

UNIVERSITY OF GLOUCESTERSHIRE

The missing social dimensions of agri-environment schemes in the UK and lessons for a post-Brexit era

A thesis submitted to the University of Gloucestershire in accordance with the requirements of the degree of Doctor of Philosophy in the School of Natural, Social and Sport Sciences

By

Jane Mills

May 2023

Word count: 19,282

Abstract

Agri-environment schemes (AES) in the UK offer payments to farmers or landowners to undertake environmentally-beneficial management practices. Despite the long-term financial support available for these schemes, their success in providing environmental benefits is variable. Many farmers show limited engagement with the objectives of these schemes and long-term pro-environmental behaviours is often lacking. Furthermore, policy-makers lack monitoring and evaluation tools to assess AES achievements in influencing farmers' long-term willingness to deliver environmental outcomes, as well as the role of AES in contributing to the social sustainability of farming.

Conceptually, the thesis draws on behavioural science to identify through empirical research the central role of the psycho-social factors that affect farmers' pro-environmental behaviour in the context of AES. It further examines the potential of AES to deliver social outcomes that strengthen the farming community. The findings from the research, which uses a combination of quantitative and qualitative methods, are published in four peer-reviewed papers. An important contribution is the development and application of a new conceptual framework which extends previous behavioural models focused on farmers' willingness and ability, to include the influence of social relations, recognising that farmer behaviour change is part of a social process that is facilitated through long-term advice and supportive relationships. The findings also identify the importance of social norms, self-identity and behavioural control beliefs in influencing farmers' willingness to engage in environmental practices.

Social sustainability outcomes resulting from AES participation relating to health and wellbeing and quality of life are identified. A key contribution is the development of these social factors into indicators for measuring both the 'quality' of farmer engagement with AES and the social sustainability of AES. In this way, this body of research enables a better understanding of the relationship between social and environmental outcomes and can help policy-makers to gauge the social sustainability of AES. Policy recommendations and future research directions are identified with the aim of strengthening post-Brexit AES design and delivery to incorporate social goals, alongside environmental ones.

Keywords: Agri-environment schemes, pro-environmental behaviour, psycho-social factors, social indicators, social sustainability.

Author's declaration

I declare that the work in this thesis was carried out in accordance with the regulations of the University of Gloucestershire and is original except where indicated by specific reference in the text. No part of the thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas.

Any views expressed in the thesis are those of the author and in no way represent those of the University

Signed

Date 12.12.2022

Acknowledgements

First of all, I would like to offer huge thanks and gratitude to my supervisors, Dr Pete Gaskell and Professor Janet Dwyer, for all their guidance and support not only through my PhD, but throughout my academic career at CCRI. I am enormously indebted to them and other colleagues at CCRI for their continued encouragement and support. I would particularly like to extend my thanks to colleagues for their insights and assistance in the data collection that contributed to the papers in this thesis, Julie Ingram, Matt Reed, Chris Short, Hannah Chiswell, Paul Courtney and George Cusworth.

I would also like to thank Natural England and Defra for funding the research that made this PhD thesis possible. In particular, Steve Chaplin and Beth Brockett at Natural England for their inspiration and reflections on this research.

Furthermore, I would like to thank all the farmers that contributed to this study for their knowledge, friendliness and generosity in giving up their precious time for this research.

Finally, thanks to my friends and family for providing their encouragement and moral support. Thanks to my parents for giving me opportunity to grow up on a farm which led to my appreciation of farming and our beautiful countryside. Particular thanks to my amazing daughters for their tolerance in sharing their mother with her research work and to my partner, Tom, without whose support none of this research would have been possible.

DOI: 10.46289/BB52Z6H3

Contents

1 INTRODUCTION	1
1.1 AIMS AND RESEARCH QUESTIONS	8
1.2 RELATIONSHIP BETWEEN PAPERS	9
1.3 THESIS STRUCTURE.....	10
2 CONCEPTUAL FRAMEWORK	13
2.1 PARADIGM AND METHODOLOGY	13
2.2 CONCEPTUAL FRAMEWORK FOR THIS RESEARCH.....	14
2.3 CONCEPTUALISING FARMER ENVIRONMENTAL BEHAVIOUR CHANGE	15
2.4 SOCIAL SUSTAINABILITY	19
2.5 CONCEPTUALISING ENGAGEMENT AND SOCIAL INDICATORS.....	21
3 METHODOLOGY	24
3.1 INTRODUCTION	24
3.2 METHODS	24
3.3 DATA ANALYSIS	28
3.4 RESEARCH ETHICS.....	29
3.5 AUTHOR CONTRIBUTIONS	29
4. PAPER 1.....	33
5 PAPER 2.....	49
6 PAPER 3.....	60
7 PAPER 4.....	70
8 DISCUSSION.....	93
8.1 INTRODUCTION	93
8.2 WHAT SOCIAL FACTORS AFFECT FARMERS' PRO-ENVIRONMENTAL BEHAVIOUR IN THE CONTEXT OF AGRICULTURAL ENVIRONMENT SCHEMES?.....	94
8.3 WHAT ARE THE SOCIAL OUTCOMES OF AES AND HOW DO THESE RELATE TO ENVIRONMENTAL OUTCOMES?	102
8.4 WHAT LESSONS CAN BE DRAWN TO INFORM THE DEVELOPMENT OF AES TO ACHIEVE LONG-TERM FARMER BEHAVIOURAL CHANGE AND SOCIAL SUSTAINABILITY IN A POST-BREXIT ERA?	104
8.5 LESSONS FOR AES MONITORING AND EVALUATION	111

9 CONCLUSIONS	114
9.1 POLICY RECOMMENDATIONS.....	115
9.2 RECOMMENDATIONS FOR FUTURE RESEARCH	117
REFERENCES.....	122
APPENDIX 1 CO-AUTHOR DECLARATIONS.....	130

List of Tables

TABLE 1: PAPERS IN PORTFOLIO, AUTHORS, JOURNAL AND PUBLICATION STATUS.....	9
TABLE 2: KEY PSYCHO-SOCIAL FACTORS AFFECTING PRO-ENVIRONMENTAL BEHAVIOUR	96

List of Figures

FIGURE 1: LINKS BETWEEN THE RESEARCH QUESTIONS AND THE FOUR PAPERS	10
FIGURE 2: PHD CONCEPTUAL FRAMEWORK DEMONSTRATING THE CONTRIBUTION OF INTERPRETIVIST SOCIAL SCIENCE TO THE DEVELOPMENT OF POSITIVIST INDICATORS	15
FIGURE 3: PHD METHODS AND OUTPUTS.....	25

List of Abbreviations

AES	Agri-environment scheme
Brexit	Britain and exit
CAP	Common Agricultural Policy
CFE	Campaign for the Farmed Environment
CSFF	Countryside Stewardship Facilitation Fund
Defra	Department for Environment, Food and Rural Affairs
ELM	Environmental Land Management
ELS	Entry Level Stewardship
ES	Environmental Stewardship
ESA	Environmentally Sensitive Area
EU	European Union
FBS	Farm Business Survey
GDPR	General Data Protection Regulation
HLS	Higher Level Stewardship
NGO	Non-Governmental Organisation
OELS	Organic Entry Level Stewardship
OHLS	Organic Higher Level Stewardship
TPB	Theory of Planned Behaviour
UK	United Kingdom
VBN	Value-Belief-Norm Theory
WTO	World Trade Organisation

1 Introduction

Since the Second World War, a political drive for agricultural intensification to ensure food security in Europe has successfully increased productivity (Stoate *et al.*, 2009). This increased production was achieved through a greater use of agrochemicals, accompanied by widespread mechanisation resulting in farms that are larger, more specialised in production and working with a reduced labour force (Plieninger *et al.*, 2016; Batáry *et al.*, 2015). Farmers were incentivised through state support to intensify and increase productivity and the role of agricultural production was valued by the wider population (Burton and Wilson, 2006). Subsequently, this productivist ideology became deeply embedded in the outlook and behaviour of many farmers (Marsden *et al.*, 2005).

However, as is now widely recognised, this agricultural intensification, whilst successful in its aims, also led to long-term damage to biodiversity and ecosystem services, resulting in a loss and fragmentation of habitats, a loss of species richness and abundance, a decline in ecosystem services, such as water quality and pollinators and a decline in health and wellbeing (Stoate *et al.*, 2001; Pretty *et al.*, 2000)

Modern agricultural practices have negatively impacted the environment across the globe. Whatever the dominant political and economic ideology in place, whether advanced capitalism, such as in the United States and Australasia or communism, as in China, the trajectory of environmental decline due to agricultural intensification has been the same (Horrigan *et al.*, 2002; Shapiro, 2001). It is not only agricultural intensification that has led to environmental decline, although this has received the most academic and political attention. Due to the spatial complexities of the agricultural transformation, in some parts of the world, the processes of extensification and abandonment have also had serious socio-economic and environmental consequences.

In some areas of Europe, this process of agricultural intensification led to the destruction of large areas of species-rich semi-natural grassland and heath destroyed by either ploughing and re-sowing, or chemical application and nutrient enrichment. In some European countries, environmental decline was caused by abandonment of agricultural land, reforestation

associated with declining rural population densities and intensification of agriculturally productive areas (Plieninger *et al.*, 2016). In central and eastern countries of Europe, the creation of large co-operatives under the communist political regime resulted in the removal of hedgerows, field roads and field margins to create large-scale agricultural systems (Sutcliffe *et al.*, 2015; Báldi and Batáry, 2011). More recently, these areas are experiencing biodiversity declines due to rapid economic transformations that are further intensifying the region's agricultural landscape (Žmihorski *et al.*, 2016).

In England and Wales, a similar pattern of environmental decline was observed. For example, around 97% of semi-natural grassland was lost in England and Wales between 1932 and 1984 (Fuller, 1987). Further drivers of biodiversity loss have included a shift from spring to autumn cereals to improve yields, specialisation of farm systems resulting in a loss of mixed farming from much of central England and removal of hedgerows, walls and ditches to create larger fields (Robinson and Sutherland, 2002), and farm enlargement and simplification in marginal areas leading to a relative decline in management of remaining 'high nature value' semi-natural areas.

These trends have led to the emergence since the early 1980s of successive policy initiatives seeking to address the negative environmental consequences of agricultural change in the United Kingdom (UK) and Europe. Broadly, these may be described as 'agri-environment policies': schemes and measures designed to encourage positive environmental management within agriculture.

In this thesis I am focusing on the agri-environment policies in Western Europe and the experience of the UK and, in particular, England within the European Union (EU). My area of research relates to the Common Agricultural Policy (CAP) and its approach to halting environmental decline by encouraging environmentally positive behaviour in agriculture. From the 1970s a suite of regulatory approaches was introduced which aimed to prevent significant environmental damage, for example, Birds Directive (1978), Environmental Impact Assessment Directive (1985), Nitrates Directive (1991), Natura 2000 (1992), Integrated Pollution Prevention and Control Directive (1996) and the Water Framework Directive 2000. These regulations were regarded as setting the baseline or 'reference level' of acceptable environmental behaviour in society (Fuentes, 2004; OECD, 2001).

At the same time the EU also recognised the value of a voluntary approach in achieving improved environmental performance and providing incentives for farmers to take up specific environmental measures that went beyond the baseline.

The European interest in voluntarism to tackle the decline in environmental conditions first manifested itself in the 1980s with the introduction of voluntary agri-environmental schemes (AES – also known as AEM or AECM¹ under the CAP). These schemes offer multi-annual contracts that provide regular, often annual, payments to farmers to undertake environmentally-beneficial management practices. These practices seek to maintain and enhance biodiversity, reduce environmental degradation, protect and enhance natural resources and preserve cultural landscapes. The farmer or landowner enters into an agreement with the Government to deliver specific environmental actions in exchange for payment.

Since the 1980s, these schemes have expanded across Europe and are now a significant mechanism for combatting environmental decline on agricultural land. Within the EU, AECM have been funded by the European Agriculture Fund for Rural Development as part of Rural Development Programmes. They are mandatory for national or regional administrations to offer, but uptake is voluntary for farmers. The eligible management practices for which payments are offered are very diverse, reflecting the diversity of EU farming systems and valued habitats. Examples of management options include introducing buffer strips along watercourses, reducing grazing pressure on grassland, reducing fertilisers and/or pesticides, avoiding soil erosion, and protecting historical/cultural assets.

Despite the long-term financial support available for AES in Europe, their success in providing environmental benefit has been judged as variable. AES have delivered some positive environmental outcomes (Baker *et al.*, 2012; Pywell *et al.*, 2012) while others conclude that their overall success in enhancing biodiversity is limited (Batáry *et al.*, 2015; Kleijn *et al.*, 2006).

It is generally assumed that the most effective mechanism for encouraging farmers to participate

¹ Agri-environmental Measures, or since 2014: Agri-environment-climate measures

in AES is economic and that farmers' engagement with AES is a contractual arrangement that is simply financially motivated (Bräuer *et al.*, 2006). There is a concern that many farmers show limited engagement with the objectives of AES (Burton *et al.*, 2008), and that they may revert to previous management practices once financial support is halted (e.g., Marshall *et al.*, 2020) in relation to arable reversion). It is claimed that AES have not resulted in a broad pro-environmental behavioural change amongst farmers (Burton *et al.*, 2008) – that is, behaviour that a farmer consciously chooses in order to minimise the negative (or enhance the positive) impact of their actions on the environment (Kollmuss and Agyeman, 2002). A number of academics have highlighted the need for improving farmers' intrinsic or internal motivations for achieving environmental objectives in order to achieve sustained environmental outcomes (Van Herzele *et al.*, 2013; Matzdorf *et al.*, 2009; Stobbelaar *et al.*, 2009; Wilson and Buller, 2001; Wilson and Hart, 2001). The aim of this thesis is to show, via a suite of relevant empirical research undertaken over more than a decade and reported in four published papers, that the impact of these schemes upon farmers' attitudes, understanding and actions is in fact much more complex than that of a simple response to financial incentives. As the papers explain, a mix of agricultural, economic and social and psychological factors affects farmers' environmental decision-making and, in turn, influences their long-term pro-environmental behaviour. The focus of this thesis is particularly on teasing out the psycho-social factors² that affect AES participation and how in turn, participation affects these factors, recognising that these characteristics are important determinants of behaviour in the context of AES and in particular in respect of long-term behavioural change. This conceptualisation is explained in two published papers (Papers 1 and 2) and serves as a framework for the thesis (Mills *et al.*, 2018; Mills *et al.*, 2017). Furthermore, in Papers 3 and 4 the thesis highlights the value of understanding the social dimensions of AES as well as their contribution to sustainable farming communities (Mills *et al.*, 2021; Mills, 2012).

Much of the work on which this thesis is based involved evaluating different aspects of AES policy via a number of research projects commissioned by the Department for Environment, Food and Rural Affairs (Defra) and Natural England. This work provided the empirical evidence which has informed my conceptualising and developing theory, in this context. Having grown up on a farm

² the psychological processes that interact with the sociocultural context to shape behaviour

with a father who had an interest in wildlife, particularly birds, but a reluctance to engage in AES other than as a transactional arrangement, I have been interested to analyse and reflect on how farmers engage with AES throughout the lifetime of their agreements, and the psycho-social factors that affect this engagement.

I was able to consider the psychology of farmer behaviour in relation to agri-environmental activities more deeply than previous studies through two projects for Defra that are reported in Paper 1 (Mills *et al.*, 2017). This research work led to an increased understanding of the importance of social influences alongside the already-identified economic and environmental motivators from previous work in this field. I was then able to investigate how these factors combine to influence behaviour change in Paper 2, which explores the extrinsic and intrinsic motivations for undertaking environmental activities in the absence of payments (Mills *et al.*, 2018). These two papers showed how psycho-social factors are woven into the framework of farmer values and decisions and are often a critical element in ensuring lasting pro-environmental behaviour.

My interest in understanding the psycho-social factors that affect farmers agri-environmental behaviour, also led to a particular interest in trying to identify more clearly how AES participation can deliver social benefits, as a way of ensuring these social outcomes are considered in AES design (Paper 3) (Mills, 2012).

Finally, the enhanced understanding generated from these three papers allowed me to see the complex interlinkages between social values and motivators, environmental management choices and collective or peer-related learning and actions, and the social benefits arising from AES participation. I was then in a position to be able to formalize these elements within a framework that could enable policy makers to better understand and use them, in future AES design, implementation and monitoring and evaluation, as reported in Paper 4 (Mills *et al.*, 2021).

In 2020 the UK withdrew from the EU in a process commonly referred to as Brexit, an abbreviation of 'Britain' and 'exit'. Since leaving the EU, the Government has embarked on developing a national 'Environmental Land Management Scheme' (ELMS) for England that is intended to support the rural economy while achieving the goals of the UK 25 Year Environment Plan, and is specifically

aimed at meeting its environment and climate change objectives (Defra, 2021, 2018a). Some of the targets set out in the plan that are relevant to agricultural practices are to:

- improve at least 75% of waters to close to their natural state;
- achieve net zero targets by 2050; and
- create or restore 0.5 million hectares of wildlife-rich habitat outside the protected area network.

In addition, the England Trees Action Plan aims to increase woodland coverage from 10% to 12% by 2050 (UK Government, 2021).

The ELMS is currently undergoing a period of 'Test and Trials' and is due to be rolled out across England by the end of 2024, replacing all of the support previously available under the EU's CAP. So, whilst the UK and EU have diverged in some areas of policy, the need for the State to intervene to reduce the harmful environmental impacts of agriculture through a mix of incentivisation and regulations remains broadly aligned.

Under the EU's agri-environment framework, AES were designed to cover the opportunity cost of environmental management with public funding. Within the new agri-environmental approach of ELMS, there is also an increasing emphasis on the concept of payments for public goods, signalling the establishment of public-private partnerships to leverage greater private investment into the task of delivering environmental outcomes.

The farming community is seen as integral to delivering the new environmental policies (Defra, 2018b). However, to achieve these goals requires a resilient farming community that can adapt to the demands of the State and the increasing uncertainties and challenges of global agricultural markets, affected by successive crises including pandemics, war and the climate emergency. Previous research on AES behaviour has focused on changing farmers' production decisions towards more environmentally-benign options, but these changes may be harder to make if the system is under stress. In such circumstances, the social sustainability of these 'agents of change' needs also to be considered. The government in England is currently embarking on a major shift in

policy to the whole farm sector. My concern is that as direct subsidies are withdrawn from farmers, they will not have the transformation resilience to develop sustainable agricultural businesses. The future support system under ELMS needs to contribute to farmer's social resilience and health and wellbeing so that they are able to deliver environmental outcomes. There is an important role for pro-environmental behaviours to reinforce social sustainability, particularly if this involves farmers engaging in group working.

There has been limited monitoring and evaluation of the social or behavioural impacts of AES by other researchers. Historically, evaluations of AES in the UK have largely focused on their environmental performance in delivering for biodiversity and the cultural landscape, with some studies also considering the more easily quantifiable economic impacts of AES. However, less attention has focused on the achievements of AES in contributing to the social sustainability of farming. Neither have the monitoring and evaluation programmes assessed AES achievements in influencing farmers intrinsic motivations to deliver long-term environmental outcomes. This is perhaps because socio-cultural values are viewed as less robust, more contentious and less easily measured, than environmental values (Slee, 2007). However, as Pike (2008) argues, just measuring past actions is insufficient, "for sustained long-term change, attitudes (and awareness) need to be measured along with habits, observable actions (behaviours) and social norms." (Pike, 2008 p4).

This PhD by publications aims to offer an original and critically important contribution to future policy making in this post-Brexit era by providing insights on strategies for better influencing farmer behaviour to deliver long-term environmental outcomes. The thesis will examine how AES have the potential to contribute to the social fabric of farming communities by impacting on-farm employment; income security; human capital through skills and training development; and social capital through the extension of knowledge networks and flows (Mills, 2012). Furthermore, AES have the potential to act as a catalyst for collaborative working and social learning, which can lead to other rural development benefits (Mills, 2012). Finally, there is the potential to engage farmers in advice and support networks that foster a genuine interest, responsibility and a sense of personal and social norms, to sustain environmental outcomes in the longer-term (Mills *et al.*, 2017) and without financial incentives (Mills *et al.*, 2018). In recognition of these potential social

impacts of AES, the thesis concludes with a paper identifying indicators to assess farmers' 'quality' of engagement with AES and the potential social outcomes of AES. In this way, this body of research enables better understanding of the relationship between social outcomes and environmental outcomes and can help us to gauge the social sustainability of AES.

1.1 Aims and research questions

This thesis identifies the central role of the psycho-social factors that affect farmers pro-environmental behaviour in the context of AES. It also examines the potential of AES to deliver social outcomes as well as the environmental outcomes for which they were designed, which in turn can strengthen environmental motivations and outcomes. It identifies the potential of these schemes to lead to collaborative working, to develop an interest and sense of personal responsibility for the environment and to produce social outcomes that strengthen the farming community. Finally, the thesis draws out lessons in psycho-social understanding for policy makers to inform the future development of AES in order better to achieve long-term behavioural change and outlines future research requirements.

Overall, the aims of the thesis can be distilled into the following questions:

1. What social and psychological factors affect farmers' pro-environmental behaviour in the context of agri-environment schemes?
2. What are the social sustainability outcomes of AES and how do these inter-relate with environmental outcomes?
3. What lessons can be drawn from the research to inform the development of AES to achieve long-term farmer behavioural change more effectively in a post-Brexit era?

The thesis is based on a portfolio of four papers. Introductions to the respective published papers (Chapters 4-7) present more detailed rationales and context for specific aspects of the research study. The papers in this portfolio are listed in Table 1 below.

Table 1: Papers in portfolio, authors, journal and publication status

Paper number	Title	Authors	Journal	Year published
1	Engaging farmers in environmental management through a better understanding of behaviour	Mills, J., P. Gaskell, J. Ingram, J. Dwyer, M. Reed, and C. Short	Agriculture and Human Values	2017
2	Understanding farmers' motivations for providing unsubsidised environmental benefits	Mills, J., Gaskell, P., Ingram, J., Chaplin, S.	Land Use Policy	2018
3	Exploring the social benefits of agri-environment schemes in England.	Mills, J.	Journal of Rural Studies	2012
4	Developing farm-level social indicators for agri-environment schemes: a focus on the agents of change	Mills, J., Chiswell, H., Gaskell, P., Courtney, P., Brockett, B., Cusworth, G. and Lobley, M.	Sustainability	2021

1.2 Relationship between papers

How these four papers are linked to answering the specific research questions are illustrated in Figure 1. Papers 1 and 2 focus on identifying the psycho-social factors that affect environmental behaviour in relation to AES. These two papers identify the antecedent factors that affect willingness and motivations, ability and the social relations influencing levels of AES engagement and pro-environmental behaviour. These psycho-social factors identified in Paper 1, 2 and 3 contribute to the indicators developed for monitoring and evaluating AES in Paper 4. Paper 1 also introduces a conceptual framework that is further developed in Paper 4. Paper 3 identifies social benefits of AES that also feed into the development of the social sustainability indicators described in Paper 4.

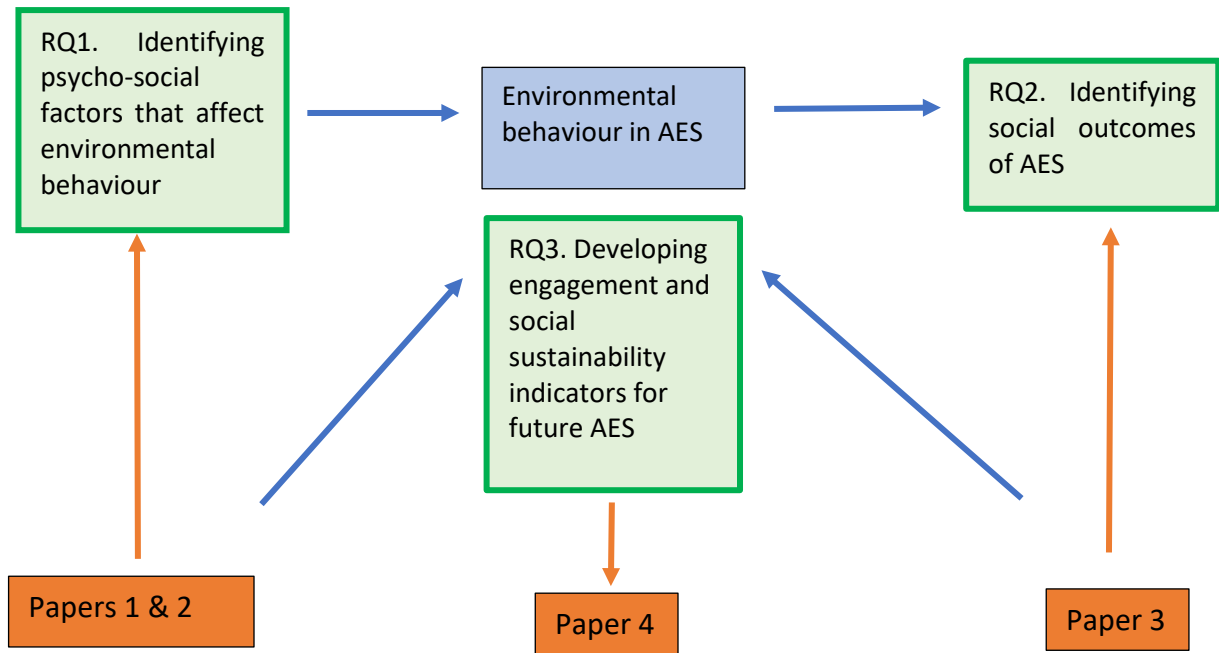


Figure 1: Links between the research questions and the four papers

1.3 Thesis structure

The thesis comprises 9 chapters. **Chapter 1** sets the context for the study, identifying the impact of agricultural intensification on the environment, and the policy response through the implementation of voluntary AES. The chapter concludes with a section outlining the aims and research questions for the thesis.

Chapter 2 outlines the conceptual framework for the study, introducing paradigms of the research and the methodology used. The chapter further describes relevant concepts of the study, such as farmer willingness and ability to change and the concepts of social capital and social sustainability. A conceptualisation of engagement and social indicators is also described in this chapter.

