them correctly to bring about desired benefits (Dicks and Benton, 2014). There are also concerns (Cimino et al., 2015; Lakner, 2015; Matthews, 2015) that farms will select EFA options that are the easiest/least costly to implement, rather than those likely to increase ecological benefits. Although these are legitimate concerns, this does not mean that EFAs cannot have a more positive benefit if due consideration is given to relevant spatial and management parameters within the realms of what is practical and feasible for farm management. Therefore any tools or information, such as indicators, that can aid the incorporation of these factors into farm management decision making processes could help EFAs achieve their desired aim.

Indicators and indicator frameworks have the potential to help distil complex scientific information to aid decision making from the strategic level of policy making down to the level of individual farms (Bockstaller et al., 1997; de Groot et al., 2010; Ran et al., 2015; Rigby et al., 2001; van Oudenhoven et al., 2012). This paper presents work undertaken to derive a prototype indicator framework and relative performance index to assess the potential impact of EFAs on ecosystem services and biodiversity. These impacts were selected as clearly a key aim of EFAs is to maintain and enhance biodiversity and positive ecosystem services. The framework has been developed in order to support and complement existing initiatives that encourage their adoption (not as a replacement for them) and thus aims to provide guidance and direction with regard to EFA selection and management. More specifically, this paper explores how the framework tackles the issue of accounting for spatial and management parameters, with respect to potential impacts, thus presenting a novel framework for distilling complex scientific information to aid decision making.

2. Input data and methods

2.1. Overview of the challenge and the approach

The core challenge was the level of complexity that needed to be tackled due to the combination of different land uses and landscape features, impacts and contexts. Nineteen EFAs needed to be assessed, including the features that make up those EFAs (see Table 1); a taxonomy and hierarchy of impact categories were necessary to cover the broad range of ecosystem service and biodiversity impacts; and multiple spatial, ecological and management contexts were needed to cover the 28 EU Member States, and thus a range of parameters were needed to characterise these contexts. For example, woodland has potential to impact upon a broad range

Download English Version:

https://daneshyari.com/en/article/6293370

Download Persian Version:

https://daneshyari.com/article/6293370

Daneshyari.com