Chapter 3 sets out the methodology, providing an overview of the mix of methods and approaches that were used to address the overall aim and objectives. The chapter justifies the use of the mixed methods approach.

Chapter 4 consists of a peer reviewed paper published in *Agriculture and Human Values* titled “Engaging farmers in environmental management through a better understanding of behaviour”. The paper provides social psychological insights into farmers’ willingness and ability to undertake environmental management and explores farmers’ level of engagement with advice and support to sustain high quality environmental outcomes. I was the lead author of this paper and had overall responsibility for the design, data collection and analysis of the interview data underpinning the paper. The conceptual frameworks presented in the paper were developed from a previous study for Defra undertaken in equal partnership with James Hutton Institute (Dwyer *et al.*, 2007).

Mills, J., Gaskell, P., Ingram, J., Dwyer, J., Reed, M. and Short, C., 2016. Engaging farmers in environmental management through a better understanding of behaviour. *Agriculture and Human Values*, 34(2), pp.283-299.

Chapter 5 presents the results from two national surveys and farmer interviews to identify farmers’ motivations for unsubsidised practices that benefit the environment in a peer reviewed paper published in *Land Use Policy*, titled “*Understanding farmers’ motivations for providing unsubsidised environmental benefits*”. The research identified clear differences between motivations for undertaking subsidised and unsubsidised agri-environmental activities. Financial reasons dominated farmers’ motivations for engaging in subsidised AES practices, whilst agronomic and environmental motivations were of greater importance for unsubsidised activity. I was the lead author of this paper and had overall responsibility for the design, data collection and analysis of the data presented in the paper.

Mills, J., Gaskell, P., Ingram, J. and Chaplin, S., 2018. Understanding farmers’ motivations for providing unsubsidised environmental benefits. *Land Use Policy*, 76, pp.697-707.

Chapter 6 contains a peer reviewed paper published in *Journal of Rural Studies* that explored the social benefits of AES using both telephone and face to face interviews with agreement holders. The paper assesses four areas of social benefit, namely on-farm employment, income security and human capital and social capital development. I was the sole author of the paper and led the design, data collection and analysis of the research presented in the paper.

Mills, J., 2012. Exploring the social benefits of agri-environment schemes in England. *Journal of Rural Studies*, 28(4), pp.612-621.

Chapter 7 presents a peer-reviewed paper that was published in *Sustainability*. This paper reviews the literature and through a ranking exercise identifies potential social indicators that can affect the quality of AES engagement and the social outcomes of AES. I was responsible for the overall design and conceptual framing of the literature review, the analysis of data, the design of the pilot indicator survey and implementation of the survey.

Mills, J., Chiswell, H., Gaskell, P., Courtney, P., Brockett, B., Cusworth, G. and Lobley, M., 2021. Developing farm-level social indicators for agri-environment schemes: a focus on the agents of change. *Sustainability*, 13(14), p.7820.

Chapter 8 is the overall discussion chapter that summarises the findings from the preceding chapters and demonstrates how the results from the four papers contribute to addressing the research questions that were presented in Chapter 1. Further, the contribution of this research to the development of future UK AES that facilitate both improved environmental and social outcomes is discussed.

Chapter 9 provides the final conclusions derived from this whole body of work as a thesis, reflecting upon these findings and providing recommendations for policy and further research.

2 Conceptual framework

As described in Chapter 1, the first aim of this thesis is to identify the psycho-social factors affecting farmers' pro-environmental behaviour in the context of AES to inform strategies to influence long-term farmer behaviour. The second main aim is to identify the social outcomes of AES. These research questions require an approach that captures the human dimensions of AES, the social and behavioural factors, rather than the usual approach of biophysical enquiry (e.g., to see whether the schemes deliver their environmental aims).

The desired pro-environmental behaviour, as defined in this thesis, is long-term and sustained environmental activities on agricultural land that will continue once an AES has ended. In other words, I seek to identify how to achieve lasting and resilient change in farmer behaviour which is motivated to bring about positive environmental outcomes. In this thesis I use the term 'psycho-social' in a broad sense to include both sociological and psychological perspectives.

2.1 Paradigm and methodology

In this thesis, and the papers that constitute its core, I mainly adopt an interpretivist paradigm. As the main aim of the research is to understand the complexities of farmer behaviour and how farmers interpret and interact within their social environment, the interpretivist paradigm was the most appropriate theoretical paradigm to use. Through taking an interpretivist approach to the research, my focus is primarily on identifying and narrating the meaning of human experiences and actions (Fossey *et al.*, 2002). This recognises that the social world is complex and therefore aims to provide insights and understandings of behaviour and actions from the perspective of the individual (Scotland, 2012). Interpretive methods often use qualitative data collection methods that are exploratory and with a thematic focus on understanding a central phenomenon through procedures, such as interviews and observations (Creswell and Creswell, 2017). The approach I have employed to understand farmer behaviour is informed by, and sits comfortably within, the interpretivist literature on farmer behaviour. Key papers that have informed my approach are Morris and Potter (1995); Wilson (1997); Seibert *et al.* (2006).

However, I have also adopted a pragmatic research philosophy in this thesis. As the research was Government-funded it needed to be both practically based, providing evidence for real world challenges, as well as theoretically driven. Rather than taking a purist approach to research, restricting myself exclusively either to quantitative or to qualitative research methods, I adopted a pragmatic philosophical standpoint using qualitative or quantitative approaches wherever these were able to contribute towards answering the research questions (Rossman and Wilson, 1985). In seeking to both understand farmer behaviours in relation to AES activities and also to identify broader patterns of behaviours and ways of measuring engagement levels and social outcomes, the research draws on both an interpretivist paradigm, but also a positivist paradigm, which has the ontological position of realism. As such, a range of methods is used, including both qualitative and quantitative approaches to generate new knowledge and improved understanding of the human factors involved in farmer environmental decision-making, as well as identifying potential indicators for measurement that will be of use to policy-makers. The mixed method approach has the advantage of extracting the strengths and diminishing the weakness in both approaches (Sieber, 1973) and is commonly used to understand a range of farm level decision-making processes (see for example, Läßle and Kelley, 2013; Burton, 1998).

2.2 Conceptual framework for this research

Figure 2 illustrates the conceptual framework for this thesis. It identifies the influencing factors that affect farmer long-term environmental behaviour in AES and the social sustainability outcomes that are derived from these schemes. It highlights the complexity of factors influencing behaviour. These factors that are derived from interpretivist research inform the development of measurable (quantifiable) indicators, which sit within a positivist paradigm.

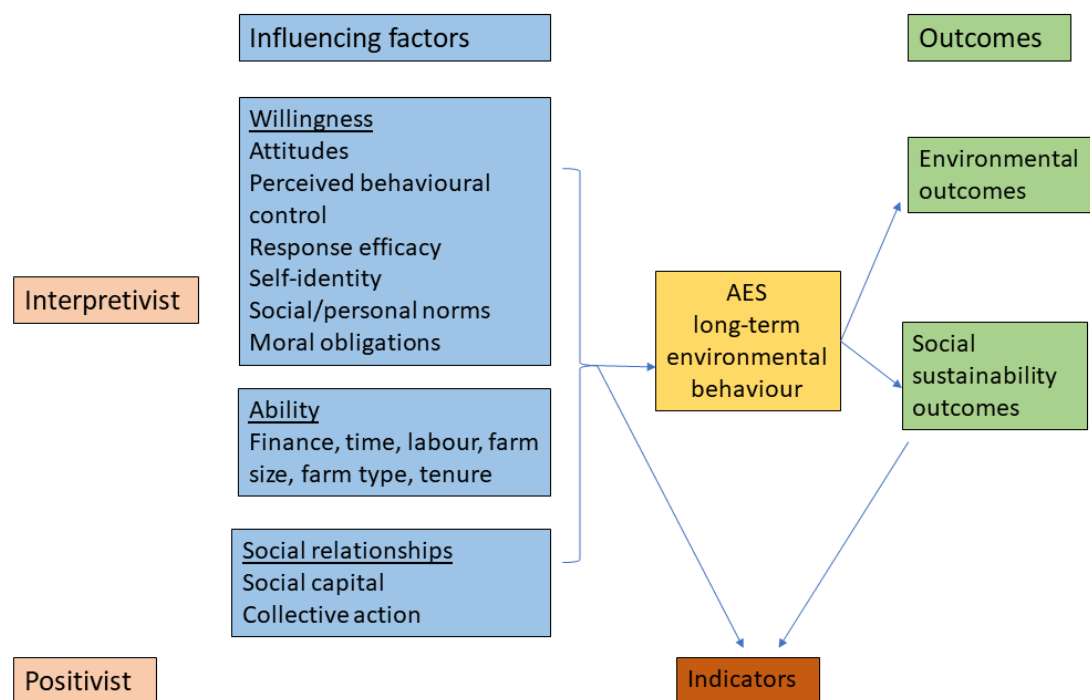


Figure 2: PhD conceptual framework demonstrating the contribution of interpretivist social science to the development of positivist indicators

2.3 Conceptualising farmer environmental behaviour change

The underlying conceptual frameworks used in papers 1,2 3 and 4 draw on concepts from different literatures and framings. The thesis largely sits in the discipline of behavioural science, which is an umbrella term incorporating disciplines from a wide range of academic fields. These include psychology, cognitive neuroscience, sociology, behavioural economics and anthropology (Gordon, 2011). Unlike theories in conventional economics, behavioural scientists do not assume that humans are rational and predictable in decision-making. Instead, they understand that humans are only predictable in their unpredictability (Ariely, 2008). The discipline puts human behaviour at the centre of theory, rather than seeing it as pre-determined by external, rational economic influences. It recognises that farmers may be influenced in their decision making by social or psychological factors, such as moral concerns, social norms, or information/contextual framings (Dessart *et al.*, 2019).

Behavioural science is a relatively new discipline and although the term is often used interchangeably with social science, it differs by focusing on communication strategies and decision processes, rather than the larger social systemic features which are more the focus of social sciences. Many disciplines have applied behavioural theories in their research and reviews of behavioural theories have been conducted for specific disciplines, such as health sector (Davis *et al.*, 2015; Munro *et al.*, 2007; Michie *et al.*, 2005) and environmental science (Morris *et al.*, 2012) and more generally on behavioural change models (Darnton, 2008). Kwon and Silva (2020) usefully undertook a systematic literature review of theories of general human behaviour that can be applied to all disciplines, but especially to the social sciences. They identified 62 behavioural theories and helpfully categorised these theories into four groups based on their focus, as follows:

1. factors that affect the intention or motivation and process of decision-making, such as subjective and personal factors like attitude, subjective norm, beliefs and values, and social interactions (Van Riper and Kyle, 2014; Fiedler, 2007; Latour, 2007; Kahneman, 2003; Putnam, 1993)
2. strategies that influence the intention or motivation, such as nudge theory (e.g., Abdukadirov, 2016) and behavioural spillover theory (e.g., Nash *et al.*, 2017), diffusion of innovation theory).
3. learning and conditioning that can modify the response or decision and is largely applied in computer science
4. modelling approaches that can represent the response or decision used in the areas of computer science and neuroscience (e.g., Spencer *et al.*, 2012) .

For the topic of this thesis, it is the first two groups that are most relevant to understand the social and psychological factors that affect farmers' willingness and ability to undertake agri-environmental activities, going beyond purely transactional influencing factors and the potential strategies or interventions that can influence agri-environmental behaviours.

Key to the main conceptual framework used in the thesis is the interplay between willingness and ability to adopt long-term behavioural change, and the social relationships that enable and sustain behavioural change. This requires an understanding of both the internal factors that affect farmers' behaviour and the external context in which they operate. The framework recognises that

each of these factors plays interwoven roles in specific farm contexts and affect the individual farmer's response to undertaking environmental activities.

2.3.1 *Willingness to adopt concepts*

To develop ideas within the willingness to adopt concept, Paper 1 draws on constructs from various social-psychological models of behaviours based on the Theory of Planned Behaviour (TPB) (Ajzen, 1991; Ajzen, 1988), Self-identity theory (Terry *et al.*, 1999) and the Value-Belief-Norm theory (Stern *et al.*, 1999). Each of these theories is explained in more detail in Paper 1 which explores their contribution to the antecedent factors influencing farmers' willingness to adopt environmental activities.

Whilst it has its limitations, the TPB is a popular theory which assumes that behavioural intentions of an individual are directly related to their attitudes, social influences and perceived behavioural control. As Paper 1 explains, the TPB was not considered complete enough to explain all behaviour in an AES context, so other determinants of behaviour were added to the conceptual framework, including response efficacy (the belief that actions can make a difference) (Homburg and Stolberg, 2006), self-identity, and moral obligations. In TPB, beliefs are positioned as the underlying foundations of behaviour, whereas Paper 1 argues that the values of the farmer, reflecting their worldview, are a more important influence. Self-identity theory is used to explain the extent to which behaviour is part of the self, reflecting the farmer's personal value system and worldview (Lokhorst *et al.*, 2014; Sulemana and James Jr, 2014; Burton and Wilson, 2006; Terry *et al.*, 1999; Charng *et al.*, 1988). Finally, exploring these elements of value systems and worldviews, it was useful to draw on Value-Belief-Norm theory, helping to shed light on the motivational roles of personal norms (Johansson *et al.*, 2013; Schwartz, 1977), moral obligations (Ajzen, 1991; Gorsuch and Ortberg, 1983) and social/group norms (de Snoo, 2013; Bamberg and Möser, 2007).

Behaviour change models have also been criticised for focusing almost exclusively on factors influencing the individual psyche and ignoring the factors beyond the individuals control (Darnton, 2008). Hence, the broader conceptual framework developed and reported in Paper 1 also included two further elements designed to reflect these 'external' factors more fully.

2.3.2 *Ability/capacity to adopt concepts*

The ability or capacity to adopt concept relates to the external influences on environmental behaviour and is well-researched in a distinct body of literature (Dwyer *et al.*, 2007; Brotherton, 1991; Potter and Gasson, 1988; Gasson, 1973). Both theorists and practitioners have acknowledged that the right external conditions are required for behaviour change to result (Darnton, 2008). However, only a few previous behavioural models have included external factors, such as Triandis's (1977) Theory of Interpersonal Behaviour, which incorporates 'facilitating conditions' that can constrain or enable behavioural choice. As a result, the framework developed and reported in this thesis includes a strengthened emphasis upon external farm structural characteristics, such as finances, time, labour, farm size, farm type, tenure which have been identified in other studies as facilitating or constraining environmental behaviour change (Marsden and Munton, 1991; Potter, 1986), alongside its use of behavioural models. These structural factors, whilst more easily measured than the 'classic' determinants of the behavioural models, only partly explain farmer pro-environmental behaviours (Battershill and Gilg, 1997). The power of the work reported in this thesis has been in using them in combination with the willingness to adopt concepts from behavioural theories, as well as in looking beyond the individual to consider the role and value of social interactions, in the context of influencing farmer behaviour.

2.3.3 *Conceptualising social relationships*

The work reported in this thesis has examined and sought to understand behaviour change in many situations or contexts where decisions are clearly influenced by societal, collective or peer-informed views and values. In order to better to reflect this, a third concept was introduced relating to the enabling environment within which the farmer operates, focusing on enabling (or indeed, discouraging) through social relationships. This dimension emerged strongly from the empirical work reported in Paper 1 and recognises that the social world in which the farmer operates, and the social interactions and relationships that they experience and value, also have an important influence on their behaviour. It acknowledges that social relationships frequently

contribute to a process of engagement with new schemes or practices. Classically, farmers' advice and support networks help to create farmer interest, call to their sense of personal and social responsibility, and encourage identification with their personal and social norms, thereby leading to more sustained and high-quality environmental outcomes than might have otherwise been achieved. This element of the framework is partly developed from Putnam's (2000) social capital: an enabling resource developed through network ties which can influence behaviour. This important social element is described in more detail in the section below, where its role in respect of the two later papers in the thesis is also identified and explained.

2.4 Social sustainability

In attempting to better understand the motivators and perpetuators of positive environmental behaviour among farmers, the key role of social influences and values was highlighted (as reported in Papers 1 and 2 in this thesis). In parallel, I developed an interest in investigating the broader social aspects of the sustainability challenge for farming. Thus, the second major theme of the thesis, relating to the social world of AES agreement holders, is the social sustainability outcomes of AES. The concepts related to this theme are presented in Paper 3 and further developed in Paper 4. Terrier *et al.*, (2013) distinguish two scales of sustainability in agriculture, farm-focused sustainability and extended sustainability occurring beyond the individual farm at the regional (or indeed national) scale. It is the former that is largely the focus of this thesis which is focused on the social sustainability outcomes of AES as they relate to the agreement holder.

The literature on social sustainability within agriculture and in particular in respect of AES, is only now emerging and a definition of the term social sustainability is itself debated. Boström suggests that rather than using a ready-made definition, the term should be used as a "conceptual tool that policy makers and practitioners can use to communicate, make decisions, and measure or assess current developments" (Boström, 2012 pg.4). Although Boström identified a number of challenges for operationalising and integrating social sustainability into policymaking, including its raising of high expectations; yet having vague, subjective, and ideological framings; he does argue that the frame of social sustainability has focused academic, policy makers and practitioners' attention on new issues and connections, including the synergies and trade-offs between social and

environmental issues. In this sense, therefore, the concept has clear and direct relevance to the topics explored in this thesis.

Boström (2012) identifies a long list of aspects that are most often referred to in empirical studies and policy debates about social sustainability. Those most relevant to AES and farmers' situations, relate to quality of life, health and wellbeing, social cohesion, sense of community attachment, belonging, and identity, social recognition, social capital development, opportunity for learning and self-development, equality and justice issues, fair distribution of resources and democratic rights. Among this long list of elements, the research reported in Papers 3 and 4 highlights the relevance of AES agreement holders' quality of life in terms of their health and wellbeing, and the socio-cultural processes related to participation and social capital development with respect to their AES experiences.

Increasingly, it is recognised that despite a public perception that farmers have a relatively high quality of life and higher job satisfaction than other occupations (Willock *et al.*, 1999), farming is nevertheless a very stressful occupation and overall quality of life and job satisfaction may be affected by increasing legislation and bureaucracy, as identified in the UK (Parry *et al.*, 2005). These stressors can affect the psychological well-being of farmers and their decision-making capabilities, which in turn could compromise the quality and resilience of AES outcomes. Thus, it becomes relevant for policy makers to seek to avoid adversely impacting farmers' quality of life and decision-making abilities.

Social capital emerges as a particularly important concept within this thesis, both helping to determine and in turn helping to sustain farmers' positive engagement with AES. Social capital is defined as social connections and the attendant norms, trust and reciprocity associated with these connections (Burgess *et al.*, 2000; Putnam, 1993). In the context of sustainable land management, social capital refers to the connections between: farmers and people with similar characteristics, such as other farmers (Putnam's 'bonding' social capital); farmers and people with dissimilar characteristics ('bridging' social capital) and; farmers and representatives of institutions with power and authority in the realm of AES, such as Natural England, the Rural Payments Agency, and Defra ('linking' social capital) (Putnam, 1993). The creation and sustaining of social capital is a

complex and dialectical process that not only influences AES engagement but is also produced and reproduced as a social outcome of AES engagement. For example, as explored by Mills *et al.* (2011), there is evidence that when farmers trust each other through the development of social capital in collaborative AES, they are more likely to engage in co-operative activity, which leads to further trust and strengthened social connections.

The concept of human capital is also relevant and needs to be considered alongside social capital as a product of AES engagement and participation, and an element of social sustainability in that context. As demonstrated by previous research, AES have the potential to develop the social and technical skills of agreement holders, as well as their knowledge and competencies (Röling and Wagemakers, 1998), and the research findings reported in Papers 1, 2 and 3 highlight how learning can be a benefit of AES, for many farmers and in turn for society as a whole. Other areas of social sustainability that can be relevant to AES participation and implementation include notions of social justice, social cohesion, cultural diversity, and gender issues, but have not been exhaustively examined within the body of this thesis. Some research on these aspects already exists; for example, Hurley *et al.*'s (2022) work on 'Harder to Reach' stakeholders looked at issues of social injustice affecting access to government schemes; however, these topics largely remain to be explored in future research.

2.5 Conceptualising engagement and social indicators

The final paper in the thesis (Paper 4) enables a consolidation of the research findings from Papers 1-3 in the task of clarifying and analysing the social aspects and benefits that inform and are informed by AES. In addition, it incorporates a further review of literature to identify 'engagement' and 'social' indicators that can be used to measure the quality of AES engagement and the social sustainability outcomes of this engagement.

Generally, indicators are regarded as having their roots in a natural science-oriented positive research paradigm. As such, researchers tend to adopt the classic criteria of natural-scientific methodology, when developing indicators: such as a focus on ensuring validity, consistency and reliability. However, as Baumgarten (2012) argues, validity and reliability are not solely connected

to positive or quantitative approaches as they also speak to quality, which is relevant to all kinds of research methods. I would also argue that in the development and use – or interpretation - of indicators, there is a critical need for contextual understanding, which requires an interpretivist paradigm: it is essential to consider and adapt one’s expectations regarding the value of an indicator, to the wider circumstances in which that indicator is produced. Furthermore, when developing indicators, researchers’ own knowledge and values will unavoidably affect their interpretation of what policy makers and other stakeholders will find most useful: value judgements are inevitably part of this process. For that reason, I would suggest that some degree of “subjectivity” is always present in indicator research.

Social indicators seek to capture characteristics that are classically seen as more subjective than environmental and economic indicators, and therefore, are considered particularly difficult to quantify (Latruffe *et al.*, 2016). Campbell and Converse (1972) were the earliest proponents of (subjective) social indicators, arguing that it was nonetheless important to identify the way social changes shape and determine people’s lives and wellbeing: “in sum, the human meaning that these changes may be said to have” (Campbell and Converse 1972, pg. 6). Scott (2012), identified the difficulty of measuring wellbeing and quality of life as indicators of social value because their measurement must be underpinned by values and beliefs about the nature of humanity and the meaning of life (i.e. the context is important, as well as the degree of commonality in such shared values). What might be considered for one person, or within one society, as a good quality of life may not be seen as the same for another. For this reason, therefore, social indicators should always be recognised as mutable social constructions, representing a multiplicity of truths, that are context-dependent.

Policy-makers often approach the subject of indicators in relation to their evidence-base: requiring ‘hard’ evidence against which to measure the performance of their policies (HM Treasury, 2020). This might lead researchers to think of indicator science as essentially a task of identifying and measuring objective data. However, this consideration and discussion of social indicators enables us to see a quite different interpretation of the task, emphasizing how indicators should be designed and embedded in the context within which they are to be used, and understood as requiring choices based upon value-judgments. Indeed, I would argue that the most valuable use

of social sustainability indicators lies not in the interpretation of (absolute or relative) values in any time period, but in the evaluation of trends in such indicators, over time.

I use Ferriss's (1988 pg. 601) definition of social indicators as a starting point for social sustainability indicators, which is a measure "used to monitor the social system, helping to identify changes and to guide intervention to alter the course of social change". In the context of AES, I refine this definition further, so that a social indicator is used as a measure to monitor and evaluate the social world of the agri-environment agreement holder, helping to identify changes and guide policy intervention to alter the course of social change towards greater social sustainability.

In respect of indicators of 'engagement', there is another literature mainly focused on educational institutions, where engagement is used as a broad term to describe a range of behaviours that influence learning outcomes (Beer *et al.*, 2010). This has clear parallels with the experience of AES engagement in the context of agri-environmental policy. Accordingly, in this thesis I use the following definition drawing on that literature: an engagement indicator is a measure of an agreement holder's enhanced personal interest in, or commitment to, the environment, leading to active learning and communication that results in changes to farming practices or farming systems. The basic tenet is that the more a farmer becomes actively engaged in their agri-environmental scheme, the greater will be the environmental outcomes and the more sustained the behavioural change that results from this process. Just as Papers 1 and 2 have focused on the factors that affect such engagement, such as interest, motivation, confidence, trust etc., Papers 3 and 4 focus more on seeking to understand the range and the value of the outcomes of such engagement, in both social and environmental terms.

This chapter has described the conceptualization and the framing of this PhD-project. It captures the human and social dimensions of the problem which must be addressed in order to answer the research questions. The next chapter will provide more details of the specific mix of interpretivist and positivist methodologies and methods used to address my overall research objectives.

3 Methodology

3.1 Introduction

The previous chapter outlined the concepts that were used to explore the psycho-social factors that affect farmers' pro-environmental behaviour and the social sustainability outcomes of AES. This chapter provides an overview of the methods and approaches used to address the overall aims of this thesis. The chapter begins by providing a justification for using a mixed methods approach, followed by an explanation of the methods used and the rationale for their adoption.

3.2 Methods

The thesis consists of 3 key phases of work (see Figure 3). The aim of this research was to provide new insights into farmers' pro-environmental behaviour and the social sustainability outcomes of AES and as I adopted a pragmatic philosophical approach to this research, it was important that the methods used were the most appropriate to explore these issues.

The empirical data for this thesis is largely drawn from research that was funded by Government bodies Defra and Natural England, with the aim of informing policy development. I then built on this research to develop a deeper understanding of the processes at work and a conceptualisation of farmer environmental behaviour and social sustainability indicators. A key driver for developing this understanding was to ensure that these social aspects are considered in future AES policy development, both in relation to stimulating engagement, but also in order to ensure that social sustainability is given due consideration in evaluating the overall sustainability of future AES. The research methods for data collection reported in Papers 2 and 4 were partly prescribed by the Government agency funding the research, with Paper 2 requiring an analysis of a government funded dataset and Paper 4 prescribing a systematic review to identify key evidence for the development of indicators. However, the analytical methods were further developed in the papers to enable a more robust analysis in order to answer the research questions. The methods used in Papers 1 and 3 were selected as most appropriate to answer the research questions.

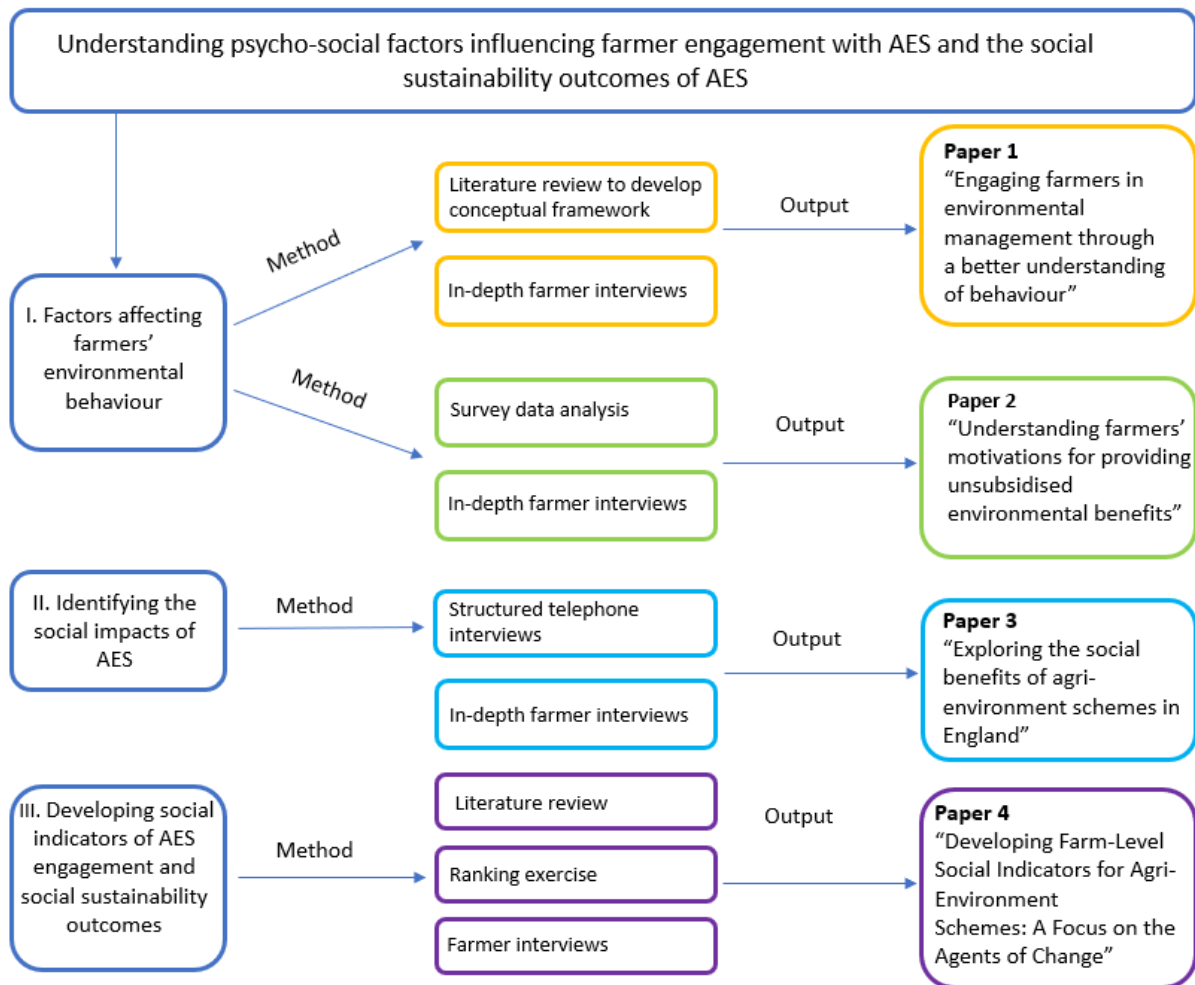


Figure 3: PhD methods and outputs

The methods used in this thesis are briefly explained in the following sections and each is further described in the methods sections of the individual papers in Chapters 4, 5, 6 and 7.

3.2.1 Paper 1 Methods – Literature review and farmer interviews

The main aim of Paper 1 was to provide insights into farmers' willingness and ability to undertake environmental management, particularly focusing on social and psychological insights. Underpinning the outputs of Paper 1 was a narrative literature review. A broad review was conducted of academic and grey literature from the UK and abroad relating to influencing farmer attitudes and behaviour with respect to the environment. This review considered a range of theoretical perspectives on attitudinal and behavioural change, ranging from actor-centred (individualised) to collective perspectives. A narrative literature review was the most appropriate

method to use as it provided a general overview of the topic and identified gaps in the literature. This literature review then enabled the development of conceptual frameworks for a qualitative empirical approach using in-depth, face-to-face farmer interviews to understand farmers' attitudes to environmental management. By taking a qualitative approach using face-to-face interviews, it was possible to produce a rich understanding of the complex meanings that the farmers construct in relation to their environmental management on their farms.

3.2.2 Paper 2 Mixed Methods – Survey and data analysis and farmer a

Paper 2, with its aim of identifying farmers' motivations for unsubsidised environmental activities, employed a mixed methods approach. Access to a large Government-funded survey dataset on farmer motivations enabled a quantitative analysis of farmers' motivations for undertaking subsidised and unsubsidised actions. The analysis was able to link farmer environmental activity at a national scale to broad categories of attributed motivations. In addition, a dataset of AES agreement points and payments was analysed to examine the interactions between subsidised and unsubsidised environmental activities. The limitation of this quantitative approach was recognised in only being able to capture largely extrinsic, easy to measure, motivations. Therefore, the analysis was supplemented with selected qualitative, face-to-face interviews that were able to capture a broader range of motivations, including social and psychological factors, and to develop a deeper understanding of how these motivations acted to influence attitudes and behaviours. By taking this mixed method approach it was possible to enhance the research (Mackenzie and Knipe, 2006) by gaining perspectives from the different types of data and strengthening the research findings. This mixed method approach can be described as a concurrent embedded strategy (Creswell, 2009). The approach enabled the qualitative data to describe aspects of farmers' motivation and an in-depth understanding that the quantitative data was unable to identify.

3.2.3 Paper 3 – Mixed method – Telephone survey and farmer interviews

In identifying the social impacts of AES, Paper 3 adopted a mixed method approach. This mixed method approach differed from that used in Paper 2, in that it adopted a sequential explanatory design, by combining quantitative and qualitative data collection and analysis in a sequence of

phases (Creswell, 2009). As discussed in the previous chapter, it is well recognised that social impacts are inherently more difficult to quantify than environmental and economic impacts, dealing as they do with many qualitative concepts, for example, sense of self-worth, satisfaction and belonging. This study took an inductive methodological approach to enable sequential refining of its hypotheses concerning social impacts and their causes, by making observations in the real world of the social impacts of AES, then identifying patterns and testing for potential causal relationships through quantitative analysis of results from a structured telephone survey and then developing explanations of those patterns through in-depth qualitative interviews with selected survey respondents. The closed questions used within the telephone survey resulted in a statistically representative set of data enabling exploration of robust patterns of the impacts of AES and enabled generalisation to the whole population. The limitations of the quantitative survey approach in terms of understanding the context and social reality of the respondents were recognised. Therefore, the analysis was supplemented with face-to-face qualitative interviews which provided an understanding of the different contexts in which farmers operate and the local conditions in which they make their decisions. In this way the quantitative and qualitative methods supported each other and enhanced the credibility of the study results.

3.2.4 Paper 4 – Systematic literature review, indicator ranking and quantitative and qualitative survey.

A key method employed in the development of psycho-social indicators in Paper 4 was a systematic literature review. Such a review was adopted because it was necessary to identify indicators through a systematic selection and critical appraisal of the literature (Snyder, 2019). A search protocol set out the search strings to use, the inclusion and exclusion criteria and critically appraised the literature using a scoring of each factor affecting AES engagement or social outcome identified in the literature, scoring it for level of impact; strength of the link between social and environmental outcomes; and strength of evidence.

A ranking exercise was then conducted by government agency staff and academics to short-list the indicators identified from the literature. The ranking was based on the perceived usefulness/relevance of the indicators in answering pertinent questions of use for policy making

and on the feasibility of implementing the indicators. The ranking exercised also assessed the relevance of any sub-level indicators for capturing changes in the associated high-level indicator. Ranking was adopted using a 5-point interval scale. The interval scale allowed for the calculation of a mean, and mode, to identify the central tendency in the scale. The indicators that received a low score against the three criteria (usefulness/relevance/feasibility) were recommended for removal from the indicator list or merged with other indicators. One of the drawbacks of using this ranking approach is that it was based on collating the responses from the expert assessment of individual's and therefore lacking in reproducibility, although different types of experts were involved to capture a broad range of views.

AES farmer survey questions were then designed to capture quantitative information for each of the potential social indicators and sub-indicators that had been identified in the literature and refined through expert assessment. Two types of questions were designed: firstly, questions that can be used to measure, assess or record the 'distance travelled' (i.e. extent of learning/change achieved) by the agreement holder during the life of their AES agreement, in terms of their willingness and capacity to engage, their level of engagement with others, and their social sustainability and health and well-being; and secondly, questions that can be used to measure, assess or record a snapshot in time, in terms of the extent of social impacts or outcomes currently delivered by their AES. The questionnaire was piloted with agreement holders; collecting both their survey responses but also seeking qualitative feedback on the questions themselves - identifying those that they struggled to answer, were uncomfortable answering or that they considered ambiguous. These responses were then used to re-work the survey questions.

3.3 Data analysis

For the research reported in Papers 1, 2 and 3, semi-structured face-to-face interviews were employed, using interview prompts to keep the interviews on topic. All qualitative interviews were recorded and transcribed, and the data uploaded to NVivo 12, a qualitative data analysis software package. The transcripts were then analysed following an iterative and reflexive process, as suggested by Bryman (2016) to capture different themes.

The quantitative survey in Papers 2 and 3 were analysed using the statistical analysis software, SPSS, to identify correlations and other basic patterns in the datasets. Analyses in both these papers were supplemented with in-depth, face-to-face interviews that asked open-ended questions to provide a greater understanding of the themes and patterns emerging from surveys.

3.4 Research Ethics

Prior to 2013 all research ethics for this research was considered under the protocols of the University of Gloucestershire's Handbook of Research Ethics, the guidelines of the British Sociological Association, and the Defra Survey Control Unit authorization process. All participants were informed of the purpose of the research and that participation was voluntary. Agreement to participate in the research was obtained through verbal consent. Data collection was conducted under the terms and conditions of the 1998 Data Protection Act. All data on agreement holders received from Defra was protected under a signed data collection and confidentiality statement. All data were anonymised, and results presented in such a way that no information relating to any particular land, business or person could be inferred from it. For example, this meant that any quotes did not include information about individual farm holdings whether directly identifiable or not.

The research conducted from 2018 onwards was subject to the new provisions of the General Data Protection Regulation (GDPR). The survey conducted for Paper 4 was approved by the University of Gloucestershire Ethics Committee and the Defra Data Protection Impact Assessment processes. All 19 farmers participants received a project information sheet detailing the purpose of the research, privacy notice and completed a written consent form agreeing to participate in the research. Due to the potential sensitivity of questions related to the participants' physical and mental health, interviewers had Farming Community Network leaflets available to offer participants a contact that could be used to seek help if they became distressed.

3.5 Author Contributions

Throughout the research studies reported in this thesis, I led and co-ordinated the key aspects of

the research that are most relevant to the topic of this thesis and I managed the projects reported in each paper. For each published paper, co-author contributions are described according to the 'CRediT Taxonomy' (CRTC) protocol as follows:

Contributor Role	Role definition
Conceptualisation	Ideas: formulation or evolution of research goals and aims
Data Curation	Management activities for data collection and storage for initial use and later use
Formal Analysis	Application of statistical, mathematical, computational, or other formal techniques to analyse or synthesize study data
Funding Acquisition	Acquisition of the financial support for the project.
Investigation	Conducting a research and investigation process, specifically performing the data/evidence collection
Methodology	Development or design of methodology
Project Administration	Management and coordination responsibility for the research activity planning and execution
Resources	Provision of study materials and other analytical tools
Supervision	Oversight and leadership responsibility for the research activity planning and execution
Validation	Verification of the overall replication/reproducibility for the research activity planning and execution
Visualisation	Preparation, creation and/or presentation of the published work, specifically visualisation/data presentation
Writing – Original Draft Preparation	Creation and/or presentation of the published work, specifically writing the initial draft
Writing – Review & Editing	Preparation, creation and/or presentation of the published work – including pre- or post- publication stages

The author contributions are summarised below. Signed statements of contribution from co-authors for Papers 1 and 2 and 4 are presented in Appendix 1.

Paper 1 author contributions

Mills, J., Gaskell, P., Ingram, J., Dwyer, J., Reed, M. and Short, C., 2017. Engaging farmers in environmental management through a better understanding of behaviour. *Agriculture and Human Values*, 34(2), pp.283-299.

Author Contributions: Conceptualization, Jane Mills*, Janet Dwyer and Julie Ingram; data curation, Jane Mills and Janet Dwyer; funding acquisition, Jane Mills and Janet Dwyer; investigation, Jane Mills, Pete Gaskell, Julie Ingram, Janet Dwyer; Matt Reed and Chris Short; methodology, Jane Mills; Janet Dwyer, Julie Ingram and Pete Gaskell; project administration, Jane Mills and Janet Dwyer; supervision, Jane Mills and Janet Dwyer; visualization, Jane Mills and Janet Dwyer; writing—original draft, Jane Mills; writing—review and editing Jane Mills, Pete Gaskell, Julie Ingram, Janet Dwyer, Matt Reed and Chris Short

Paper 2 author contributions

Mills, J., Gaskell, P., Ingram, J. and Chaplin, S., 2018. Understanding farmers' motivations for providing unsubsidised environmental benefits. *Land Use Policy*, 76, pp.697-707.

Author Contributions: Conceptualization, Jane Mills* and Steve Chaplin; data curation, Jane Mills; formal analysis, Jane Mills and Pete Gaskell; funding acquisition, Jane Mills and Steve Chaplin; investigation, Jane Mills, Pete Gaskell and Julie Ingram; methodology, Jane Mills and Pete Gaskell; project administration, Jane Mills.; resources, Jane Mills; supervision, Jane Mills; visualization, Jane Mills; writing—original draft, Jane Mills; writing—review and editing, Jane Mills, Pete Gaskell, Julie Ingram and Steve Chaplin.

Paper 3 author contributions (Sole authored)

Mills, J., 2012. Exploring the social benefits of agri-environment schemes in England. *Journal of Rural Studies*, 28(4), pp.612-621.

Paper 4 author contributions

Mills, J., Chiswell, H., Gaskell, P., Courtney, P., Brockett, B., Cusworth, G. and Lobley, M., 2021. Developing farm-level social indicators for agri-environment schemes: a focus on the agents of

change. *Sustainability*, 13(14), p.7820.

Author Contributions: Conceptualization Jane Mills* and Beth Brockett; data curation, Jane Mills and Hannah Chiswell; funding acquisition, Jane Mills; investigation, Jane Mills, Hannah Chiswell, Paul Courtney, George Cusworth, Pete Gaskell and Matt Lobley; methodology, Jane Mills, Hannah Chiswell and Paul Courtney; project administration, Jane Mills.; resources, Jane Mills; supervision, Jane Mills; visualization, Jane Mills and Beth Brockett; writing—original draft, Jane Mills; writing-review and editing, Jane Mills, Hannah Chiswell, Paul Courtney, Pete Gaskell, Beth Brockett, George Cusworth and Matt Lobley.

This chapter has provided an overview of the methods that were used to collect, analyse and interpret the data presented in the four results chapters (Chapter 4-7). The mix of methods used in these research papers enabled a good understanding of the key factors that affect farmers' pro-environmental behaviours, the causal linkages and variability across the populations. The next chapters constitute the papers that make up the main body of this PhD thesis presenting the results and discussing their meaning.

4. Paper 1

Agric Hum Values
DOI 10.1007/s10460-016-9705-4



Engaging farmers in environmental management through a better understanding of behaviour

Jane Mills¹ · Peter Gaskell¹ · Julie Ingram¹ · Janet Dwyer¹ · Matt Reed¹ · Christopher Short¹

Accepted: 20 May 2016

© Springer Science+Business Media Dordrecht 2016

Abstract The United Kingdom's approach to encouraging environmentally positive behaviour has been three-pronged, through voluntarism, incentives and regulation, and the balance between the approaches has fluctuated over time. Whilst financial incentives and regulatory approaches have been effective in achieving some environmental management behavioural change amongst farmers, ultimately these can be viewed as transient drivers without long-term sustainability. Increasingly, there is interest in 'nudging' managers towards voluntary environmentally friendly actions. This approach requires a good understanding of farmers' willingness and ability to take up environmental activities and the influences on farmer behavioural change. The paper aims to provide insights from 60 qualitative farmer interviews undertaken for a research project into farmers' willingness and ability to undertake environmental management, particularly focusing on social psychological insights. Furthermore, it explores

farmers' level of engagement with advice and support networks that foster a genuine interest, responsibility and a sense of personal and social norm to sustain high quality environmental outcomes. Two conceptual frameworks are presented for usefully exploring the complex set of inter-relationships that can influence farmers' willingness to undertake environmental management practices. The research findings show how an in-depth understanding of farmer's willingness and ability to adopt environmental management practices and their existing level of engagement with advice and support are necessary to develop appropriate engagement approaches to achieve sustained and durable environmental management.

Keywords Farmer behaviour Social psychology Environmental management Engagement

Abbreviations

AES	Agri-environment scheme
CFE	Campaign for the Farmed Environment
Defra	Department for Environment, Food and Rural Affairs
TPB	Theory of Planned Behaviour
UK	United Kingdom
VBN	Value-Belief-Norm Theory

Introduction

There has been a rich history of research exploring farmers' motivations for undertaking environmental management practices on their land. This research has stemmed from a need to encourage environmental management to counteract environmental deterioration as a result of post-war

✉ Jane Mills
jmills@glos.ac.uk
Peter Gaskell
pgaskell@glos.ac.uk
Julie Ingram
jingram@glos.ac.uk
Janet Dwyer
jdwyer@glos.ac.uk
Matt Reed
mreed@glos.ac.uk
Christopher Short
cshort@glos.ac.uk

¹Countryside and Community Research Institute, University of Gloucestershire, Oxstalls Lane, Longlevens, Gloucester GL2 9HW, UK

agricultural intensification. From the 1970s onward the nature and extent of the environmental impact of agriculture has been increasingly well documented (see, for example, Westmacott and Worthington 1974; Stoate et al. 2001) and, over time, accepted by most stakeholders (Westhoek et al. 2013; Glebe 2007)

The approach to encouraging environmentally positive behaviour in the UK has been three-pronged, through voluntarism, incentives and regulation and the balance between the approaches has fluctuated over time (Cox and Lowe 1983; Winter 1996). Whilst regulatory approaches and financial incentives have been effective in achieving some environmental management behavioural change amongst farmers (Fish et al. 2003; Crabtree et al. 1999), ultimately these can be viewed as transient drivers without long-term sustainability if they do not create a cultural change. We argue that environmental benefits that arise as a result of compensation or regulations require an on-going flow of payments or compliance checks and, if removed, there is a risk that these benefits will disappear. Purchasing environmental benefits by the state/government for short periods, usually 5 or 10 years in England, without any great confidence of achieving long-term gains is not an ideal solution for the public purse, farmers or environmental groups.

In an era of increasing pressure on government resources it is not surprising that government is looking for agri-environmental incentives to be more cost effective (Hodge 2013) and is increasingly attracted toward low cost options linked to voluntary activity by farmers and land managers. The UK Government has already committed 70 % of the agri-environment budget in the 2014–2020 Rural Development Plan for England to servicing existing agri-environment scheme (AES) agreements before they expire. A new scheme has been introduced with a more targeted and competitive approach towards environmental management and will result in an estimated reduction in AES coverage from 70 % to around 35–40 %, as existing 5 year agreements expire and are not renewed. This leaves limited scope for the negotiation of new agri-environment agreements and increases the importance of trying to secure the environmental benefits arising from those agreements that will cease to be funded in the scheme transition. In addition, there is a general reluctance to contemplate an increase in regulation set against a backdrop of European Union Agriculture Commissioner Hogan's emphasis on reducing the regulatory burden on farmers.

Given the constraints on using incentives and regulation to secure appropriate environmental management from the nation's farmers and land managers, there is a growing interest in understanding more about the actions that can be taken to 'nudge' managers towards more environmentally

friendly actions, and encourage individual responsibility for the maintenance of normative standards (Barnes et al. 2013). This approach recognises that encouraging voluntary action, rather than enforced behaviour change is more likely to persist over time as it is more likely to become embedded in social norms (Ayer 1997; Ahn and Ostrom 2002).

Work by Gasson (1973) in the 1970s recognised that farmers do not always make decisions based purely on an economically rational basis but instead may optimise social and intrinsic goals. However, despite this work much of the research into farmers motivations in relation to environmental management in the subsequent three decades has focused on financial incentives (Brotherton 1991) and barriers to adoption of environmental practices (Wilson 1997). More recently, however, there has been a growing body of research on using social psychological insights to understand farmers' attitudes and behaviours regarding environmental management (Burton 2004; Burton and Wilson 2006; Spash et al. 2009). This change reflected a cultural turn in the social sciences and a greater focus on culturally informed research into agricultural change (Morris and Evans 2004; Woods 2004), recognising the need to understand the social and cultural influences affecting farmers' behaviour (Burton 2004).

Much of this research has tried to single out specific variables that influence farmers' environmental behaviour using quantitative approaches (Lokhorst et al. 2011; van Dijk et al. 2015; Thompson et al. 2014). This paper differs in that it looks at farmers' qualitative responses and tries to understand the underlying reasons and explanations for farmers' motivations. We argue that this understanding is required in order to help policy-makers to produce appropriate advice and support programmes to encourage more environmental management on agricultural land.

Furthermore, improved understanding might enable appropriate engagement approaches which move farmers from 'tick box' compliance (with AES prescriptions or regulatory requirements) to a genuine commitment towards environmental management where outcomes are more sustained (with the ending of schemes or regulations) or of highest quality (where existing drivers are continued (Pike 2013)). Effective engagement between farmers, government and environmental organisations can help create interest, responsibility and a social norm. However, to provide this support and advice requires a good understanding of farmers' willingness and ability to undertake environmental activities and the social and cultural influences on farmer behavioural change.

The main aim of this paper, therefore, is to identify and understand the distinct influences on farmer decision-making in relation to durable environmental management practices. This will be achieved by discussing different determinants of farmer environmental behaviour and

presenting new empirical findings that provide insights into the socio-psychological factors that influence these behaviours. Two conceptual frameworks are presented that explain the social psychological factors that influence farmers' willingness to undertake environmental management practices and the interaction of these with ability factors. This improved understanding will enable policymakers to produce more effective policy instruments and engagement strategies to support sustainable and durable land management practices.

Understanding farmer environmental behaviour

It has long been recognised that, in order to understand farmers' environmental behaviours and action, consideration is required of both internal factors and the external context in which the farmer operates. It is the interplay of these different factors that is important and this will vary in different contexts. This understanding has led researchers to examine the relationship between the willingness to adopt (attitude, beliefs, values and norms of the farmer towards the environment and towards profit) and ability to adopt (economic status of farm and compatibility with farming system, external driver etc.) a central theme in a distinct body of research (Gasson 1973; Potter and Gasson 1988; Brotherton 1991; Dwyer et al. 2007). More recently there has been an interest in the importance of engagement with advice and support networks in influencing farmer behaviours. However, most of this work relates to sustainable agricultural practices (Oreszczyn et al. 2010), rather than focusing specifically on environmental management activities.

Understanding farmer environmental behaviour is complex. There is a consensus that farming systems are heterogeneous and therefore that the context and outcome for decision-making in relation to the environment will vary greatly spatially. As Siebert et al. (2006) point out, willingness and ability to co-operate in achieving biodiversity objectives cannot be reduced only to the location of a holding, the attitudes or values of the farmer, or wider social and economic factors in an atomistic fashion. There is an intricate interaction of agronomic, cultural, social and psychological factors; and each of these factors plays interwoven roles in each national, regional and specific farm context. These affect the individual farmer's response to undertaking environmental activities on a voluntary basis. Theoretically this relationship has been explored with reference to agency and structure and their interaction in the context of AES participation (e.g. Battershill and Gilg 1997; McLaughlin and Dietz 2008), where agency accepts that decision makers have a complex set of goals related to many aspects of their life and focuses on motives, values and attitudes, and structure pays attention

to farm business adjustment/survival strategies adopted in response to external pressures (e.g. markets, farm resources, agricultural policy) farmers face (e.g. Evans 2009).

Ability to adopt

There is a considerable body of evidence that has shown that farm characteristics influence farmers' decision making in relation to environmental management and their ability to adopt new practices. For example, Dwyer et al. (2007) found that conditions such as finances, time and labour can facilitate or constrain environmental behavioural change. Similarly, other research has indicated that aspects of farm structure such as farm size (Vanslebrouck et al. 2002; Wilson and Hart 2000; Ahnstrom et al. 2008; Brotherton 1991; Wilson 1996), farm type (Wilson and Hart 2000), tenure (Wilson and Hart 2000; Kabii and Horwitz 2006), dependency on farm income (Kabii and Horwitz 2006), amount of non-intensively used farmland (Wynn et al. 2001), and the bio-geographical conditions of the farmland (Wilson and Hart 2001), can have an effect on the ability to participate in pro-environmental behaviour. Farm household characteristics, such as education (Filson 1993; McDowell and Sparks 1989; Wilson 1996; Wilson 1997), succession status (Potter and Lobley 1992, 1996), age and length of residency (Wilson 1996) can also have a significant effect upon participation in agri-environmental activities.

Willingness to adopt

There has apparently been less research into understanding the willingness of farmers to undertake environmental management practices and the intrinsic factors affecting farmers' environmental behaviours. Research that has explored this area has focused on the use of the Theory of Planned Behaviour (TPB), an approach first defined over 30 years ago. The main assumption of the theory is that the behavioural intentions of an individual are directly related to his/her attitude; that people make deliberate choices in accordance with the beliefs they hold; and that the person's behaviour is a function of the information or beliefs he/she has (which may be based on experience or facts). In recognition of the weakness in using attitude alone as a predictor of response, as a positive attitude does not always lead to action, the TPB has incorporated additional determinants of behaviour including social influences (Ajzen and Fishbein 1980). Thus, the TPB attempts to predict and understand behaviour by measuring the underlying determinants of that behaviour: personal attitudes (behavioural beliefs), subjective norms (social influences) and perceived behavioural control (perceptions of the ease or difficulty of carrying out the action). In the past decade, other behavioural constructs have been added to TPB model. One

of these is response-efficacy, the belief that their actions can make a difference (Homburg and Stolberg 2006), as the higher the level of perceived efficacy, the more people are likely to persist with the new behaviour. In addition, others have advocated the importance of self-identity in understanding farmers' motivations (Burton 2004; Lokhorst et al. 2011). Self-identity is the extent to which behaviour is considered to be part of the self (Terry et al. 1999) and can relate to the social group that the farmer identifies with. It reflects the farmer's personal value system and worldview based on their own experiences and moral values and acts as an internal frame of reference, determining their perceptions of external factors and their own preferences. It has been suggested that behaviours associated with self-identity are more likely to persist over time, as the more the behaviour is repeated, the more important it becomes to the individual's self-concept (Charmg et al. 1988).

Another theory sometimes applied to understand farmer behaviour is the Value-Belief-Norm theory (VBN), developed by Stern et al. (1999), which is focused on how values and moral norms influence behaviour. This theory is based on the Norm Activation Theory (NAT) (Schwartz 1977), which posits that behaviour can be predicted by personal (or moral) norms. The theory is structured as a causal chain leading to the specified environmentally significant behaviour (Johansson et al. 2013). The chain starts with the core values that are central to the personality. Personal norms are then activated in people who hold an awareness of need (an environmental concern), awareness of consequences (acceptance of public good/ bad aspect of private actions on the environment), and awareness of responsibility (belief that their actions could prevent/provoke consequences) (Schwartz 1977; Schwartz and Howard 1981). These personal norms influence behavioural change because people wish to be morally responsible and maintain positive self-concepts. Both TPB and VBN theories have been tested empirically and found to be valuable for explaining environmental behaviour. Thus from this literature we have identified eight key constructs that may influence farmers' willingness to undertake environmental management practices and that have empirical evidence to support their relevance for explaining farmers' pro-environmental behaviour (see Table 1). We suggest that all these factors need to be considered when attempting to engage farmers in environmental practice. In this paper we particularly focus on the TPB constructs (personal beliefs, subjective norms, perceived behavioural control and response efficacy) to explain farmer behaviour, but also introduce a moral dimension by including personal (moral) norms from the VBN theory and the concept of self-identity.

Farmer engagement with environmental advice

In the context of this paper, we view farmer engagement with environmental advice as occurring when farmers are sufficiently interested and motivated to improve the environmental management of their land, such that they enter into dialogue, discussion and collective problem framing with those who hold environmental expertise and knowledge. There are different aspects to looking at the issues of engagement, such as the nature and extent of engagement and the different influences upon that, such as sources of advice, levels of trust, and continuity of relationships. However, in this paper we want to focus on how engagement with advice and support networks can help create interest, responsibility and a sense of personal and social norms (Dwyer et al. 2007; Pike 2013) that leads to sustained and high-quality environmental outcomes.

The literature suggests that farmers engage with environmental advice in different ways. As with agricultural advice, the provision of environmental advice in Europe is highly fragmented. Farmers engage with a wide range of actors, including extension agents, rural development agents, local authorities or agri-businesses (Feola et al. 2015). In particular there has been an increase in the number of advisors delivering environmental advice as a result of agri-environment schemes and regulatory requirements (Klerkx and Proctor 2013). Also some government agencies offer advice related to specific schemes or legal requirements, for example advice in relation to cross compliance requirements. The nature of farmers' relationships with all these advisers and particularly levels of trust therein (Sutherland et al. 2013), critically determine the level of engagement. For example, relationships with some government agencies have been constrained and they are not always considered a trusted source of advice (Oreszczyn et al. 2010; Hall and Pretty 2008). In recent UK policy, the concept of 'nudge' to influence behaviour has gained particular prominence (Barnes et al. 2013), which has been defined as "any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives." (Thaler and Sunstein 2008, pg 6) This follows current thinking in the UK that by combining good information with knowledge of how people make decisions, it might be possible to "nudge" them towards sustainable choices (Ölander and Thøgersen 2014). For example (Kuhfuss et al. 2015) found that by providing farmers with information about the intentions of how other farmers intended to behave, the prevailing social norm, greatly influenced a farmer's stated decision whether to maintain or not AES practices once their contract ended.

Table 1 Key constructs influencing farmers' willingness to engage in environmental behaviour

Construct	Definition	Empirical evidence
Personal beliefs/ personal attitudes	Strength of belief that a consequence will result from behaviour The degree to which a person has a favourable or unfavourable evaluation of a behaviour or object	(Beedell and Rehman 1996, 2000)
Subjective norms/social influences	Perceived social pressure felt from significant others to perform a certain behaviour	(Lokhorst et al. 2011; van Dijk et al. 2015; Beedell and Rehman 1996, 2000; Burton 2004; Ajzen and Fishbein 1980)
Perceived behavioural control	Perception of the ease or difficulty of performing a behaviour. Degree of control felt over the performance of the behaviour	(Burton 2004; van Dijk et al. 2015; Beedell and Rehman 1996, 2000; Ajzen and Fishbein 1980)
Response efficacy	The degree to which performing a specific behaviour is believed to deliver the desired outcome	(Homburg and Stolberg 2006; Karrer 2012)
Self-identity	The extent to which a certain behaviour is considered to be a part of the self	(Terry et al. 1999; Charng et al. 1988; Lokhorst et al. 2014; Sulemana and James 2014; Burton and Wilson 2006)
Personal norms	Self-expectations based on internalised values. Sense of personal responsibility, awareness of need, awareness of consequences	(Lokhorst et al. 2014; Schwartz 1977; Johansson et al. 2013)
Personal obligations	The degree of regret anticipated if the behaviour is not performed	(Gorsuch and Ortberg 1983; Ajzen 1991)
Social/group norms	The perceptions of whether other people in the reference group (e.g., farmers) perform the behaviour. Perceived pressure from others in the reference group (e.g., farmers) to adopt the behaviour	(de Snoo et al. 2013; Bamberg and Mo'sser 2007)

Farmers may also engage with environmental learning and behaviour through networking with other farmers (Sligo and Massey 2007; Oreszczyn et al. 2010) and informal sharing of knowledge and know-how. Within the UK, farmers have increasingly engaged with environmental advice through novel local governance structures, such as catchment management initiatives and landscape partnerships. Some such approaches rely heavily on seeking to change social norms. Group sharing of information, as well as raising the visibility of individual farmer practices among their peers, sets new normative standards for acceptable behaviour (Barnes et al. 2013). This approach, for example, has led to improved farmer understanding of diffuse water pollution issues (Sabatier et al. 2005; Mills et al. 2008).

Usually, studies of farmer environmental behaviour consider just the effects on farmers' short-term willingness and ability to undertake environmental management activities. However, in view of the need for more sustained, long-term and resilient behaviour change, research evidence suggests that 'engagement' with advice and support networks can help create interest, responsibility and a sense of personal and social norm (Dwyer et al. 2007; Pike 2013). Engagement means more than passive advice such as is available through a website or leaflet, but practical face-to-face interaction to complement and increase the effectiveness of interventions. By understanding farmers' motivations and values and the context within which they

work, engagement strategies and the framing of advice can be developed to resonate with them in a way that leads to sustained action.

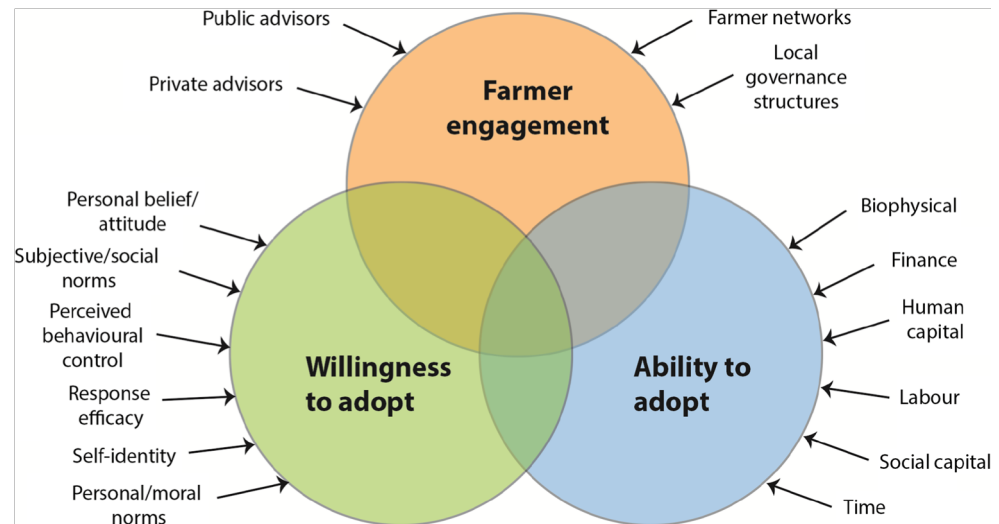
We suggest that there is a complex and iterative interrelationship between all three elements discussed above, which influences farmer environmental decision-making and is perhaps best represented as shown in Fig. 1.

Methods

The paper draws on two research projects that were undertaken for the UK Government. One project was concerned with understanding and influencing environmental behaviour change among farmers (Dwyer et al. 2007). This involved a comprehensive literature review and 78 in-depth, face-to-face interviews with a range of farmers and farm families involved in five contrasting advisory initiatives in England covering soil, water and waste management practices. The study team also interviewed and convened a discussion group with scheme promoters and key stakeholders. The project led to the development of the two key conceptual frameworks presented in this paper (Figs. 1 and 3).

The empirical data presented in this paper is derived from a later research project for the UK Department for Environment, Food and Rural Affairs (Defra) (Mills et al. 2013a) which explored farmers' attitudes to on-farm depth, environmental management. This project involved 60 in-

Fig. 1 Factors influencing farmer environmental decision-making



depth face-to-face interviews conducted with arable or mixed farmers in England.

The interviewees were selected from a previous Government postal survey in relation to the Campaign for the Farmed Environment (CFE), an industry-led partnership approach to encourage farmers to voluntarily adopt environmental management practices (Clothier 2011). The Campaign promotes and offers guidance on agri-environmental activities, but offers no financial incentives. This original survey was sent to a representative sample of approximately 5500 arable holdings over 10 ha across different English regions and farm sizes. The aim of our selection process was to obtain a good coverage from this survey of the different combinations of formal (undertaken within an AES) and informal (outside of any scheme) environmental management activity as reported by the farmers and a range of farm sizes and different locations (see Table 2).

A few farm managers were interviewed, but the majority of those interviewed were the principal farmer, often a second or third generation farmer on a family farm.

The interviews were based around a semi-structured questionnaire, and usually lasted around 1.5 h. The interview schedule was designed to identify the key willingness

and ability factors identified in Fig. 1 that affect environmental behaviours. The questions covered:

- Farmers’ situations—their needs, opportunities and constraints;
- Environmental behaviours, and how these may have changed over time;
- How attitudes have influenced decisions made, and vice versa; and
- Perceptions and opinions of different drivers and how these affect environmental decision-making.

The interviews were recorded and transcribed in full. The transcription was then analysed following an iterative and reflexive process using Nvivo, a qualitative data analysis software package as suggested by Bryman (2008) and Bazeley and Jackson (2013). Using a priori deductive codes, the data was first coded into broad categories. The second stage of the analysis took an inductive approach to further coding, capturing different patterns and themes within the broad categories. Finally, over a period of 3 days an expert panel was convened comprised of the study interviewers and ecologists to discuss each of the 60 interviewees, case by case, and to rate them on a 4-point scale for their willingness and ability to undertake environmental management based on how they responded to the survey questions and the

Table 2 Interview sample characteristics

Environmental management activity as reported by farmers	Nos. interviewed	Farm size	Nos. interviewed
AES & Informal	30	Small (≤ 10 and ≤ 100 ha)	18
Informal only	25	Medium (≤ 100 and ≤ 200 ha)	20
AES only	4	Large (≥ 200 ha)	22
No AES & informal	1		
Total	60		60

results of ecological surveys.

The next section of the paper uses the conceptual framework in Fig. 1 to explore and to understand how farmers' willingness and ability to adopt environmental management, and their level of engagement with advice, affects environmental outcomes.

Results

Levels of willingness, ability and engagement

Analysis of the responses revealed that the farmers interviewed could be placed in different positions within the conceptual framework presented in Fig. 1, depending on their level of willingness and ability to take up environmental management and their level of engagement with advice (Fig. 2).

Willing and engaged only

The data revealed farmers who had a willingness to undertake environmental management activities on their farm either within or outside of an AES, had engaged with advice through for example discussions with advisors, but this had not translated into behaviour because they lacked the ability to do so, either as a result of the biophysical constraints of the farm, or skills, labour and financial constraints. One interviewee, for example, had a personal interest in birds and was a member of two environmental organisations and expressed a desire to do more for the environment, but this had not translated into action. The interview revealed that whilst the farmer managed a small area of grassland informally on his farm to benefit wildlife,

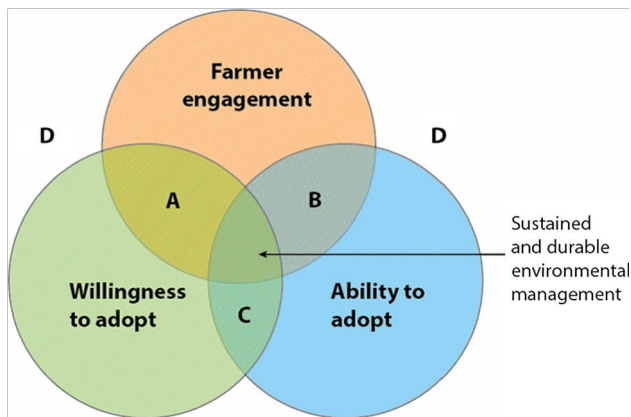


Fig. 2 Farmer categories depending on levels of willingness, ability and engagement

he felt that the rest of the arable land on his farm lacked any obvious features, such as woodland, or ponds, that could easily be developed for environmental purposes, so mistakenly believed it unsuitable for conservation purposes and consequently had undertaken no positive action. In this situation he lacked the ability (knowledge and skills) to maximise the environmental potential of his farm. Training was needed specifically to equip the farmer with the practical skills and confidence to enable him to undertake positive environmental behaviour.

Able and engaged only

The study also revealed farms that were undertaking environmental management and had engaged with advice, but lacked sustained motivation to maximise environmental benefits. This included, for example, farmers who had joined agri-environment schemes for the financial rewards, but with no change in their underlying attitudes to environmental management work. They stated that once funding stopped they would revert back to previous production practices. Some farms were large, efficient farm businesses that saw environmental management only as a subsidiary income stream. They had sufficient management capacity to engage with agri-environment schemes, as well as tailor their activities to meet the minimum prescriptions required. Environmental management was viewed as a 'crop' that was managed according to the scheme prescriptions, with a tick box mentality, which meant that they did not undertake any more environmental activity than required by the scheme, unless there were clear agronomic reasons for doing so. To achieve sustained environmental management in the long-term with farms that fall into this group would require an increased internalisation of the values underpinning environmental management activities, among the farmers concerned.

Willing and able only

This type of farm was actively undertaking environmental management, but had not engaged with any advice which meant that the land was not delivering its full environmental potential. In our study this category is typified by a mixed farm where the farmer had a personal interest in wildlife with a wealth of knowledge about nature. However, as he lacked confidence that the AES prescriptions would deliver the required environmental outcomes (response efficacy) and the AES lacked flexibility to adapt to his local knowledge he had not engaged with any scheme and consequently not received any advice. As a result, some of the environmental management practices on the farm, as assessed by ecologists involved in the study (Mills et al. 2013a), were

not effective as they could have been. Providing advice to those farmers that are 'willing' and 'able' can ensure the highest quality environmental outcomes for the land. This often requires specific scientific knowledge that farmers may lack. There may even be opportunities to support interested farmers to undertake on-farm experimentation to identify the best environmental practices for their farm. Some farmers may not seek this advice believing they are already producing the best environmental outcomes. However, the study also found that there is often a disparity between farmers' perceptions of environmental benefits delivered by their activities and the observed environmental benefits, as identified by ecologists (Mills et al. 2013b).

Disengaged

There was also a smaller group of farmers who had not engaged with any environmental management, either because they were not willing, they do not have capacity, or they dislike outside interference or are concerned about loss of control or management flexibility. Often these farms were isolated and not part of any social grouping. They could be the least networked farms in our sample, lacking external information and thus more immune to social influences. Consequently, it was judged very difficult to influence their norms and self-identity.

Finally, there was a group of farmers who fell into the intersect between A, B and C. These farmers were committed to long-term environmental management on their farms and had the ability (time and resources) to undertake the work and to engage with environmental advice. For one such farmer the catalyst for his interest in the environment stemmed from contact with a University academic who monitored the plants in his ditches and persuaded him in the 1980s to change his annual ditch clearing to every 3 years. He has since had a long-term association with University academics and taken part in a number of monitoring trials, gaining considerable enjoyment from learning about the science involved.

Levels of influence on willingness

The literature suggests that of the three elements presented in Fig. 2, the hardest to influence is a farmers' underlying beliefs and therefore their overall willingness to change (Pannell et al. 2006; Johansson et al. 2013; Gardner and Stern 1996). A complex set of inter-relationships influences willingness to change which can be usefully considered at three different levels: farm level; community level and societal level; as illustrated in Fig. 3. At the farm level evidence suggests that family members, particularly on large farms, have an important influence on the decision-making process (Burton and Wilson 2006; Blackstock et al. 2010). Whilst at the community level, research has found that people are usually

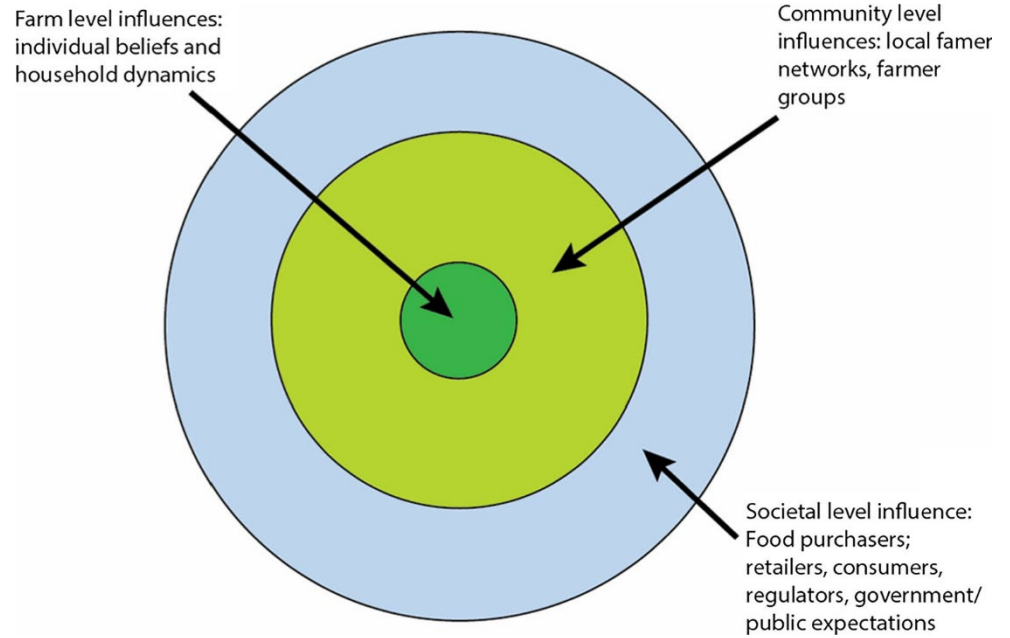
more influenced by in-group than out-group messages (Olson and Zanna 1993). Perception of societal wishes have also been found to influence pro-environmental behaviour by farmers (Beedell and Rehman 2000). We found evidence in our data that showed how these different levels of influence could in particular affect farmers' beliefs, norms and self-identity.

At the farm level the influence of the individual farmer or family dynamics is important for environmental decision-making. As identified from the literature, at the core of an individual farmer's attitude to environmental practice is their personal beliefs and moral norms. Our data demonstrated how farmers' personal beliefs and norms appeared to affect their self-identity and overall farming philosophy, including their attitude to environmental management. Two important personal beliefs could be identified from the farmer interviews, based around the concepts of custodianship and productivity, which reflected how they perceived themselves as farmers (self-identity). This in turn affected the type of advisors that they engaged with. Those farmers expressing strong views on custodianship tended to be more positive about environmental management activities than farmers who emphasised the productive nature of their farming activities. However, these were not mutually exclusive groups and some of the farmers said that taking care of the land was not incompatible with productive farming. Also of importance was the influence of family members and particularly a strong influence from the previous generation, a reflection of the family nature of many farm businesses.

For those who displayed custodianship beliefs, the importance of taking care of the land and farming responsibly was stressed as was handing the land to the next generation of their family in 'good heart'. For some, custodianship was seen as a moral obligation. Food production was only one of a number of considerations that had to be taken into account when deciding on how the land should be managed. Taking care of the environment in terms of resource protection, wildlife and biodiversity and landscape protection was seen as an important and sometimes essential part of being a good custodian of the land and part of their self-identity. Farmers with a strong view on the importance of custodianship also generally had a positive attitude to environmental management activities. Good agronomic and environmental management were seen as compatible and in some cases indistinguishable. An illustration of such a view of custodianship is provided by the quote below.

I've always been conscious of the wildlife around me. My father was a big believer in that we're only farming for a very short period of time in the global thing, so we're only borrowing the land and when you borrow anything from anybody, whether its land or your

Fig. 3 Levels of influences affecting farmers' willingness to change



next door neighbour's car, lawnmower or kettle or whatever, when you borrow anything you always put it back as good or better as when you got it. That's deep inside me with everything, with everything I do... That applies to the land just as it does with your next-door neighbour's kettle. (AES only, large arable tenant farm)

The quote reflects the influence of a significant other, his father, in shaping his values. It was also common for farmers to talk about the need to find a balance between production and environmental management, which were not always viewed as conflicting needs. This was particularly the case on some of the farms that had replaced conventional ploughing with direct drilling systems.

In contrast to those who emphasised the importance of custodianship of the land, some farmers had an inherent, deep-seated personal belief that agricultural production should be maximised on productive land. This was sometimes couched in terms of needing to make a profit, but also in terms of the need to feed a world with impending food shortages, that it was a moral obligation. One farmer cited a large area of productive agricultural land close to his farm.

The world is short of food, full stop, end of story. To take land out of production and let somebody starve, morally is that right? Who is the prime species? Is it human or is it wildlife? It's a balancing act... There is a vast area of land, thousands of acres being taken out of production. Now this is prime vegetable growing land which is being taken out of production for the butterflies and the birds. Now morally is that right? There are areas in the country that can't produce a

good crop.... Let the poorer land go for the birds and the butterflies (AES only, large, arable, tenanted farm)

Similarly, another farmer argued that:

The world needs food and this here two metre margin amounts to a lot of land in a big field and that could be producing food that the country needs, well the world needs. It's around thousands and thousands of acres and it mounts up... We seem to be more interested in wildlife than we are people... That's my feeling. (Informal only, small, arable, mixed tenure)

The data also revealed evidence of differing inter-generational views about environmental management within a family, demonstrating that at the farm level, strongly held beliefs and values can change over time. One farmer who had recently taken over the management of the farm business from his father, had difficulties in persuading his father, who undertook all the ploughing, to leave grass margins against hedges. This young farmer was trying to undertake more environmental activities but was facing resistance from his father. As he explained in relation to leaving 2 m margins:

The only thing I did struggle with was my Dad because he doesn't like to leave these 2 m margins. He is totally against it; I had to threaten him because he does all the ploughing. It is just a generation thing. When my Dad was brought up if they couldn't get into the corner the ploughman used to get out and turn it over with a spade. With the hedges they used to dig under hedges to stop the weeds spreading. It goes completely against how they were brought up. (No AES, medium, mainly horticultural, tenanted farm)

Some case study farmers reflected on how their views on the environment had changed. This quote reflects how the lifestyle of an individual can affect their willingness to adopt environmental practices.

I remember years ago when I was a young man, soon after I left school, there was a farm nearby where I farmed... It had a lot of parkland... I remember saying to my Dad one day, ‘‘Jesus if I farmed this I would rip all them trees out and plough up to the hedge.’’ There was probably 10 metres around every field that they couldn’t plough. I, as a young man, looked at it as a waste of land because it wasn’t doing anything. It wasn’t producing wheat; they couldn’t cut it to produce hay It was just a waste. And Dad turned round to me and said ‘thank the Lord you don’t farm it boy.’ And I look back at that and think how right he was. It’s age, it mellows you... As a young man I did not see wildlife, I saw production of wheat, production of crop. As a young man I wanted to produce, I wanted to be the best farmer in the world. I wanted to produce the maximum from every acre that I farmed, that I rented. (AES and Informal, medium, arable, mainly tenanted farm)

Our data highlights that the personal beliefs farmers held about wildlife was often a key factor influencing those with a positive attitude to the environment. Where farmers have an interest in the environment, which can often be deep-seated, it can be a trigger to undertaking beneficial management actions on their farms and seeking advice to maximise these benefits. The interview survey found that farmers expressed their personal interest in the environment in different ways. For some the interest was lifelong and could be traced back to childhood and growing up on a farm, as reflected by this quote from a farmer who is not engaged in any AES

I’ve been interested in the environment since my childhood. Both me and my wife enjoy walking in the countryside. You look for things. I don’t go around with a pair of binoculars, twitching. It is nice to see the wildlife about. It’s nice to see the swallows; we never had those in years gone by. We have Canada geese coming on to the pond which we never had before, not that they are an endangered species. There are lots of bits and bobs. We also have black-headed gulls, when I’m ploughing I’ve had up to 7 herons following me down the fields picking up worms, which never happened before. This year for the first time ever I had a big tawny owl following me. There are barn owls on the farm. (Informal only, medium, arable farm)

The following quotes highlight the enjoyment that these farmers derive from observing wildlife on their farms and the influence of positive management reflecting personal norms and contributing to self-esteem.

It creates a bit of habitat and some seeds for the birds, creatures, or whatever over winter. And I feel good about myself when I do that sort of thing. (AES only, small, dairy owner-occupied farm)

When you are driving around on a tractor all the time you see a lot. I was driving the tractor last week and I had 13 buzzards following me. Last year I had 20 something and 2 red kites. They must be getting short of food to be after the worms. That has only happened in the last 10 years as the numbers have increased. We don’t mind, it is nice to see the birds of prey. The red kites are beautiful; it is nice to see them up close. When you’re sat on a tractor you can be 10 or 20 yards away and they don’t mind, you get out and they have gone, the same with the buzzards. You can get really close to them. (Informal only, medium, mixed, owner-occupied farm)

As the quotes above illustrate, the representation of the environment from these farmers’ perspectives and many others in our interviews largely related to the higher species and particularly birds.

At the community level farmers’ attitudes to the environment can be influenced by those who are in their reference group, and by their perception of how other farmers see them through social norms. For some of the farmers interviewed, having a productive farm and that other farmers recognised it as such, were seen as a status achievement. For these farmers, productivity was seen as the main criterion by which they and their farming should be judged. This was important for their own self-image as contributing to society more broadly, as well as running a profitable enterprise, and their status within the farm community. Environmental concerns were seen at best as secondary, or possibly tertiary uses for quality farmland and generally a distraction from the project of farming.

However, community image is a mutable concept and can change over time. One farmer suggested that what is considered acceptable farming practice within the farming community has changed over the years. This farmer when asked if he had undertaken any activities for the benefit of the environment initially responded in the negative and that everything he did was just normal farming practice. Then on reflection he recounted that the situation on his farm was very different in the 1970s when they had ploughed to the edge of every field, sprayed out all the hedge bottoms and ditches to keep the weeds down and cropped the hedges to very near the ground. He said that such practices were the norm then but that he farms differently now, in that he has margins around every field, does not use as many chemicals and lets his hedges grow out more than he used to. When asked why he did this, his response was ‘to reduce pollution and to benefit the wildlife’.

Societal level influence through the way that farmers perceive consumer and public concerns can also affect farmers' views and responses towards environmental protection. Our findings showed evidence amongst the farmers interviewed of a more positive attitude to the environment compared to three decades previously. A cultural change has occurred partly as a result of societal influences affecting subjective norms. In particular, negative publicity has had an impact as the following quote illustrates.

Over the years farmers have had a lot of bad publicity and rightly so..., in those days we were burning straw and if you lost a hedge, I mean we put firebreaks in, but no one said much about it (Informal only, large, arable, mainly tenanted farm)

This need to be seen to "be doing the right thing" was demonstrated by a number of farmers in the survey whose farms abutted nature reserves which motivated them to do more for the environment. They felt under an obligation (or observation) to undertake environmental management practices, in part as it contributed positively to their societal image.

It is easier to have the margin because on the other side of the ditch the land belongs to an ecological trust and they have trees and fancy grass and bird boxes and all that and I thought it might look like I was doing my bit as well. (No AES, medium sized, tenanted, horticultural farm).

Evidence of this sense of social responsibility was even found amongst those not participating in an AES. Some had come out of an AES, but were continuing some of their activities and were particularly keen to highlight that they were contributing to the environment, despite not being involved in an AES.

The social influence of the farming community and broader society on farmers' attitudes to environmental management has not been uncontested. The productivist values that dominated much of the post-war period are still an important influence on farmers. Recent discussions surrounding food security and the threat of impending world food shortages were drawn on by some farmers in the interviews to justify some of their land management practices and lack of engagement in environmental management activities, as they felt they had a social responsibility to produce as much as possible from their land.

Discussion: implications for farmer engagement

The research findings showed considerable heterogeneity in the levels of farmer commitment to environmental management. Consequently, advisory approaches need to be

able to understand and to cope with this heterogeneity and must adapt and target messages accordingly (Blackstock et al. 2010). They must also be sensitive to the ways in which different combinations of farmers' level of willingness, ability and engagement, in different circumstances or even between different farms in similar circumstances, will present different challenges and opportunities. To be able to develop this understanding and locate advice in its farm specific context requires some degree of personal engagement.

The interviews have shown the importance of understanding values and personal and social norms, as well as pragmatic and economic factors, affecting farmer environmental behaviour. Of particular importance are beliefs about custodianship and productivity. By having this awareness of the underlying values and norms that shape farmer decisions, we suggest it would be possible to frame advice messages and to develop advisory programmes that work more collaboratively in partnership with individual farmers and farm families to encourage more effective and sustainable environmental behaviour. We recognise, however, that it is generally easier to change environmental beliefs and attitudes through advisory approaches than particular ethics or values, which take longer to change (Johansson et al. 2013; Gardner and Stern 1996). Some attempts have been made to segment farmers into behavioural groups which recognise different underlying values and motivations (Wilson et al. 2013). However, we believe that the most effective way of gaining a nuanced understanding of the factors affecting farmers' environmental behaviour is through one-to-one advisory programmes.

Our findings identified different farmer groupings based on their level of willingness and ability to change, as well as their extent of engagement with advice, for environmental management. For the farmers falling into group A in Fig. 2 that are willing to undertake environmental management activities but are unable to respond to advice due to biophysical, economic, technological or labour constraints (a value: action gap), educational and/or financial support may help to galvanise such farmers into action. The approach in this situation could be through some hands-on learning process, enabling development of specific skills and confidence (Petty et al. 2003), coupled with finance targeted at removing or reducing specific constraints, as far as feasible.

For farms in group C, where the farmers are willing to be engaged with environmental activity but have not taken up external advice through fear of loss of control or outside interference, then information could be disseminated through environmental or other organisations to which the farmers belong. Alternatively, they could be encouraged into action through more of a partnership working process, enabling them to experiment with different options, contributing their

own knowledge, whilst also providing a sense of ownership and control.

For those who are implementing environmental activity but with no accompanying attitudinal change (Group B), initially financial incentives can be positive if they introduce farmers to new ways of doing things and to new people, change initial beliefs and introduce new “habits” (Kuhfuss et al. 2015; Hiedanpää and Bromley 2014). However, evidence suggests that eventually, to ensure sustained environmental management, an internalisation of the values underpinning environmental management activities is required, which is a challenge to achieve through financial support alone. Use of nudges may help in these situations. For example, providing information about the pro-environmental behaviour of other farmers in their peer group could be a powerful nudge. Also, engaging farmers within schemes in a learning process, where they share their experiences with experts and other farmers, encouraging discussion and debate about outcomes and perhaps offering encouragement to engage in this way through prizes and newsletters and reporting and celebrating progress could be beneficial. However, there is evidence that unless these nudges lead to environmental management activities that become habituated their influence can diminish overtime (Allcott and Rogers 2012).

The group of farmers who are most difficult to engage and have a negative attitude to environmental management may have strong self-identities related to food production. It may be difficult to influence this cohort of farmers through advice alone. Our research found that often these farms are not well networked or part of any social grouping and therefore lack information and may be more immune to wider community level influences. This situation makes it difficult to change norms and self-identity through advice and support programmes. Others may be disengaged from advice due to negative experiences. This was evident in our study where farmers’ experiences of the inappropriateness of particular AES prescriptions led them to disengage from schemes. One way to achieve behavioural change on such farms is to work with the next generation of farmers and to seek tactics which explicitly couple improved business management with a higher level of environmental management: presenting a younger cohort of farmers with a challenge to step up to enhance performance across the board. There is evidence to suggest that deeply-held values within a farming family can change across generations (Elder and Conger 2014).

At the *farm level*, it is a challenge to change an individual farmer’s deeply-held values and beliefs, particularly through advice to an individual alone. However, this change can occur through extended periods of personal interaction with a known advisor or peer group and the building up of trust over time (Sutherland et al. 2013). In general, the higher the credibility of the advice source, such as people from farming

backgrounds or trusted networks, the higher the persuasion factor will be (Blackstock et al. 2010). Advice can also be effective in engaging farmers by identifying an issue, problem or particular species of interest to the individual, such as flooding or soil erosion issues or visible or emblematic species in decline such as birds, flowers, pollinators. There was strong evidence from our interviews of a widespread interest in birds among farmers which had led to conservation efforts, including by farmers who were not part of an AES.

Advice delivered at the *community level* through farmer/peer groups might prove more effective at influencing and engaging farmers in environmental behaviours than advice to individual farmers (McGuire et al. 2013; Mills et al. 2011). There is evidence that environmental messages passed through a group can create a positive social norm (if most farmers in the group take up the message). Through group sharing of information and best practice with their peers, perceptions of what is deemed appropriate behaviour become more accepted and this increases feelings of personal responsibility (van Dijk et al. 2015; Mills et al. 2011; Barnes et al. 2013). In the case of environmental change, it can also increase response efficacy, as individuals feel they are more likely to achieve a positive outcome if all are working towards resolving the issue. For advisory approaches to work at this level requires an understanding of who is in the farmer’s network (their reference group), whom they trust and could possibly take a local delivery, partnership working approach.

The positive environmental behavioural response of those abutting nature reserves is an interesting observation and may reflect what Goddard et al. (2013) refer to when looking at environmental behaviour in urban settings, as neighbour mimicry—a feeling of not wanting to let the standards down in an area. This was an observation also noted by Mills et al. (2008) when looking at the social processes involved in motivating a group of farmers undertaking environmental management practices, such as hedge management in a water catchment. This social process could be harnessed to encourage more environmental behaviour within a particular locality.

At the *societal level* changing farmers’ values and beliefs is easier if they recognise that it is something that society wants and values. It is government’s role to ensure clear, consistent, practical messages on desired behaviour are delivered to farmers, as to other citizens. Within living memory (and bearing in mind the relatively high average age of farmers today), farmers in the UK have received some contrasting messages about what society requires of them, often couched in terms of a trade-off, between being managers of the UK countryside and custodians of the natural environment first and foremost (Department of Environment

and Ministry of Agriculture Fisheries and Food 1995; Department of the Environment Transport and the Regions and Ministry of Agriculture Fisheries and Food 2000), and being global food producers with a duty to produce marketable outputs cheaply and efficiently, as the priority (Her Majesty's Stationery Office 1979, 1975). Policy-makers need to encourage and reinforce a sense of civic responsibility for environmental management among the farming community, particularly given the emerging discourse about the need to maximise food production to counter threats to food security caused by increased global demand. Policy-makers have a role to play in communicating the more sophisticated message that environmental management and productive agriculture are not mutually exclusive but must work hand-in-hand. In that context in particular, the modern policy rhetoric of 'sustainable intensification' may be useful for encouraging a 'twin-track' approach to future farm management, but only in so far as the environmental element is promoted as strongly as the intensification message, and in combination with it. History suggests that farmers can be motivated by a feeling that their core purpose (as they see it) of food production is explicitly valued and encouraged by government, but it would seem essential that this process is today fostered within a wider climate of farming 'better', in respect of protecting and sustaining environmental resources, rather than presented as a swing of the political or economic pendulum back to the narrowly output-oriented focus of the early 1980s.

Finally, in the process of behaviour change, farmers often state that they would value a much greater level of feedback and public or formal recognition that they are doing a good job or at least making a positive contribution that is valued (see, for example, Ingram et al. 2009). This feedback in itself can help in the process of identity verification and in establishing new norms for the practice of environmental management (McGuire et al. 2013). For example, (Kuhfuss et al. 2015) found that farmers who experienced acknowledgment for their contribution to the protection of the environment or a better life quality were more likely to maintain the adopted practices even in the absence of payments. However, in recent years, as a result of the pursuit of 'greater efficiency' in the delivery of agri-environmental schemes, the vast majority of farmer participants have received almost no feedback on the results of their changed practices, from government agencies or environmental NGOs supporting the schemes. Rather, the national and international message of campaigning organisations that 'things are still getting worse, and policies are insufficient' is prominent in media coverage. Without a more personal level of positive feedback, this could lead to cynicism and a sense of futility among farmers in respect of their (admittedly, often modest) environmental efforts. It would therefore seem worthwhile

for some advisory resource to be devoted to this purpose.

Conclusions

The paper has presented two conceptual frameworks which we feel are helpful in understanding the complex set of inter-relationships influencing farmers' willingness to undertake environmental management practices and which can assist in developing appropriate engagement approaches. The first framework is useful in identifying factors affecting farmers' levels of environmental activity depending on their willingness and ability to adopt environmental management practices and their existing level of engagement with advice. The second conceptual framework helps in showing how farmers' willingness to adopt environmental activities is affected by influences at different levels which range from individual beliefs and values to community and societal norms. Our research findings highlight the considerable heterogeneity of farmers' beliefs and values in relation to custodianship and productivity. Consequently, advisory approaches need to be able to understand and to cope with this heterogeneity and need to adapt and target messages accordingly. We would suggest that further research, particularly approaches involving action research and working closely with farmers in the co-production of knowledge and understanding, could help to clarify and test the most appropriate engagement messages and approaches required in different situations.

Reflecting further on the insights achieved through these studies, we note that whilst appropriate advice and engagement strategies are important, the ultimate aim is to achieve sustainable and durable environmental activity. This calls for a balanced mix of policy measures also involving partnership working, incentives and regulations. There is the need for a coherent policy and advice framework in which regulations and incentives are important elements for signalling societal norms and expectations, but advice and engagement are equally important ingredients in helping to encourage sustained behavioural change on the ground. There is, in fact, a growing number of local partnerships and/or farmer-group initiatives which are offering new ways to engage the sector in deliberative environmental management (Hodge and Adams 2014). However, most of these are relatively short-term projects, which presents a challenge to building trusting relationships and encouraging sustained outcomes.

Ultimately, farmers need to be encouraged and empowered to take long-term ownership of the environmental agenda and work in a more equal partnership with government agencies and NGOs, to deliver resilience and adaptability in the face of unpredictable challenges (e.g. from climate change and global market volatility), for the

future.

Given the long-term nature of the endeavour in which society has engaged in pursuing greater environmental sustainability on agricultural land, establishing a longer-term approach to agri-environmental support which focuses on influencing the underlying beliefs and values of farmers, and which is less directly dependent upon current public finances which are currently subject to year-on-year decline, could be a worthwhile investment.

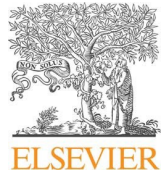
Acknowledgments We would like to acknowledge the support of the Department of Environment, Food and Rural Affairs in funding the two research projects that contributed to this paper. Also special thanks to Kirsty Blackstock at the James Hutton Institute and Tony Pike at the Department of Environment, Food and Rural Affairs who contributed to the development of some of the ideas presented in the paper and to James Taylor who assisted with the interviews. We would also like to thank the two anonymous reviewers whose suggestions greatly improved this paper. Finally, our thanks also go to all the farmers who took their time to participate in this research.

References

- Ahn, T.K., and E. Ostrom. 2002. Social capital and the second generation theories of collective action: An analytical approach to the forms of social capital. In *Paper presented at the Annual Meeting of the American Political Science Association*. 29 Aug–1 Sept 2002. Boston, MA: American Political Science Association.
- Ahnstrom, J., J. Hockert, H.L. Bergea, C.A. Francis, P. Skelton, and L. Hallgren. 2008. Farmers and nature conservation: What is known about attitudes, context factors and actions affecting conservation? *Renewable Agriculture and Food Systems* 24(1): 38–47.
- Ajzen, I. 1991. The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 50(2): 179–211.
- Ajzen, I., and M. Fishbein. 1980. *Understanding attitudes and predicting social behaviour*. Englewood Cliffs: Prentice Hall.
- Allcott, H., and T. Rogers. 2012. The short-run and long-run effects of behavioral interventions: Experimental evidence from energy conservation. Technical Report No. w18492. National Bureau of Economic Research.
- Ayer, H.W. 1997. Grass roots collective action: agricultural opportunities. *Journal of Agricultural and Resource Economics* 22(1): 1–11.
- Bamberg, S., and G. Möser. 2007. Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology* 27(1): 14–25.
- Barnes, A.P., L. Toma, J. Willock, and C. Hall. 2013. Comparing a ‘budge’ to a ‘nudge’: Farmer responses to voluntary and compulsory compliance in a water quality management regime. *Journal of Rural Studies* 32: 448–459. doi:10.1016/j.jrurstud.2012.09.006.
- Battershill, M.R.J., and A.W. Gilg. 1997. Socio-economic constraints and environmentally friendly farming in the Southwest of England. *Journal of Rural Studies* 13(2): 213–228.
- Bazeley, P., and K. Jackson. 2013. *Qualitative data analysis with NVivo*. London: Sage.
- Beedell, J., and T. Rehman. 2000. Using social-psychology models to understand farmers’ conservation behaviour. *Journal of Rural Studies* 16: 117–127.
- Beedell, J.D.C., and T. Rehman. 1996. A meeting of minds for farmers and conservationists: Some initial evidence of attitudes towards conservation from Bedfordshire. *Farm Management* 9: 305–313.
- Blackstock, K.L., J. Ingram, R. Burton, K.M. Brown, and B. Slee. 2010. Understanding and influencing behaviour change by farmers to improve water quality. *Science of the Total Environment* 408(23): 5631–5638. doi:10.1016/j.scitotenv.2009.04.029.
- Brotherton, I. 1991. What limits participation in ESAs? *Journal of Environmental Management* 32(3): 241–249. doi:10.1016/S0301-4797(05)80055-6.
- Bryman, A. 2008. *Social research methods*. Oxford: Oxford University Press.
- Burton, R.J.F. 2004. Reconceptualising the ‘behavioural approach’ in agricultural studies: a socio-psychological perspective. *Journal of Rural Studies* 20(3): 359–371. doi:10.1016/j.jrurstud.2003.12.001.
- Burton, R.J.F., and G.A. Wilson. 2006. Injecting social psychology theory into conceptualisations of agricultural agency: Towards a post-productivist farmer self-identity? *Journal of Rural Studies* 22(1): 95–115. doi:10.1016/j.jrurstud.2005.07.004.
- Charng, H.-W., J.A. Piliavin, and P.L. Callero. 1988. Role identity and reasoned action in the prediction of repeated behavior. *Social Psychology Quarterly* 51(4): 303–317.
- Clothier, L. 2011. Survey of land managed under the Campaign for the Farmed Environment 2010/11: Additional Analysis. Defra Agricultural Change and Environment Observatory Research Report No. 28. London: Department for Environment, Food and Rural Affairs.
- Cox, G., and P. Lowe. 1983. Countryside politics: Goodbye to goodwill? *Political Quarterly* 54(3): 268–282.
- Crabtree, J.R., A. Thorburn, N. Chalmers, D. Roberts, G. Wynn, Barron N., F. Barraclough, and Macmillan. D. 1999. Socioeconomic and agricultural impacts of the environmentally sensitive areas scheme in Scotland. In *Economics and Policy Series* 6. Aberdeen: Macaulay Institute.
- de Snoo, G.R., I. Herzon, H. Staats, R.J.F. Burton, S. Schindler, J. van Dijk, A.M. Lokhorst, et al. 2013. Toward effective nature conservation on farmland: Making farmers matter. *Conservation Letters* 6(1): 66–72. doi:10.1111/j.1755-263X.2012.00296.x.
- Department of Environment, and Ministry of Agriculture Fisheries and Food. 1995. *Rural England: A nation committed to a living countryside*. London: HMSO.
- Department of the Environment Transport and the Regions, and Ministry of Agriculture Fisheries and Food. 2000. *Our countryside: The future, a fair deal for rural England*. London: Department of the Environment, Transport and the Regions/ Ministry of Agriculture, Fisheries and Food.
- Dwyer, J., J. Mills, J. Ingram, J. Taylor, R. Burton, K. Blackstock, B. Slee et al. 2007. *Understanding and influencing positive behaviour change in farmers and land managers—a project for Defra*. Gloucester: CCRI, Macaulay Institute.
- Elder, G.H., and R.D. Conger. 2014. *Children of the land: Adversity and success in rural America*. Chicago: University of Chicago Press.
- Evans, N. 2009. Adjustment strategies revisited: Agricultural change in the Welsh Marches. *Journal of Rural Studies* 25: 217–230.
- Feola, G., A.M. Lerner, M. Jain, M.J.F. Montefrio, and K.A. Nicholas. 2015. Researching farmer behaviour in climate change adaptation and sustainable agriculture: Lessons learned from five case studies. *Journal of Rural Studies* 39: 74–84.
- Filson, G. 1993. Comparative differences in Ontario farmers’ environmental attitudes. *Journal of Agricultural and Environmental Ethics* 6(2): 165–184. doi:10.1007/BF01965482.
- Fish, R., S. Seymour, and C. Watkins. 2003. Conserving English landscapes: Land managers and agri-environmental policy. *Environment and Planning A* 35(1): 19–41.

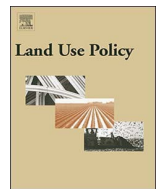
- Gardner, G.T., and P.C. Stern. 1996. *Environmental problems and human behavior*. Boston: Allyn and Bacon.
- Gasson, R. 1973. Goals and values of farmers. *Journal of Agricultural Economics* 24(3): 521–542.
- Glebe, T.W. 2007. The environmental impact of European farming: How legitimate are agri-environmental payments? *Applied Economic Perspectives and Policy* 29(1): 87–102. doi:10.1111/j.1467-9353.2006.00331.x.
- Goddard, M.A., A.J. Dougill, and T.G. Benton. 2013. Why garden for wildlife? Social and ecological drivers, motivations and barriers for biodiversity management in residential landscapes. *Ecological Economics* 86: 258–273. doi:10.1016/j.ecolecon.2012.07.016.
- Gorsuch, R.L., and J. Ortberg. 1983. Moral obligation and attitudes: Their relation to behavioral intentions. *Journal of Personality and Social Psychology* 44(5): 1025–1028. doi:10.1037/00223514.44.5.1025.
- Hall, J., and J. Pretty. 2008. Then and now: Norfolk farmers' changing relationships and linkages with government agencies during transformations in land management. *Journal of Farm Management* 13(6): 393–418.
- Her Majesty's Stationery Office, H. 1975. *Food From Our Own Resources*. Cmnd. 6020. London: HMSO.
- Her Majesty's Stationery Office, H. 1979. *Farming and the Nation*. Cmnd. 7458. London: HMSO.
- Hiedanpää, J., and D.W. Bromley. 2014. Payments for ecosystem services: Durable habits, dubious nudges, and doubtful efficacy. *Journal of Institutional Economics* 10(02): 175–195.
- Hodge, I. 2013. Agri-environment policy in an era of lower government expenditure: CAP reform and conservation payments. *Journal of Environmental Planning and Management* 56(2): 254–270.
- Hodge, I.D., and W.M. Adams. 2014. Property institutions for rural land conservation: Towards a post-neoliberal agenda. *Journal of Rural Studies* 36: 453–462. doi:10.1016/j.jrurstud.2014.05.004.
- Homburg, A., and A. Stolberg. 2006. Explaining pro-environmental behavior with a cognitive theory of stress. *Journal of Environmental Psychology* 26(1): 1–14.
- Ingram, J., C. Short, P. Gaskell, J. Mills, N. Lewis, M. Clark, E. Dennis, R. Fisher, and I. Owen. 2009. *Entry and exit from agri-environmental Schemes in Wales*. Final report for Welsh Assembly Government. Cheltenham: Countryside and Community Research Institute.
- Johansson, M., J. Rahm, and M. Gyllin. 2013. Landowners' participation in biodiversity conservation examined through the Value-Belief-Norm theory. *Landscape Research* 38(3): 295–311.
- Kabii, T., and P. Horwitz. 2006. A review of landholder motivations and determinants for participation in conservation covenanting programmes. *Environmental Conservation* 33(1): 11–20.
- Karrer, S.L. 2012. Swiss farmers' perception of and response to climate change. PhD Dissertation. Eidgenössische Technische Hochschule ETH Zürich, Nr. 20410.
- Klerkx, L., and A. Proctor. 2013. Beyond fragmentation and disconnect: Networks for knowledge exchange in the English land management advisory system. *Land Use Policy* 30(1): 13–24.
- Kuhfuss, L., R. Preget, S. Thoyer, N. Hanley, P. Le Coent, and M. Désolé. 2015. Discussion Papers in Environmental Economics No. 2015-15. University of St Andrews, UK.
- Lokhorst, A.M., C. Hoon, R. le Rutte, and G. de Snoo. 2014. There is an I in nature: The crucial role of the self in nature conservation. *Land Use Policy* 39: 121–126. doi:10.1016/j.landusepol.2014.03.005.
- Lokhorst, A.M., H. Staats, J. van Dijk, E. van Dijk, and G. de Snoo. 2011. What's in it for Me? Motivational differences between farmers' subsidised and non-subsidised conservation practices. *Applied Psychology: An International Review* 60(3): 337–353. doi:10.1111/j.1464-0597.2011.00438.x.
- McDowell, C., and R. Sparks. 1989. Multivariate modelling and prediction of farmers' conservation behaviour towards natural ecosystems. *Journal of Environmental Management* 28: 185–210.
- McGuire, J., L.W. Morton, and A.D. Cast. 2013. Reconstructing the good farmer identity: Shifts in farmer identities and farm management practices to improve water quality. *Agriculture and Human Values* 30(1): 57–69.
- McLaughlin, P., and T. Dietz. 2008. Structure, agency and environment: Toward an integrated perspective on vulnerability. *Global Environmental Change* 18(1): 99–111.
- Mills, J., P. Gaskell, M. Reed, C. Short, J. Ingram, N. Boatman, N. Jones et al. 2013a. *Farmer attitudes and evaluation of outcomes to on-farm environmental management*. Project No. IF01114. Report to Department for Environment, Food and Rural Affairs (Defra). Gloucester: Countryside and Community Research Institute (CCRI).
- Mills, J., P. Gaskell, N. Jones, N. Boatman, N. Boatman, M. Green, J. Marshall, K. Musters, W. Peach, and S. Peel. 2013b. Farmer attitudes and evaluation of outcomes to on-farm environmental management. *Aspects of Applied Biology* 118: 209–216.
- Mills, J., D. Gibbon, J. Ingram, M. Reed, C. Short, and J. Dwyer. 2011. Organising collective action for effective environmental management and social learning in Wales. *Journal of Agricultural Education and Extension* 17(1): 69–83.
- Mills, J., J. Ingram, M. Reed, C. Short, D. Gibbon, and J. Dwyer. 2008. *Evaluation of key factors that lead to successful agri-environmental co-operative schemes*. Final Report for Welsh Assembly Government. Gloucester: Countryside and Community Research Institute (CCRI).
- Morris, C., and N. Evans. 2004. Agricultural turns, geographical turns: Retrospect and prospect. *Journal of Rural Studies* 20(1): 95–111.
- Olander, F., and J. Thøgersen. 2014. Informing versus nudging in environmental policy. *Journal of Consumer Policy* 1–16. doi:10.1007/s10603-014-9256-2.
- Olson, J.M., and M.P. Zanna. 1993. Attitudes and attitude change. *Annual Review of Psychology* 44(1): 117–154.
- Oreszczyn, S., A. Lane, and S. Carr. 2010. The role of networks of practice and webs of influencers on farmers' engagement with and learning about agricultural innovations. *Journal of Rural Studies* 26(4): 404–417.
- Pannell, D.J., G.R. Marshall, N. Barr, A. Curtis, F. Vanclay, and R. Wilkinson. 2006. Understanding and promoting adoption of conservation practices by rural landholders. *Animal Production Science* 46(11): 1407–1424.
- Petty, R.E., S.C. Wheeler, and Z.L. Tormala. 2003. Persuasion and attitude change. In *Handbook of psychology: Vol. 5: Personality and social psychology*, ed. T. Mellon, and M.J. Learner, 353–382. Hoboken: Wiley.
- Pike, T. 2013. Farmer engagement: an essential policy tool for delivering environmental management on farmland. *Aspects of Applied Biology* 118: 187–191.
- Potter, C., and R. Gasson. 1988. Farmer participation in voluntary land diversion schemes: Some predictions from a survey. *Journal of Rural Studies* 4: 365–375.
- Potter, C., and M. Lobley. 1992. The conservation status and potential of elderly farmers: Results from a survey in England and Wales. *Journal of Rural Studies* 8: 133–143.
- Potter, C., and M. Lobley. 1996. The farm family life cycle, succession paths and environmental change in Britain's countryside. *Journal of Agricultural Economics* 47: 172–190.
- Sabatier, P.A., W. Focht, M. Lubell, Z. Trachtenberg, A. Vedlitz, and M. Matlock. 2005. Collaborative approaches to watershed management. In *Swimming upstream: Collaborative approaches to watershed management*, ed. P.A. Sabatier, W. Focht, M. Lubell, Z. Trachtenberg, A. Vedlitz, and M. Matlock, 1–21. Cambridge: Massachusetts Institute of Technology.
- Schwartz, S.H. 1977. Normative influences on altruism. *Advances in Experimental Social Psychology* 10: 221–279.
- Schwartz, S.H., and J.A. Howard. 1981. A normative decision-making

- model of altruism. In *Altruism and helping behaviour: Social, personality and developmental perspectives*, ed. J.P. Rushton, 189–211. Hillsdale, NJ: Erlbaum.
- Siebert, R., M. Toogood, and A. Knierim. 2006. Factors affecting European farmers' participation in biodiversity policies. *Sociologia Ruralis* 46(4): 318–340.
- Sligo, F.X., and C. Massey. 2007. Risk, trust and knowledge networks in farmers' learning. *Journal of Rural Studies* 23: 170–182.
- Spash, C.L., K. Urama, R. Burton, W. Kenyon, P. Shannon, and G. Hill. 2009. Motives behind willingness to pay for improving biodiversity in a water ecosystem: Economics, ethics and social psychology. *Ecological Economics* 68(4): 955–964.
- Stern, P.C., T. Dietz, T. Abel, G.A. Guagnano, and L. Kalof. 1999. A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review* 6(2): 81–98.
- Stoate, C., N. Boatman, R. Borralho, C.R. Carvalho, G. De Snoo, and P. Eden. 2001. Ecological impacts of arable intensification in Europe. *Journal of Environmental Management* 63(4): 337–365.
- Sulemana, I., and J.H.S. James. 2014. Analysis: Farmer identity, ethical attitudes and environmental practices. *Ecological Economics* 98: 49–61. doi:10.1016/j.ecolecon.2013.12.011.
- Sutherland, L.-A., J. Mills, J. Ingram, R.J.F. Burton, J. Dwyer, and K. Blackstock. 2013. Considering the source: Commercialisation and trust in agri-environmental information and advisory services in England. *Journal of Environmental Management* 118: 96–105. doi:10.1016/j.jenvman.2012.12.020.
- Terry, D.J., M.A. Hogg, and K.M. White. 1999. The theory of planned behaviour: Self-identity, social identity and group norms. *British Journal of Social Psychology* 38(3): 225–244.
- Thaler, R., and C. Sunstein. 2008. *Nudge: Improving decisions about health, wealth and happiness*. New Haven: Yale University Press.
- Thompson, A.W., A. Reimer, and L.S. Prokopy. 2014. Farmers' views of the environment: The influence of competing attitude frames on landscape conservation efforts. *Agriculture and Human Values* 32(3): 1–15.
- van Dijk, W.F., A.M. Lokhorst, F. Berendse, and G.R. de Snoo. 2015. Collective agri-environment schemes: How can regional environmental cooperatives enhance farmers' intentions for agri-environment schemes? *Land Use Policy* 42: 759–766.
- Vanslebrouck, I., G. Van Huylenbroeck, and W. Verbeke. 2002. Determinants of the willingness of Belgian farmers to participate in agri-environmental Measures. *Journal of Agricultural Economics* 53(3): 489–511. doi:10.1111/j.1477-9552.2002.tb00034.x.
- Westhoek, H.J., K.P. Overmars, and H. van Zeijts. 2013. The provision of public goods by agriculture: Critical questions for effective and efficient policy making. *Environmental Science and Policy* 32: 5–13. doi:10.1016/j.envsci.2012.06.015.
- Westmacott, R.N., and T. Worthington. 1974. *New agricultural landscapes: Report of a study*. Cheltenham: Countryside Commission.
- Wilson, G.A. 1996. Farmer environmental attitudes and ESA participation. *Geoforum* 27(2): 115–131.
- Wilson, G.A. 1997. Factors influencing farmer participation in the environmentally sensitive areas scheme. *Journal of Environmental Management* 50(1): 67–93. doi:10.1006/jema.1996.0095.
- Wilson, G.A., and K. Hart. 2000. Financial imperative or conservation concern? EU farmers' motivations for participation in voluntary agri-environmental schemes. *Environment and Planning A* 32(12): 2161–2185.
- Wilson, G.A., and K. Hart. 2001. Farmer participation in agri-environmental schemes: Towards conservation-oriented thinking? *Sociologia Ruralis* 41(2): 254–274. doi:10.1111/1467-9523.00181.
- Wilson, P., N. Harper, and R. Darling. 2013. Explaining variation in farm and farm business performance in respect to farmer behavioural segmentation analysis: implications for land use policies. *Land Use Policy* 30(1): 147–156.
- Winter, M. 1996. *Rural politics: Policies for agriculture, forestry and the environment*. London: Routledge.
- Woods, M. 2004. *Rural geography: Processes, responses and experiences in rural restructuring*. London: Sage.
- Wynn, G., B. Crabtree, and J. Potts. 2001. Modelling farmer entry into the environmentally sensitive area schemes in Scotland. *Journal of Agricultural Economics* 52(1): 65–82.
- Jane Mills** is a Senior Research Fellow at the Countryside and Community Research Institute (CCRI) at the University of Gloucester, UK. Her main research interests focus on the social and economic aspects of agri-environmental policy, agricultural change and environmental management. She is particularly interested in understanding farmer behaviour and in researching collaborative institutional arrangements and knowledge exchange processes which effectively reconcile agricultural production and environmental quality objectives.
- Peter Gaskell** is a Senior Research Fellow at the Countryside and Community Research Institute (CCRI) at the University of Gloucester, UK. He has research interests in agricultural and environmental policy analysis and evaluation, decision making at the farm level, landscape change and the historic environment.
- Julie Ingram** is a Reader in Agri-environmental Systems at the Countryside and Community Research Institute (CCRI) at the University of Gloucester, UK. Her main research interests are concerned with the socio-economic aspects of agriculture in relation to policy, practice, management and the environment, with particular focus on farmer knowledge, behaviour, attitudes and motivations. She is interested in knowledge exchange within the agricultural community and knowledge processes within the context of sustainable agriculture and natural resource protection, with particular reference to soil.
- Janet Dwyer** is a Professor of Rural Policy at the Countryside and Community Research Institute (CCRI) at the University of Gloucester, UK. She directs and undertakes research related to agriculture, the environment and rural development. Her research expertise centres on European and UK rural development policy and practice, with particular interest in integrated approaches, environmental sustainability and institutional adaptation.
- Matt Reed** is a Senior Research Fellow at the Countryside and Community Research Institute (CCRI) at the University of Gloucester, UK. He is a sociologist with research interests in how and why social change takes place around food. For more than a decade Matt has been researching the organic food movement from various perspectives, publishing his findings in a range of books and articles. Alongside this interest he has research interests in the farming family, rural communities, social networks, fishing communities and the changing technologies of food.
- Christopher Short** is a Senior Research Fellow at the Countryside and Community Research Institute (CCRI) at the University of Gloucester, UK. He has particular interests in the development and implementation of rural development and agri-environment policy, as well as the nature of partnerships and knowledge exchange that these require. He has considerable expertise in issues relating to landscape scale initiatives, shared resources, collective action and commons across Europe



Contents lists available at ScienceDirect

Land Use Policy

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

Understanding farmers' motivations for providing unsubsidised environmental benefits

Jane Mills^{a,*}, Peter Gaskell^a, Julie Ingram^a, Stephen Chaplin^b

^a *Countryside and Community Research Institute, University of Gloucestershire, Oxstalls Lane, Longlevens, Gloucester, GL2 9HW, UK* ^b *Natural England, Foss House, Kings Pool, 1-2 Peasholme Green, York, YO1 7PX, UK*

ARTICLE INFO

Keywords:

Farmer motivations
Agri-environmental practices
Unsubsidised
Agri-environment schemes
Environmental stewardship
Message framing

ABSTRACT

This paper examines farmers' motivations for voluntary unsubsidised practices that benefit the environment. It identifies amongst a group of English farmers the amount of unsubsidised environmental activities on mainly arable land, and explores the extent to which motivations are extrinsic and intrinsic for undertaking this unsubsidised activity. Using responses from a national survey in England of 1,345 farmers, in-depth face-to-face interviews with 60 farmers and an analysis of existing agri-environment scheme data, the extent to which subsidised and unsubsidised environmental activity is undertaken on arable land was identified. Furthermore, it was also possible to identify and compare the motivations behind subsidised and unsubsidised environmental activity and to understand the interaction between these two types of activity at the farm scale. The research found that around 25% of all environmental activity undertaken on arable farms in England is unsubsidised, although some of this activity sits alongside subsidised activity. There were clear differences between the motivations for undertaking subsidised and unsubsidised environmental activities. Financial reasons dominated farmers' motivations for engaging in subsidised agri-environment scheme practices, whilst agronomic and environmental motivations were of greater importance for unsubsidised activity. Data analysis also revealed oversubscription in agri-environment schemes, with a considerable amount of environmental activity occurring without payment. From a policy perspective it is helpful to understand motivations for existing unsubsidised environmental activity as this can inform the design of advice and message framing to encourage uptake of more widespread voluntary environmental behaviour.

1. Introduction

Agriculture in Europe has been affected by multiple drivers of change since the Second World War, including a post-war political drive for agricultural intensification to ensure food security, demographic changes through urbanisation and rural-urban migration, improvements in technology and economic processes resulting in a cost-price squeeze on agricultural production (Van Vliet et al., 2015). This process has led to a broadly similar aggregate response to agricultural production across Europe; intensification of the most productive land and extensification (and in some cases abandonment) of the least productive land (Van Vliet et al., 2015). These changes in agricultural management practices have created agricultural systems that are successfully leading to increased productivity, with farms that are larger, more specialised in production and working with a reduced labour force, but often at the expense of the environment (Plieninger et al., 2016). As is well documented, some of these modern agricultural practices have resulted in considerable environmental and health costs (Pretty et al., 2000).

The policy response to this impact of agriculture on the

environment has been to increase beneficial environmental management through three distinct mechanisms. One mechanism is regulation, which has been used to enhance environmental behaviour to protect the environment. A second mechanism is agri-environment schemes (AES), whereby farmers are paid for voluntarily undertaking specified environmental actions. This activity is referred to later in the paper as subsidised environmental activity. A third mechanism is the use of social approaches, whereby farmers are encouraged to undertake environmental management activities without financial reward or coercion, referred to in this paper as unsubsidised environmental activity.

Interest in promoting unsubsidised environmental activity has ebbed and flowed in recent decades. Agricultural producer groups have promoted industry-led agri-environment initiatives in an attempt to dissuade the Government from implementing environmental regulation in the face of growing public pressure over environmentally damaging agriculture practices (Cox et al., 1985, 1986; Clark and Jones, 1998). This approach also resonates with the neo-liberal interest in shifting responsibility away from government with a greater emphasis on civic responsibility, giving rise to 'social approaches' (Burton and Paragahawewa, 2011; Potter and Tilzey,

* Corresponding author.

E-mail addresses: jmills@glos.ac.uk (J. Mills), pgaskell@glos.ac.uk (P. Gaskell), jingram@glos.ac.uk (J. Ingram), Stephen.chaplin@Naturalengland.org.uk (S. Chaplin).

2005). Furthermore, there has been increasing Government support for industry-led partnerships in England, such as the Campaign for the Farmed Environment (CFE). The CFE is a partnership of agricultural industry and environmental organisations that aims to maintain and improve the environmental condition of agricultural habitats and landscapes by working with farmers and advisers to embed environmental management as a core principle of all farm businesses for which they receive no financial reward (Clothier and Pike, 2013). The CFE was also promoted as a means of combatting the threat of further regulation of management practices on arable land through the introduction of compulsory set-a-side (Tasker, 2009). However, to date, there is a paucity of research on the use of non-monetary voluntary approaches to achieve nature conservation benefits (Santangeli and Laaksonen, 2015). Little is currently known about the amount of unsubsidised environmental activity occurring across the farming community and we present some empirical evidence identifying the extent of this activity amongst English farmers and compare some of its characteristics with subsidised environmental activity.

There is a distinct body of research that has explored farmers' motivations for undertaking various environmental activities, by which we mean the reasons or driving force behind a particular behaviour.

This work has looked at farmers' motivations for complying with regulations (Winter and May, 2001) and the extrinsic and intrinsic motivations for undertaking subsidised activities through AES (Home et al., 2014; Van Herzele et al., 2013). Recent work has also found that intrinsic motivations related to the concepts of self-identity and personal norms were important in influencing the intention to undertake unsubsidised conservation activities (Lokhorst et al., 2011; Van Dijk et al., 2016). However, little else is known about the motivations for unsubsidised agri-environmental behaviour and particularly with respect to specific environmental management practices. As environmental practices that are undertaken voluntarily, without coercion or incentives, have a greater potential for sustained and durable benefits (Mills et al., 2016), we believe that this type of activity, in particular, requires more attention.

Given the limited understanding of unsubsidised environmental activity on farms, the aim of this paper is three-fold. Firstly, to consider the extent to which subsidised and unsubsidised environmental activity is undertaken, focusing particularly on arable land. Secondly, to describe and compare farmers' motivations for undertaking subsidised and unsubsidised environmental activity; and thirdly to understand the interaction between these types of activity at the farm scale. The proposition is that by having a better understanding of these motivations it may be possible to achieve greater engagement in environmental activity amongst the farming community and to design advice, information and message framing that responds to and supports farmers' main drivers for undertaking unsubsidised environmental management activity.

In the next section we discuss different policy approaches to influencing environmental behaviour change and how an understanding of motivations can help with message framing to encourage voluntary environmental behaviour. In Section 3, we describe our methodology and in Section 4 we present new empirical findings on the pattern of uptake of subsidised and unsubsidised environmental activity in England and provide insights into the motivations that lead to voluntary environmental behaviours in farmers. In Section 5, we discuss the implications of our findings for message framing and engagement strategies.

2. Policy approaches to environmental behaviour change

As previously mentioned, there are a number of policy approaches that can be used to change environmental behaviour on agricultural land, including regulations, economic incentives and social/voluntary approaches (Oecd, 2001), although in practice, many policies use levers that fall into more than one of these

categories.

Regulations aim to change behaviour by requiring certain management practices or placing particular legal obligations upon managers of rural land. For example, the establishment of Nitrate Vulnerable Zones (NVZs) under the European Union (EU) Nitrates Directive areas in which farmers' nitrogen fertiliser practices are restricted. It has been argued that regulation—i.e. prohibiting actions that are deemed unacceptable—should form a 'baseline' level of behaviour or a 'reference level' which it is assumed that society wishes all land managers to observe in carrying out their activities (Fuentes, 2004; Oecd, 2001). Regulatory approaches seem to work best in situations where the target group is already, or can relatively quickly be, persuaded that the regulated actions clearly fall below an acceptable 'reference level' of responsible farming practice (Oecd, 2001). It is hoped that through regulatory approaches an enforced change in behaviour will ultimately lead to a change in attitude towards environmental practices (Davies and Hodge, 2006), although evidence of such positive behavioural change is limited unless combined with other approaches (Barnes et al., 2013). For example, Riley (2016) identified that only when closer environmental regulations were combined with longer-term AES participation were AES activities considered by the farming community as 'good farming' practices. In fact, there is increasing recognition that command and control regulatory approaches are often overly bureaucratic and expensive (in terms of monitoring and enforcing compliance). Also, it has been argued that formal legal approaches to environmental management de-motivates the individuals concerned, discouraging them to take an active approach to environmental stewardship and deliver sustainable, long-term benefits (Koontz, 2003; Spash and Biel, 2002).

The rationale of applying and implementing economic compensation in agri-environment policy and schemes is based on market failure to deliver the socially desirable level of environmental quality (Pearce and Turner, 1990). The evidence suggests that these economic incentives are an important factor to increase farmers' explicit participation in environmental management, in particular if payments and schemes are tailored to local natural and agronomic conditions (Bräuer et al., 2006). However, whilst some evidence suggests that AES can deliver durable changes in farmers' attitudes and behaviour (Crabtree et al., 1999; Darragh and Emery, 2017; Fish et al., 2003), others argue that AES have not resulted in a broad pro-environmental behavioural change amongst European farmers (Burton et al., 2008; Van Herzele et al., 2013). Some would argue further that AES have created complacency with farmers only adopting agri-environmental options that require no or minimal effort (Hodge and Reader, 2010; Schmitzberger et al., 2005; Wilson and Hart, 2000) and viewing environmental management as a public good for which they should be paid to deliver (Hodge and Reader, 2010). Several observers also suggest that the payment of subsidies for agri-environmental contracts might discourage innovation and long-term commitment, as farmers are not rewarded for doing any more than the minimum required to receive payments (Burton et al., 2008; Deuffic and Candau, 2006; Kaljonen, 2006).

Therefore, in the UK, there is increasing interest in the use of social/ voluntary approaches to encourage behavioural change. It is suggested that shifting farmers' extrinsic motivations for undertaking environmental management activities to more intrinsic ones is necessary to ensure sustained and widespread environmental improvements (De Snoo et al., 2013; Matzdorf and Lorenz, 2010; Van Herzele et al., 2013; Wilson and Hart, 2001). Furthermore, it is argued that if behaviour change leads to voluntary action then it tends to persist over time as it is more likely to become embedded in social norms (Ayer, 1997).

2.1. Farmer motivations and message framing for environmental activities

There has been recognition of the importance of motivation, and especially the source of motivation, in attempting to explain farmers' voluntary behaviour, such as their inclination to adopt conservation practices and participate in environmental schemes and practices

(Black and Reeve, 1993; Home et al., 2014; Potter and Gasson, 1988; Smithers and Furman, 2003; Wilson and Hart, 2000; Wilson and Hart, 2001).

The theoretical base for much of the work on individual motivation is derived from the field of psychology, education and employment research which distinguishes between different types of motivation based on the underlying attitudes and goals that give rise to an action and their intensity (Deci and Ryan, 1985; Gagné and Deci, 2005; Ryan and Deci, 2000). According to Ryan and Deci (2000, p.55) 'The most basic distinction is between intrinsic motivation, which refers to doing something because it is inherently interesting or enjoyable, and extrinsic motivation, which refers to doing something because it leads to a separable outcome'. An intrinsically motivated action is not reliant upon any outcome separable from the behaviour itself. For example, a farmer may undertake an environmental activity, such as planting trees, for no other reason than because it is innately satisfying. Conversely, extrinsic motivation is instrumental in nature and so is performed to attain some other outcome. For instance, a farmer might undertake environmental activity as part of an AES in order to receive a payment (Legault, 2016).

Mills et al. (2013) have identified an array of extrinsic and intrinsic motivations for undertaking environmental management (Table 1). It has been argued that the strength of and interplay between these motivations can have a profound effect on a farmers behaviour and environmental management, where actions taken as a result of intrinsic motivation may have greater longevity and permanence than some of the actions motivated by extrinsic reasons (De Young, 1985). In addition, it has also been argued that some extrinsic motivations can undermine and suppress intrinsic motivations (Ryan and Deci, 2000) and can even lead to crowding out of intrinsic motivations (Greiner and Gregg, 2011). Although, others suggest that the interplay between intrinsic and extrinsic motivations is more complex and cannot be straightforwardly separated (Darragh and Emery, 2017).

Within the research on motivations, the main interest has been on the balance or tensions between extrinsic and intrinsic motivations behind subsidised environmental activity. This paper differs by considering the balance between extrinsic and intrinsic motivations in unsubsidised environmental behaviours.

Those who demonstrate extrinsic motivations respond to rewards. In the context of AES these can be direct rewards, in the form of payments to the farm business, either for investment or to enhance income, or indirect rewards through recognition from their peers and from society. Many studies emphasise the importance of financial incentives for participation in AES. Wilson and Hart (2000, 2001) noted in their extensive transnational study that most farmers surveyed were driven in their AES participation decisions primarily by perceived financial benefits, despite the fact that AES are designed to be

Table 1
Motivations for undertaking environmental management.
Source Mills et al. (2013).

Extrinsic motivations
• Financial incentives
• Profit maximisation
• Security, long-term farm viability and/or risk minimisation, securing the family future and its continuity
• Capital investment
• Community image, standing within the community, respect amongst peers
• Regulation (fear of penalty)
• Recognition in wider society
Intrinsic motivations
• Personal sense of environmental responsibility and accountability
• Commitment and interest in the environment
• Personal sense of enjoyment
• More durable than extrinsic

income neutral. This mirrors findings from other national and international studies that have highlighted the financial imperative behind scheme participation in most EU AES (for example Brouwer and Lowe, 1998; Buller et al., 2000; Morris and Potter, 1995; Whitby, 1996; Wilson, 1996; Wilson and Hart, 2000).

Intrinsic motivations are those which reside in the values, beliefs and environmental sympathies of the individual (Vinning et al., 1992) and are often reflected in a personal sense of environmental responsibility and accountability. Commitment to the natural environment and a personal interest in wildlife are clear intrinsic motives identified by a number of studies (Berentsen et al., 2007; Herzon and Mikk, 2007; Mills et al., 2016). Motivations often overlooked are those that relate to social and psychological factors. These may for example, relate to the impact on social status or reputational benefits, or even a sense of moral obligation (Borkey et al., 1999; Burton and Paragahawewa, 2011).

An understanding of farmers' motivations to undertake voluntary environmental activities can help with the development of advice and information strategies for enhancing environmental management and in framing appropriate messages for the adoption of specific practices (Mills et al., 2016). Research shows that the way in which a message is framed can affect the degree of persuasion elicited (Smith and Petty, 1996). Frames can be defined as interpretive structures through which individuals organise and make sense of an ambiguous stream of events in the world (Goffman, 1974). The framing literature distinguishes between information that focuses on the positive consequences of undertaking a particular behaviour (gain frame), and information on the negative consequences of not undertaking a particular behaviour (loss frame) (Spence and Pidgeon, 2010). For example, advisory information could state that the establishment of field margins will increase the number of farmland birds (gain frame), or conversely, if field margins are not established then farmland bird numbers will continue to decline (loss frame).

The idea of message framing is based on regulatory focus theory (Higgins, 1997) which postulates that individuals have two distinct types of orientations in pursuit of their goals, the pursuit of positive outcomes (i.e. a promotion focus) or the avoidance of negative consequences (i.e. prevention focus), which impacts on message persuasiveness. Interestingly, research has also linked different goal pursuits to individual characteristics. Those individuals demonstrating a promotion focus in their goal pursuits tend to concentrate on needs that relate to hopes, accomplishment and progress (Higgins, 1997). They also have an independent self-view with a focus on themselves (Aaker and Lee, 2001). In contrast, those who exercise a prevention focus are concerned with safety, responsibility and security needs and tend to have an interdependent self-view (i.e., a focus on others) (Aaker and Lee, 2001; Higgins, 1997).

The heterogeneity of farmer motivations and environmental behaviour is well documented (Dwyer et al., 2007; Mills et al., 2013). Therefore, it is inevitable that the impact of message persuasiveness to undertake unsubsidised environmental management will vary depending on the individual farmers' underlying motivations. This paper seeks to identify the motivations for undertaking specific environmental management activities, thereby providing evidence with which to develop engagement strategies and to frame messages to encourage more widespread unsubsidised uptake of environmental management practices. We argue that to achieve sustained and durable environmental management, the ultimate aim would be to frame messages that encourage a shift from extrinsic motivations towards more intrinsic ones that become embedded in the social norms of the farming community.

Whilst studies have explored the extrinsic and intrinsic motivations has considered the motivations for undertaking unsubsidised environmental management on a voluntary basis. The focus of this paper, therefore, is to identify amongst a group of English farmers the extent of unsubsidised environmental activities on mainly arable land, the motivations for undertaking this

unsubsidised activity and the interaction between the subsidised and unsubsidised environmental management practices

3. Methods

Three sources of data which provide insights into farmer motivations are used to address these foci/questions. Data are derived from a large face-to-face Government survey of 1345 farmer businesses and from in-depth face-to-face interviews with 60 farmers. Findings are also presented from an analysis of the national dataset of English AES (Entry Level Stewardship (ELS) and Higher Level Stewardship (HLS)). The research focuses particularly on arable farms because we were interested in the motivations of farmers who had joined CFE, which is the largest initiative promoting unsubsidised management ever undertaken in England and which at the time applied only to arable land.

3.1. Analysis of Farm Business Survey

The quantitative data presented in this paper are derived from the UK Government's 2008 Farm Business Survey (FBS) of England. This survey provides a valuable dataset with which to examine the question of farmer motivations for undertaking subsidised and unsubsidised environmental activity. It is a national face-to-face survey funded by the UK Government that provides information on the physical and economic performance of farm businesses. The survey represents all aspects of agriculture and covers all types of farms in all regions of the country. It includes owner-occupied, tenanted and mixed tenure farms. Results are weighted to represent the whole English population of farm businesses with at least the minimum size of ½ Standard Labour Requirement.

The following analyses presented in this paper are based on a subset of the main sample that responded to a section on countryside maintenance and management in 2008 and the results have been reweighted to take account of non-responses, so as to represent the overall FBS target population (Department for Environment Food and Rural Affairs, 2010). Only those farms in the FBS which were managing the land in a positive manner were eligible to complete the survey module (henceforth referred to as eligible farms). Positive management was defined as any land management measures or activities that deliver a positive environmental outcome as identified by the farmer. 95% confidence intervals were calculated and are shown as error bars around the percentages presented in Fig. 2.

The countryside maintenance and management module of the FBS questioned farmers about 27 types of environmental activity, all options with the English AES, Entry Level Stewardship. The analyses presented here focus on 7 activities that relate specifically to arable production and had a sufficient number of responses to conduct significance tests.¹ These environmental activities, that may have been subsidised (occurring within an AES) or unsubsidised, are presented in Table 2 along with a description of the associated environmental benefits.

The FBS asked respondents to select from a list of 16 predetermined responses, the primary reason (or motivation) for undertaking each environmental activity. These responses were then grouped by the survey designers into 5 main motivations as presented in Table 3.

The FBS analysis enabled us to link the pattern of subsidised and unsubsidised environmental activity at a national scale with some broad categories of attributed motivation. However, we recognise its limitations in providing only a limited range of mainly extrinsic motivations. The analysis was therefore supplemented by in-depth

face-to-face interviews which enabled a more nuanced approach allowing for a broader range of motivations, including social and psychological factors.

3.2. Face-to-face interviews

The qualitative analysis was based on in-depth, face-to-face interviews with 60 mixed or arable farmers. The interviewees were selected from a government postal survey of 754 farms in relation to the CFE and the interviews were held with the main decision-maker on environmental management on the farm. The majority of interviews were with the principal farmer (47), but interviews were also undertaken with farm managers (5), husband and wife teams (4), father and son teams (3) and a family (1). The selection covered each of the 8 regions in England, although as the study was focused on arable areas, a greater proportion of the interviews was undertaken in the predominantly arable regions of England (Eastern and East Midlands) than the pastoral areas of the country. The aim of the selection process was also to obtain a good coverage of the different combinations of subsidised and unsubsidised environmental management activity and farm sizes. This analysis was valuable as it allowed a direct comparison of motivations between a group of farmers who were undertaking subsidised and unsubsidised environmental activity.

The methodology for the in-depth farmer interviews was based on a semi-structured questionnaire incorporating a fairly open framework which allowed the interviewer to probe for details or discuss particular issues as they arose. The interview guide aimed to identify the farmers' motivations or barriers to environmental management activities. Questions also focused on understanding the different contexts in which the farmers operated, the local conditions in which they made their decisions, and the role of farming culture, focusing beyond the individual. The interviews took place at the farm, taking on average 1 h to complete.

3.3. Analysis of the national dataset of English AES

Analysis of the agreement holder data was undertaken for AES operating in England, which provides some insights into the interaction between subsidised and unsubsidised environmental activity at the farm scale. At the time of the analysis in 2013 around 70% of all agricultural land in England was under an AES agreement. The scheme was comprised of the Entry Level Stewardship (ELS) scheme, which was a basic fixed payment scheme based on points which related to the total area of agreement land.² The basic ELS could also be combined with a Higher Level Scheme (HLS), requiring more demanding options.

4. Results

4.1. Comparing the extent of subsidised and unsubsidised environmental activity

Analysis of the FBS data identified the proportion of respondents on eligible farms that were undertaking their environmental activities either as a subsidised AES, unsubsidised, or a combination of both. As Fig. 1 shows, four out of five farmers (79%) were members of an AES, while two thirds (66%) undertook unsubsidised environmental management activities. The most common category was to undertake environmental management activity both as part of an AES and unsubsidised (45%).

Analysis of the FBS data identified in more detail the extent of subsidised AES and unsubsidised environmental activity on English farms. In Fig. 2, the FBS data for eligible farms were analysed by the number of arable environmental management activities undertaken

¹The Chi-square test is used to determine if the differences between intrinsic and extrinsic motivations for undertaking subsidised and unsubsidised environmental activity are statistically significant (Fig. 3). The significance level was set at $P < 0.05$, indicating that there is a 95% probability that differences are not due to chance

²Points target = 30 points × hectares of agreement land.

Table 2
Description of environmental activities used in FBS survey.

Activity	Description
Field corner management	Uncultivated corners of a field (often awkward or irregular in shape) providing potential foraging areas for birds and insects
Wild bird/pollen and nectar mixture	Strips of land sown for wild bird cover or wildflowers
Buffer strips	Areas of land maintained adjacent to watercourses in permanent vegetation that help to control soil and water quality
Overwintered stubble	Fields where the stubble of the harvested crop is left overwinter to provide food and winter refuge for wildlife.
Uncropped land (excluding buffer strips)	Arable land which is not used for growing crops, such as field margins, set-aside land
Hedges: maintenance	Hedges that are maintained for the environment through a cutting regime that provides food for birds
Ditches: maintenance, restoration	Ditches that are maintained or restored to benefit the environment, affecting floating and submerged aquatic species and riparian species on ditch banks.

Table 3
Grouping of motivations for undertaking environmental management activities.

General group	FBS Questionnaire motivation
Financial	Maintain capital value of farm/appearance of farm Contributes to overall business e.g. shooting, open farm Financial benefits of scheme membership Other Financial reasons
Environmental	Safeguarding environmental features for future generations Interest in agri-environment management Good for long term sustainability of the farm
Agronomic	Ground conditions/Wet Autumn Stock keeping Part of rotation Provides a natural means of controlling pests
Outside farmers control	Cross compliance (regulation) Feature has always been there Landlord/owner likes it/condition of tenancy agreement Legal Requirement (regulation)
Other	Other

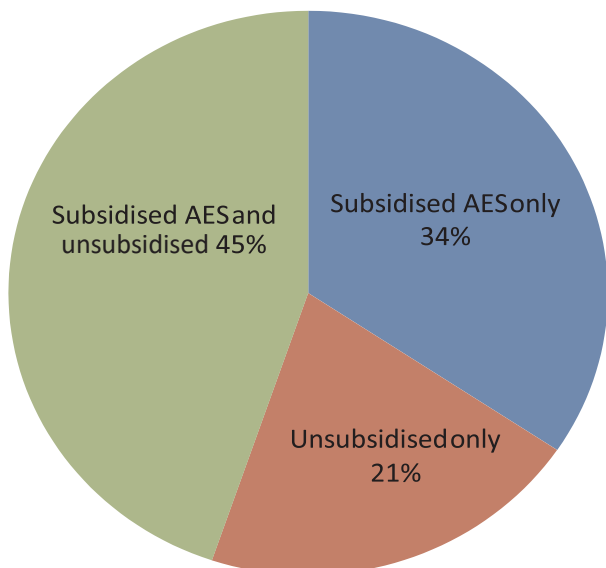


Fig. 1. Percentage of farms by environmental management activity (n = 1345). either within a subsidised AES or unsubsidised. It is clear that the majority of environmental management activities take place within a subsidised AES (72%), although around a quarter of activity is unsubsidised (28%).

Fig. 2 also shows that when comparing the area or length of different arable environmental activities, a significantly higher proportion of uncropped land is unsubsidised, than in a subsidised

AES. The other activities are significantly more likely to be undertaken within a subsidised AES, particularly field corners, buffers strips and wild bird/ pollen and nectar mixes.

4.2. Motivations for undertaking subsidised and unsubsidised environmental activity

The FBS data were analysed to identify motivations for undertaking environmental activities on mainly arable farms within subsidised AES and as unsubsidised activity (Fig. 3). Respondents were mainly motivated to undertake all arable environmental activities within a subsidised AES for financial reasons. Although AES are designed to be income neutral, farmers perceived benefits in terms of maintenance of capital values and contribution to the overall farm business. Those who were managing wild bird/pollen and nectar seed mixes were more likely to cite environmental motivations for doing this compared to the other activities. Activities more likely to be motivated by agronomic reasons were overwintered stubble and uncropped land. Ditch management and buffer strips were activities more likely to be undertaken for reasons outside the farmer’s control, which is likely to relate to regulatory requirements.

The motivations for undertaking unsubsidised environmental activities are distinctly different to the motivations for undertaking subsidised AES activities. A striking difference in the responses is the extent to which agronomic and environmental motivations are of greater importance for unsubsidised activity. The agronomic reasons are particularly important for unsubsidised overwintered stubbles and uncropped land. Environmental reasons were given in particular for carrying out unsubsidised field corner management and establishing wild bird/pollen and nectar seed mixes, buffer strips and ditch maintenance and restoration. Reasons ‘Outside of farmer’s control’ were also of importance, particularly relating to maintenance of ditches, hedges and buffer strips. This explanation is likely to relate to regulatory requirements, such as Local Environmental Risk Assessment for Pesticides regulations (LERAPs), which stipulate pesticide spraying buffer zones near watercourses.

Table 4 provides a breakdown of the motivations for undertaking unsubsidised environmental activity by specific reasons.

Through the 60 in-depth farmer interviews it was possible to further explain and show the relevance of the motivations for undertaking unsubsidised environmental activities described in the FBS survey. The next section illustrates how the extrinsic and intrinsic motivations reveal themselves in practice by focusing on several specific features.

4.2.1. Agronomic motivations (extrinsic)

The survey analysis and interviews revealed that some activities identified by farmers as unsubsidised environmental management were in fact extrinsically motivated often arising as a result of agronomic convenience.

One such example is the use of overwintered stubble, an important food source and refuge for wildlife. In the FBS survey, 76% of farmers stated that the main reason for establishing unsubsidised overwintered stubbles was for agronomic reasons. Of these, 49% stated that the

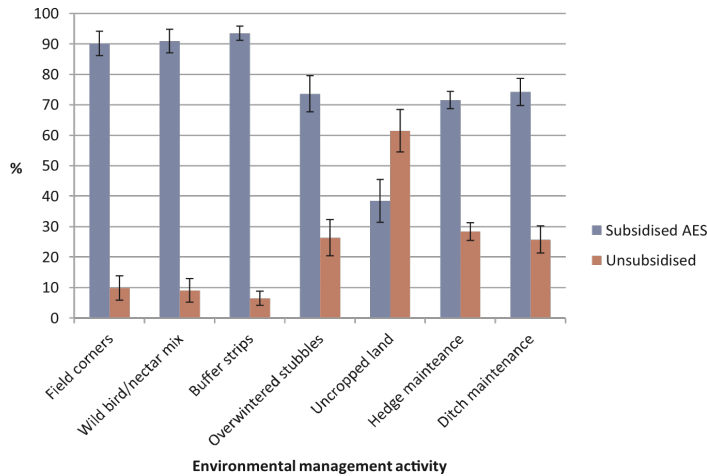


Fig. 2. Environmental features undertaken by management grouping. The vertical lines on each bar represent the 95% confidence intervals. The results are statistically significant where the confidence intervals do not overlap.

reason was due to their rotation, whilst the other 27% reported that it was due to ground conditions/wet autumn. For some farmers interviewed, whilst they recognised the environmental benefits of overwintered stubbles, they were extrinsically motivated to leave them agronomic reasons, because it fitted with their spring cropping rotation. Also, areas of uncropped land were often left for agronomic reasons. For example, uncropped areas, such as grass margins around arable fields aided vehicular access across the farm. Areas were also left uncultivated due to the suboptimal condition of the land, or where the ground was too wet to cultivate in the autumn (31%) as illustrated by the following quote

“Next to the woodland it is a very cold dank piece of ground, it never dries out and is fairly heavy ground you can do what you like to farm it but it never grows anything, so if it doesn’t grow anything what is the point? We seeded it down and let it go au naturale”. (large sized, mixed farm).

Clearly, this farmer was extrinsically motivated to leave the field margin uncultivated, but still viewed it as an environmental activity.

4.2.2. Financial motivations (extrinsic)

The survey and interviews also revealed that some unsubsidised activities provided financial benefits. For example, around 45% of the FBS survey respondents were extrinsically motivated by financial reasons for establishing unsubsidised wild bird/pollen and nectar mixes, of which 40% claimed that the activity contributed to the overall farm business (Table 4). The farmer interviews revealed that financial considerations may arise from the establishment of these strips for game birds. Many arable farms in England have pheasant or partridge game shoots for which wild bird strips have been established. As some income is gained from these birds shoots there is a financial motivation for establishing such strips, although respondents were also convinced that these strips benefited wild birds on the farm, as the following quote illustrates.

“We have a little shoot on the farm. That is really good because we use 4 or 5 different mixes in there. We have maize, fodder rape, red and white millet, they love that. All the little finches and little birds that feed in the garden all winter are down there as well. If you walk down there are hundreds of birds coming out of the game crop into the hedge”. (large sized, horticultural, tenanted farm)

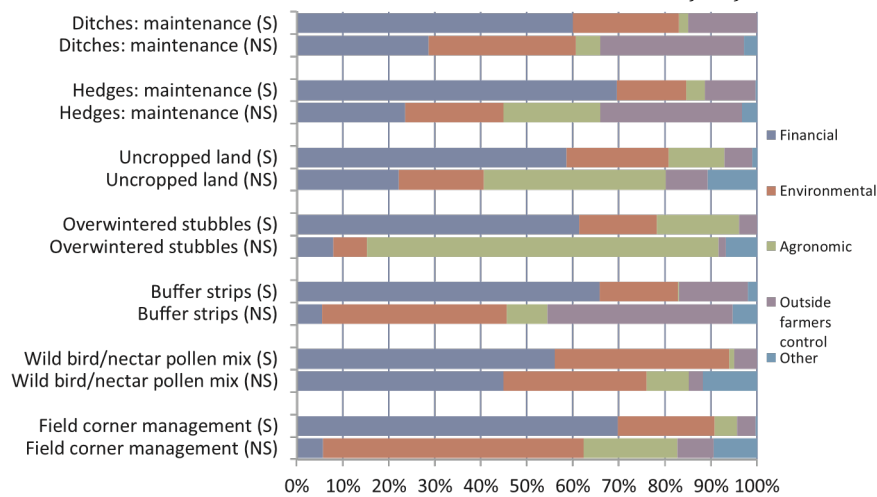


Fig. 3. Primary motivations for undertaking subsidised AES and non-subsidised activities. S = subsidised AES; NS = non-subsidised. The association between motivation and subsidised and unsubsidised environmental management is significant using Chi-square test.

Table 4
Primary motivations for undertaking unsubsidised environmental activities (%).

General group	FBS Questionnaire	Ditches restoration n = 129	maintenance/hedges, maintenance n = 360	Uncropped land n = 113	Overwintered stubbles n = 42	Buffer strips n = 51	Wild bird/nectar pollen mixes	Field corners n = 45
Agronomic (extrinsic motivations)	- Ground conditions/Wet Autumn	4.5	0	31	27	6.8	8.4	18.5
	- Stock keeping	0.8	20.4		0	0	0	0
	- Part of rotation	0	0.3	8.6	49.3	2	0	1.9
Financial (extrinsic motivations)	- Provides a natural means of controlling pests	0	0.3	0	0	0	0.8	0
	- Maintain capital value/appearance of farm	21.4	22.8	0	1.4	0	0	0
	- Contributes to overall business	2.7	0.7	13.9	5.9	5.5	4.2	0.6
Environmental (intrinsic motivations)	- Other Financial reasons	4.5	0	8.3	0.6	0	4	5.1
	- Safeguarding environmental features for future generations	2.4	1.5	3.8	0	4	2.5	5.9
	- Interest in agri-environment management	8.9	8.8	10.2	3.3	34.7	28.4	37.4
Outside farmers control	- Good for long term sustainability of the farm	20.7	11.1	4.4	4.1	1.4	2.7	13.3
	- Cross compliance	0	1.4	1.2	1.6	37	0	0
	- Feature has always been there	30.3	24.9	7.9	0	0	0	7.9
Other	- Landlord/owner likes it/condition of tenancy agreement	0.9	4.2	0	0	0	3	0
	- Legal Requirement	0	0.3	0	0	3.3	0	0
	- Other	2.9	3.3	10.7	6.8	5.3	11.1	9.4

Interestingly, establishing game strips was one activity where farmers often took a holistic overview of the farm. For example, one farmer referred to locating the game strips to make wildlife corridors through the farm, others had established blocks of game cover strategically around the farm. Also, several of those interviewed had enjoyed experimenting with different seed mixes in order to find food plants that would function most effectively on their farm. It appears that pleasure was derived from the experiential learning involved in establishing these strips.

The interviews also revealed that the financial motivations for unsubsidised maintenance of ditches and hedges related to a desire to maintain the capital value and appearance of the farm. The respondents were prepared to undertake these management practices without any financial compensation as they saw the economic benefits of keeping fields drained and hedges trimmed to allow vehicular access and protect livestock. There may have also been an intrinsic motivation for maintaining these features related to aesthetic appeal and maintaining a sense of place for “features that have always been there.”

4.2.3 Environmental motivations (intrinsic)

An interest in the environment and wildlife provided a clear intrinsic motive for undertaking some unsubsidised activity. For example, a high proportion of farmers (57%) in the FBS survey stated that the primary motivation for undertaking unsubsidised field corner management was for environmental reasons. With many of these (37%) stating an interest in agri-environment management as a reason. The interviews revealed that field corners were often left by farmers to deliver environmental benefits. By leaving these small areas at the edges of productive land they felt they were making their contribution to the environment. Field corners were favoured by farmers as they provided environmental benefits whilst fitting in well with existing farm management systems and having minimal impact on production. So, whilst there were intrinsic motivations for establishing the unsubsidised field corners, the behaviour, as with the uncropped land above, was also influenced by extrinsic motivations, for example, leaving existing areas of unproductive land, or awkward corners that were difficult to cultivate, sometimes due to an obstacle, such as a tree, as the following quote illustrates.

“One corner was taken out because there is an old oak tree in the corner and the sprayer won’t go between the oak tree so that is taken out. Another corner has been fenced with trees because it lies a little bit wet.... There are a lot of wildflowers, albeit a lot of the wildflowers are weeds!” (medium sized, mixed, owner occupied farm)

Unsubsidised buffer strips were also cited by 40% of farmers as being undertaken for environmental reasons. Although a similar number (40%) stated that they implemented buffer strips for regulatory reasons. The farmer interviews revealed that the participants particularly understood the rationale for buffer strips against watercourse in terms of preventing water pollution. One farmer, for example, talked about leaving a larger margin against watercourses than the cross-compliance requirements, as he had attended a number of spraying courses and was ‘frightened’ of causing environmental pollution through spraying. He felt more comfortable knowing that had he had some leeway with the spraying because he had established the extra wide margins, as the following quote highlights.

“With spraying you realise how many miles [of water course] that can contaminate, you start thinking, well for the sake of 6 meters of grass...” (medium sized, mixed, owner occupied farm)

This farmer was clearly intrinsically motivated by a personal sense of environmental responsibility.

The FBS survey also revealed that around 30% of farmers stated

environmental motivations for establishing unsubsidised wild bird/pollen and nectar mixes. Whilst the previous section identified extrinsic motivations for establishing wild bird strips, the interviews also revealed intrinsic motivations stemming from a personal interest in wildlife. These farmers in particular tended to be more observant of changes in species occurrence and abundance on the farm, although they viewed wildlife from a fairly narrow perspective, focusing on the higher species and not the less conspicuous species which are not part of everyday life. They were particularly keen on undertaking bird-friendly management activities and undertaking these unsubsidised activities reflected personal norms and contributed to self-esteem as the following quote illustrates.

"It creates a bit of habitat and some seeds for the birds, creatures, or whatever over winter. And I feel good about myself when I do that sort of thing." (small sized, dairy, owner occupied farm)

The in-depth interviews also captured other motivations for undertaking unsubsidised environmental management that were not covered by the questioning in the FBS survey. For example, a number of farmers in the survey abutted nature reserves and this motivated them to do more for the environment. This is illustrated by one farmer's reason for placing a wide margin against a watercourse

"It is easier to have the margin because on the other side of the ditch the land belongs to an ecological trust and they have trees and fancy grass and bird boxes and all that and I thought it might look like I was doing my bit as well" (medium sized, tenanted, horticultural farm).

They evidently felt under an obligation (or observation) to undertake environmental management practices, in part as it contributed positively to their community image. This is another example of an activity that is both intrinsically and extrinsically motivated.

4.3. Unsubsidised environmental activity within AES

Analysis of agri-environment scheme data for England reveals that a significant proportion of the subsidised agreements exceeded their required points. In other words, they were delivering more environmental activity than they were receiving payment for. In 2013 this resulted in over 24 million excess points in AES which is equivalent to £24 m annual value of unsubsidised activity (see Table 5). On average there were 11.6% extra points in ELS agreements, with clear differences between ELS only and ELS-HLS variants. The stand-alone ELS agreement delivered more excess points, than those ELS agreements combined with HLS agreements.

Looking in more detail at the subscription rates it can be seen from Fig. 4 that 57% of agreements had 10% or more excess points and 20% of agreements had 25% or more excess points and 8% of agreements had 50% or more excess points.

Some of the farmers' motivations for this unsubsidised activity were identified during the face-to-face interviews with farmers. Field margins, in particular, were often additional to the AES requirements but were being managed to the prescriptions included in the agreement due to the increased flexibility that this offered the farmers. Having these additional margins provided the flexibility to change the location of the margins across the farm if necessary, or in the case of nectar/pollen strips acted as a back-up if another strip failed to establish properly.

Table 5
Excess Points delivered by English AES

	Total Excess Points	Excess Points as% of Scheme Threshold
ELS	16,401,015	13.7
ELS/HLS	5,754,640	8.0
Organic ELS	1,293,780	17.3
Organic ELS/HLS	925,422	9.0
Grand Total	24,374,857	11.6

"We have a half acre pollen and nectar mix running down the side of the margin. This is also in HLS. We have another one that is not in HLS and not paid for. We put that one in because you have to rotate them every 5 years because the cover runs out of steam so you get a year without any cover on it because you have to plough it up, so I have two. So if anyone comes round to inspect I have another one". (medium sized, mixed, tenanted farm)

The interviews also revealed that some larger farms, in particular, were managing an extra 10% on their margins as a risk management strategy to ensure compliance with the scheme prescriptions in order to protect their AES payment. This additional unsubsidised activity also applied to regulatory requirements. Wider cross-compliance strips were being left in order to protect their Single Payment Scheme payments, which were viewed as an important source of income.

Also, in situations where farmers had not renewed their AES agreement, some had retained AES prescriptions for certain features, particularly margins and field corners and consequently AES had led to a permanent change in behaviour. Some were 'between' AES agreements, therefore, this management contributed only temporarily to unsubsidised environmental management.

5. Discussion

This paper has explored the patterns of uptake of subsidised and unsubsidised environmental activity at a national level in England. The results indicate that at the time of the survey the majority of environmental activity in terms of occurrence and scale on farms in England was subsidised, but around 25% of all environmental activity was unsubsidised, although as shown in Fig. 1, often subsidised and unsubsidised activities take place alongside each other on the farm. However, as we also reveal, the activities classed as 'environmental' may have been extrinsically motivated, rather implemented solely for environmental benefits. This supports Darragh and Emery's (2017) finding that definitions of what constitutes environmental behaviour on a farm is complex.

5.1. Understanding motivations and engagement strategies

The paper sought to identify farmers' motivations for undertaking unsubsidised environmental activities. The analysis provides insights into the extrinsic and intrinsic motivations for undertaking these activities, revealing that these are not discrete types but are heterogeneous and overlapping. There are, however, clear differences in farmers' motivations for undertaking subsidised and unsubsidised management activities. A complex mix of motivations influenced farmers to undertake subsidised activities within an AES, of which financial motivations dominated. The environmental motivations were considerably less apparent and we would argue that to ensure durable and sustained environmental management, advice and engagement strategies need to shift the financial extrinsic motivations of farmers participating in AES to more intrinsic environmental motivations which are known to have greater permanence (Mills et al., 2016). The activities most likely to be undertaken within an arable AES for environmental reasons were the wild bird/pollen and nectar mixes, possibly because the environmental benefits of such activities are clearly visible.

In contrast, there were clear environmental motivations for undertaking some of the unsubsidised activities; this was particularly the case for field corner management, buffer strips and wild bird/pollen/nectar mixes. Generally, the farmers surveyed understood the rationale for undertaking these unsubsidised activities for the benefit of the environment, clearly believing that their action would benefit wildlife.

The findings also revealed that whilst intrinsic motivations were important for undertaking unsubsidised activities, extrinsic motivations, particularly agronomic and financial ones, also influenced decisions. One such activity already mentioned was the use of wild bird

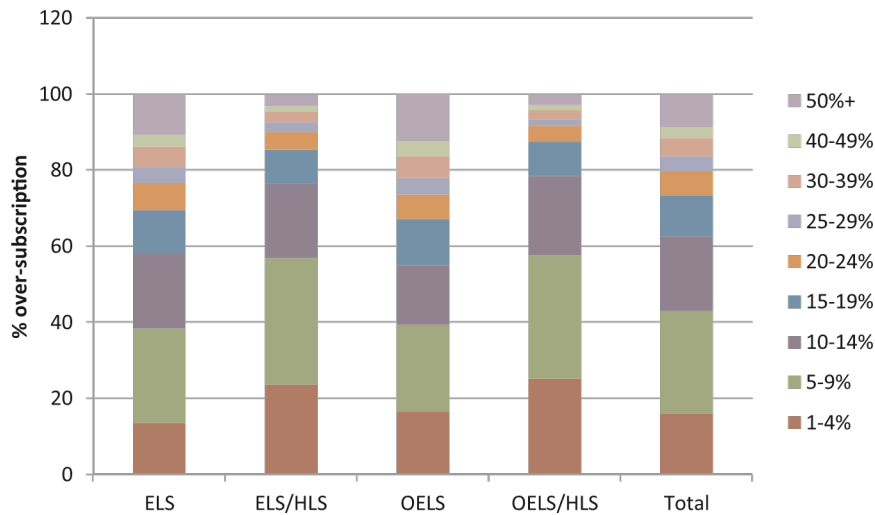


Fig. 4. Details of English AES over-subscription

seed mixes for game shooting. Game shoots provide a financial income, although for many of the arable farmers in our study they were viewed as a cultural activity often used informally with friends and family. They were also considered environmentally beneficial for smaller wild birds. This example, illustrates an interesting interplay between extrinsically-motivated actions and their overlap with intrinsically-motivated cultural and environmental concerns. An environmental activity mainly driven by agronomic motivations in the arable context was overwintered stubbles, where cereal stubbles are left uncultivated and unsprayed after harvest for as long as possible. This practice can provide an important food source for seed-eating birds, whilst working well with spring cropping enabling a spreading of the workload and improving spring weed control. Other practices that might be undertaken for agronomic reasons, include grass margins, field corners, nectar and pollen strips for pollinators and cover crops which provide a habitat for many different species above ground, and also help improve the activity of microbes in the soil.

Clearly, there is the potential to promote some unsubsidised environmental activities by highlighting the agronomic and financial benefits that resonate with farmers' extrinsic motivations. Whilst there will often be a need for financial incentives for the more demanding environmental activities that impact on agricultural productivity, evidence from our study points to the potential to develop win-win scientific solutions and advice that can benefit both farming and the environment and therefore require no financial incentives.

The data analysis also revealed some interesting interaction between subsidised and unsubsidised activity, with environmental features moving between the two. There was evidence that some environmental features continued to be managed positively for the environment once a subsidised AES contract had finished, although further research is required to understand the full extent to which this happens. Our interviews also provided some explanation for the AES over-subscription identified in terms of managing risk and contributing to farm management efficiency. Whilst the scheme guidance document did recommend delivering options slightly in excess of the target points, some of the oversubscription identified was considerable, going beyond expectations for normal risk management and would benefit from further exploratory research.

5.2. Advice and message framing

The survey has clearly identified that many environmental

activities are undertaken without subsidies, however, what is more questionable is the quality of the environmental management. The ecological surveys conducted during the research (Mills et al., 2013), found that often those unsubsidised environmental areas, such as buffer strips, field margins and field corners were left unmanaged, with no active management to improve, or at least maintain, environmental quality. Farmers in the study often viewed the act of taking land out of production as sufficient for providing environmental benefits. However, for most environmental features active management is required. For example pollen and nectar strips, require specific cutting regimes and even with best management practice need to be re-established after 3-4 years (Pywell et al., 2011). This finding highlights the value in providing guidance and advice to ensure unsubsidised features are managed to their optimum environmental potential.

The CFE developed general guidelines setting out best practice for environmental management. However, the interview responses from farmers highlighted a reluctance to follow these guidelines for unsubsidised management activities, preferring to adapt practices to fit in with their farm management, such as allowing vehicular access on grass margins or flexible cutting times. If a policy objective is to improve the quality of existing unsubsidised managed land, then alternative mechanisms, other than general guidelines are required to disseminate this information. Advice needs to be able to understand and cope with the heterogeneity in farmers' motivations that engender unsubsidised environmental practices and to adapt and target messages depending on the farmers' predisposition. To be able to develop this understanding and locate advice in its farm specific context requires some degree of personal engagement. We would suggest that further research, particularly approaches involving action research and working closely with farmers in the co-production of knowledge and understanding, could help to clarify and test the most appropriate engagement messages and approaches required in different situations.

Understanding the motivational pull for farmers to undertake unsubsidised environmental management practices can help with message framing in any advice or engagement strategy to encourage adoption of these practices. As discussed earlier, message framing effects can vary depending on the farmer predispositions. For those farmers that respond to gain framing messages, highlighting the positives of activities, the win-win situations where practices appeal to agronomic and financial motivations by fitting in with the existing farming system and/ or having financial advantages as well as benefiting the environment, can be effective. Particularly if

environmental practices are promoted that are compatible with farmers' cultural values. Such messaging can create new beliefs that environmental activities on farm can enhance production (Home, 2014). From our research findings, for example, the message might relate to field corner management and highlight the efficiency of taking awkward field corners out of production. Furthermore, positive messages might, for example, highlight the positive impact of establishing wild bird mixes on increasing farmland bird numbers, rather than focusing on continued bird population decline through inaction.

Other farmers, with more interdependent self-views, may respond better to loss framing messages with a personal or cultural connection, particularly those that instil fear if a particular environmentally beneficial behaviour is not performed, or evoke concern for a particular target species (Dickinson et al., 2013). Examples from our research is the voluntary implementation of wider buffer zones alongside watercourses undertaken for fear of causing widespread water pollution from chemical spraying, or the introduction of skylark plots in recognition of the decline of this iconic farmland bird. This type of messaging requires an acceptance of responsibility by the farmer and perceived response efficacy.

Fear messages promoting the possibility of regulation prompted some unsubsidised environmental action under the CFE initiative. The industry-led CFE was a response to the regulatory threat of compulsory set-aside (Powell et al., 2012). The motivation for action was to pre-empt additional regulatory burdens which may have brought additional, and uncertain, costs. Our findings also indicate that fear of incurring penalties led to additional unpaid activity within AES and cross-compliance.

Ultimately, to embed durable and sustainable environmental management in farmer behaviour requires an increase in farmers' intrinsic motivations to undertake these activities. However, as discussed elsewhere (Mills et al., 2016) this shift often requires a change in farmers' underlying values and beliefs which are influenced over time by societal norms. To achieve this shift there is the need for a coherent policy and advice framework in which regulations and incentives are important elements for signalling societal norms and expectations, but in which advice and engagement are equally important in helping to understand farmers existing intrinsic and extrinsic motivations and encourage sustained behavioural change on the ground.

6. Conclusions

As the environmental quality of agricultural land across Europe continues to decline there is an ever increasing need to find ways of encouraging environmentally beneficial farming practices. The policy response has been characterised by a mixture of three mechanisms; regulation, incentive schemes and voluntary/social approaches to rejoin agricultural practice and beneficial environmental management. Whilst regulation and AES are part of the solution, there may emerge a need under the current neo-liberalised agenda to find ways to encourage farmers to undertake unsubsidised environmentally beneficial practices. This type of activity has greater potential to embed lasting beneficial environmental management in farmer behaviour than regulation and incentive schemes.

From a policy perspective it is helpful to understand the motivations for existing unsubsidised activity as this can inform appropriate engagement strategies and message framing that will encourage uptake of more widespread voluntary environmental behaviour. Our research has identified that around 25% of all environmental activity undertaken on arable farms in England is already unsubsidised. However, an in-depth examination of motivations for undertaking this activity reveals an interesting

interplay between extrinsic and intrinsic motivations. The evidence highlights that intrinsic environmental motives are important for delivering unsubsidised environmental practices on arable land, related to a personal interest in wildlife, although social concerns about pollution and reputational effects are also important and messages should therefore be framed accordingly. However, the evidence also clearly indicates that extrinsic motivations, particularly agronomic ones, are important for key unsubsidised environmental practices and therefore messages should be framed to highlight the potential agronomic benefits of environmental activities.

Furthermore, our findings identify that subsidised activity can be a trigger for more unsubsidised activity. Whilst there is 25% unsubsidised environmental activity this often spills out from subsidised activities (especially relating to field margins). This interplay is interesting in itself and also it presents evidence that farmers receiving subsidies for environmental are doing extra without payment, which is worthy of more research.

Finally, advice needs to be able to understand and cope with the heterogeneity in farmers' motivations that engender unsubsidised environmental practices and to adapt and target messages depending on the farmers' predisposition. However, to be able to develop this understanding and locate advice in its farm specific context requires some degree of personal engagement, which is often lacking in the current policy instruments and engagement strategies used to support environmentally-beneficial land management practices.

Acknowledgements

We would like to acknowledge the support of the Department of Environment, Food and Rural Affairs (Defra) in funding the research project that contributed to this paper. Our sincere thanks also go to all the farmers who took their time to participate in this research.

References

- Aaker, J.L., Lee, A.Y., 2001. I seek pleasures and we avoid pains: the role of self-regulatory goals in information processing and persuasion. *J. Consum. Res.* 28, 33–49. <http://dx.doi.org/10.1086/321946>.
- Ayer, H.W., 1997. Grass roots collective action: agricultural opportunities. *J. Agric. Resour. Econ.* 1–11.
- Barnes, A.P., Toma, L., Willock, J., Hall, C., 2013. Comparing a 'budge' to a 'nudge': farmer responses to voluntary and compulsory compliance in a water quality management regime. *J. Rural Stud.* 32, 448–459. <http://dx.doi.org/10.1016/j.jrurstud.2012.09.006>.
- Berentsen, P.B.M., Hendriksen, A., Heijman, W.J.M., Van Vlokhoven, H.A., 2007. Costs and benefits of on-farm nature conservation. *Ecol. Econ.* 62, 571–579. <http://dx.doi.org/10.1016/j.ecolecon.2006.07.026>.
- Black, A.W., Reeve, I., 1993. Participation in landcare groups: the relative importance of attitudinal and situational factors. *J. Environ. Manage.* 39, 51–71.
- Borkey, P., Glachant, M., Leveque, F., 1999. Voluntary Approaches for Environmental Policy: An Assessment. Organization for Economic Cooperation and Development, Paris, France.
- Bräuer, I., Müssner, R., Marsden, K., Oosterhuis, F., Rayment, M., Miller, C., Dodoková, A., 2006. The Use of Market Incentives to Preserve Biodiversity. Report for the European Commission.
- Brouwer, F., Lowe, P. (Eds.), 1998. CAP and the Rural Environment in Transition: A Panorama of National Perspectives. Wageningen Pers., Wageningen.
- Buller, H., Wilson, G.A., Holl, A. (Eds.), 2000. Agri-Environmental Policy in the European Union. Ashgate, Aldershot.
- Burton, R.J., Paragahawewa, U.H., 2011. Creating culturally sustainable agri-environmental schemes. *J. Rural Stud.* 27, 95–104.
- Burton, R., Kuczera, C., Schwarz, G., 2008. Exploring farmers' cultural resistance to voluntary agri-environmental schemes. *Sociologia Ruralis* 48, 16–37.
- Clothier, L., Pike, T., 2013. Campaign for the Farmed Environment: Summary of Evidence, Defra Agricultural Change and Environment Observatory Research Report No. 33.
- Cox, G., Lowe, P., Winter, M., 1985. Land use conflict after the wildlife and countryside act 1981: the role of the farming and wildlife advisory group. *J. Rural Stud.* 1, 173–183.
- Cox, G., Lowe, P., Winter, M., 1986. From State Direction to Self Regulation: the historical development of corporatism in British agriculture. *Policy Politics* 14, 475–490.

- Crabtree, J.R., Thorburn, A., Chalmers, N., Roberts, D., Wynn, G., Barron, N., Barraclough, F., Macmillan, D., 1999. Socio-economic and agricultural impacts of the environmentally sensitive areas scheme in Scotland, economics and policy series 6. Economics and Policy Series 6. Macaulay Institute, Aberdeen.
- Darragh, H.S., Emery, S.B., 2017. What can and can't crowding theories tell us about farmers' 'environmental' intentions in post-agri-environment scheme contexts? *Sociologia Ruralis*. <http://dx.doi.org/10.1111/soru.12159>. n/a-n/a.
- Davies, B.B., Hodge, I.D., 2006. Farmers' preferences for new environmental policy instruments: determining the acceptability of cross compliance for biodiversity benefits. *J. Agric. Econ.* 57, 393–414. <http://dx.doi.org/10.1111/j.1477-9552.2006.00057.x>.
- De Snoo, G.R., Herzon, I., Staats, H., Burton, R.J., Schindler, S., Van Dijk, J., Lokhorst, A.M., Bullock, J.M., Lobley, M., Wrba, T., 2013. Toward effective nature conservation on farmland: making farmers matter. *Conserv. Lett.* 6, 66–72.
- De Young, R., 1985. Encouraging Environmentally Appropriate Behavior: The Role of Intrinsic Motivation.
- Deci, E.L., Ryan, R.M., 1985. *Intrinsic Motivation and Self-Determination in Human Behavior*. Plenum, New York.
- Department for Environment Food and Rural Affairs, 2010. *Countryside Maintenance and Management in England*. National Statistics, London.
- Deuffic, P., Candau, J., 2006. Farming and landscape management: how French farmers are coping with the ecologization of their activities. *J. Agric. Environ. Ethics* 19, 563–585.
- Dickinson, J.L., Crain, R., Yalowitz, S., et al., 2013. How framing climate change influences citizen scientists' intentions to do something about it. *J. Environ. Educ.* 44, 145–158.
- Dwyer, J., Mills, J., Ingram, J., Taylor, J., Burton, R., Blackstock, K., Slee, B., Brown, K., Schwarz, G., Matthews, K., Dille, R., 2007. Understanding and Influencing Positive Behaviour Change in Farmers and Land Managers. CCRI, Macaulay Institute, Gloucester.
- Fish, R., Seymour, S., Watkins, C., 2003. Conserving English landscapes: land managers and agri-environmental policy. *Environ. Plann. A* 35, 19–41.
- Fuentes, M., 2004. Farm management indicators related to the policy dimension in the European Union. OECD Expert Meeting on Farm Management Indicators and the Environment 12.
- Gagné, M., Deci, E.L., 2005. Self-determination theory and work motivation. *J. Organiz. Behav.* 26, 331–362.
- Goffman, E., 1974. *Frame Analysis: An Essay on the Organization of Experience*. Harvard University Press.
- Greiner, R., Gregg, D., 2011. Farmers' intrinsic motivations, barriers to the adoption of conservation practices and effectiveness of policy instruments: empirical evidence from Northern Australia. *Land Use Policy* 28, 257–265.
- Herzon, I., Mikk, M., 2007. Farmers' perceptions of biodiversity and their willingness to enhance it through agri-environment schemes: a comparative study from Estonia and Finland. *J. Nat. Conserv.* 15, 10–25. <http://dx.doi.org/10.1016/j.jnc.2006.08.001>.
- Higgins, E.T., 1997. Beyond pleasure and pain. *Am. Psychol.* 52, 1280.
- Hodge, I., Reader, M., 2010. The introduction of entry level stewardship in England: extension or dilution in agri-environment policy? *Land Use Policy* 27, 270–282.
- Home, R., Balmer, O., Jahrl, I., Stolze, M., Pfiffner, L., 2014. Motivations for implementation of ecological compensation areas on Swiss lowland farms. *J. Rural Stud.* 34, 26–36. <http://dx.doi.org/10.1016/j.jrurstud.2013.12.007>.
- Kaljonen, M., 2006. Co-construction of agency and environmental management: the case of agri-environmental policy implementation at Finnish farms. *J. Rural Stud.* 22, 205–216.
- Koontz, T.M., 2003. The farmer, the planner: and the local citizen in the dell: how collaborative groups plan for farmland preservation. *Landscape Urban Plann.* 66, 19–34.
- Legault, L., 2016. Intrinsic and extrinsic motivation. *Encyclopedia of Personality and Individual Differences*. Springer.
- Lokhorst, A.M., Staats, H., Van Dijk, J., Van Dijk, E., De Snoo, G., 2011. What's in it for me? Motivational differences between farmers' subsidised and non-subsidised conservation practices. *Appl. Psychol.: Int. Rev.* 60, 337–353. <http://dx.doi.org/10.1111/j.1464-0597.2011.00438.x>.
- Matzdorf, B., Lorenz, J., 2010. How cost-effective are result-oriented agri-environmental measures?—An empirical analysis in Germany. *Land Use Policy* 27, 535–544. <http://dx.doi.org/10.1016/j.landusepol.2009.07.011>.
- Mills, J., Gaskell, P., Reed, M., Short, C., Ingram, J., Boatman, N., Jones, N., Conyers, S., Carey, P., Winter, M., Lobley, M., 2013. Farmer Attitudes and Evaluation of Outcomes to On-Farm Environmental Management. Project No. IF01114. Report to Department for Environment, Food and Rural Affairs (Defra). Countryside and Community Research Institute, Gloucester.
- Mills, J., Gaskell, P., Ingram, J., Dwyer, J., Reed, M., Short, C., 2016. Engaging farmers in environmental management through a better understanding of behaviour. *Agric. Hum. Values* 1–17.
- Morris, C., Potter, C., 1995. Recruiting the new conservationists: farmers' adoption of agri-environmental schemes in the U.K. *J. Rural Stud.* 11, 51–63.
- Oecd, 2001. *Improving the Environmental Performance of Agriculture: Policy Options and Market Approaches*. OECD Publishing.
- Pearce, D.W., Turner, R.K., 1990. *Economics of Natural Resources and the Environment*. JHU Press.
- Plieninger, T., Draux, H., Fagerholm, N., Bieling, C., Bürgi, M., Kizos, T., Kuemmerle, T., Primdahl, J., Verburg, P.H., 2016. The driving forces of landscape change in Europe: a systematic review of the evidence. *Land Use Policy* 57, 204–214.
- Potter, C., Gasson, R., 1988. Farmer participation in voluntary land diversion schemes: some predictions from a survey. *J. Rural Stud.* 4, 365–375.
- Potter, C., Tilzey, M., 2005. Agricultural policy discourses in the European post-Fordist transition: neoliberalism: neomercantilism and multifunctionality. *Progress Hum. Geogr.* 29, 581–600.
- Powell, J.R., Kambites, C.J., Reed, M., Gaskell, P., Lewis, N., Curry, N.R., 2012. The Campaign for the Farmed Environment: evaluation of partnership, local and wider impacts. Final Report to Defra.
- Pretty, J.N., Brett, C., Gee, D., Hine, R., Mason, C., Morison, J., Raven, H., Rayment, M., Van Der Bijl, G., 2000. An assessment of the total external costs of UK agriculture. *Agric. Syst.* 65, 113–136.
- Pywell, R.F., Meek, W.R., Hulmes, L., Hulmes, S., James, K.L., Nowakowski, M., Carvell, C., 2011. Management to enhance pollen and nectar resources for bumblebees and butterflies within intensively farmed landscapes. *J. Insect Conserv.* 15 (6), 853–864.
- Riley, M., 2016. How does longer term participation in agri-environment schemes [re] shape farmers' environmental dispositions and identities? *Land Use Policy* 52, 62–75. <http://dx.doi.org/10.1016/j.landusepol.2015.12.010>.
- Ryan, R.M., Deci, E.L., 2000. Intrinsic and extrinsic motivations: classic definitions and new directions. *Contemp. Psychol.* 25, 54–67.
- Santangelo, A., Laaksonen, T., 2015. Voluntary nonmonetary conservation approaches on private land: a review of constraints, risks, and benefits for raptor nest protection. *Environ. Manage.* 55, 321–329.
- Schmitzberger, I., Wrba, T., Steurer, B., Aschenbrenner, G., Peterseil, J., Zechmeister, H.G., 2005. How farming styles influence biodiversity maintenance in Austrian agricultural landscapes. *Agric. Ecosyst. Environ.* 108, 274–290.
- Smith, S.M., Petty, R.E., 1996. Message framing and persuasion: a message processing analysis. *Personality Soc. Psychol. Bull.* 22, 257–268. <http://dx.doi.org/10.1177/0146167296223004>.
- Smithers, J., Furman, M., 2003. Environmental farm planning in Ontario: exploring participation and the endurance of change. *Land Use Policy* 20, 343–356.
- Spash, C.L., Biel, A., 2002. Social psychology and economics in environmental research. *J. Econ. Psychol.* 23, 551–555.
- Spence, A., Pidgeon, N., 2010. Framing and communicating climate change: the effects of distance and outcome frame manipulations. *Glob. Environ. Change* 20, 656–667. <http://dx.doi.org/10.1016/j.gloenvcha.2010.07.002>.
- Tasker, J., 2009. Farm advisers back environment campaign. *Farmers Weekly*.
- Van Dijk, W.F.A., Lokhorst, A.M., Berendse, F., De Snoo, G.R., 2016. Factors underlying farmers' intentions to perform unsubsidised agri-environmental measures. *Land Use Policy* 59, 207–216. <http://dx.doi.org/10.1016/j.landusepol.2016.09.003>.
- Van Herzele, A., Gobin, A., Van Gossom, P., Acosta, L., Waas, T., Dendoncker, N., Henry De Frahan, B., 2013. Effort for money? Farmers' rationale for participation in agri-environment measures with different implementation complexity. *J. Environ. Manage.* 131, 110–120. <http://dx.doi.org/10.1016/j.jenvman.2013.09.030>.
- Van Vliet, J., De Groot, H.L.F., Rietveld, P., Verburg, P.H., 2015. Manifestations and underlying drivers of agricultural land use change in Europe. *Landscape Urban Plann.* 133, 24–36.
- Vinning, J., Linn, N., Burge, R.J., 1992. Why recycle? A comparison of recycling motivations in four communities. *Environ. Manage.* 16, 785–797.
- Whitby, M. (Ed.), 1996. *The European Environment and CAP Reform: Policies and Prospects for Conservation*. CAB International, Wallingford.
- Wilson, G.A., Hart, K., 2000. Financial imperative or conservation concern? EU farmers' motivations for participation in voluntary agri-environmental schemes. *Environ. Plann. A* 32, 2161–2185.
- Wilson, G.A., Hart, K., 2001. Farmer participation in agri-environmental schemes: towards conservation-oriented thinking? *Sociologia Ruralis* 41, 254–274. <http://dx.doi.org/10.1111/1467-9523.00181>.
- Wilson, G.A., 1996. Farmer environmental attitudes and ESA participation. *Geoforum* 27, 115–131.
- Winter, S.C., May, P.J., 2001. Motivation for compliance with environmental regulations. *J. Policy Anal. Manage.* 20, 675–698. <http://dx.doi.org/10.1002/pam.1023>.



Contents lists available at SciVerse Science Direct

Journal of Rural Studies

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

Exploring the social benefits of agri-environment schemes in England

Jane Mills*

Countryside and Community Research Institute, Oxstalls Campus, University of Gloucestershire, Oxstalls Lane, Longlevens, Gloucester GL2 9HW, UK

a b s t r a c t

Keywords:

Agri-environment schemes
 Social impact
 Social capital
 Human capital
 Farming communities
 Employment

Recent decades have seen sustainable development emerging as a core concern of European Union (EU) policy. In order to consider how policies can contribute more positively to the goals of sustainable development, major EU policies must undergo an assessment of their potential economic, environmental and social impacts. Within the agri-environment sector, this is reflected in the increasing requirement for EU Members States to monitor and evaluate the socio-economic as well as the environmental and agricultural impacts of their agri-environment programmes. Whilst some research has looked at the more easily quantifiable economic impacts of agri-environment schemes (AES), there is a paucity of research exploring the social dimensions. In this paper, four areas where social impacts of AES can be assessed are suggested: namely impact on on-farm employment; income security; human capital through skills and training development; and social capital development through extension of knowledge networks and flows. These areas are explored in detail using the results of a survey of Environmental Stewardship schemes in England. The results show that the level of social benefit is differentiated by scheme and farm type. The more demanding Higher Level Stewardship schemes help to develop human capital and increase networks, and dairy farmers in particular have extended their advisory networks in order to participate in AES. The paper concludes that through the exploration of the social impact of AES it may be possible to identify ways to more closely link social and environmental stewardship objectives and thereby contribute to sustainable agriculture.

© 2012 Published by Elsevier Ltd.

1. Introduction

Recent decades have seen sustainable development emerging as a core concern of European Union (EU) policy. In order to consider how policies can contribute more positively to the goals of sustainable development, major EU policies must undergo an assessment of their potential economic, environmental and social impacts (Tamborra, 2002). Within the agri-environment sector, this is reflected in the increasing requirement for EU Members States to monitor and evaluate the socio-economic as well as the environmental and agricultural impacts of their agri-environment programmes (EU, Article 16, EC Regulation No. 746/96).

Agri-environment schemes (AES) are the main mechanism used in Europe to deliver biodiversity and resource protection benefits on agricultural land. These schemes were introduced in 1985 under European Structures Regulations (797/85). They allowed member states to provide funding for schemes which contributed towards the introduction or continued use of agricultural production

practices, while being compatible with the requirements of conserving the natural habitat and ensuring an adequate income for farmers. These schemes have been mandatory for member states in the EU since 1992. Currently, around 68% of utilisable agricultural area in England is managed under AES.

In the UK, previous impact assessments of AES were based mainly on understanding the environmental impact and the cost-effectiveness of these schemes. These identified the cost of implementing AES and compared it against the environmental benefits derived. As a result, a wealth of research has explored the environmental and agricultural impacts of AES across the UK (Boatman et al., 2008; Davey et al., 2010). However, it is increasingly recognised that AES also have the potential to contribute to the social fabric of rural communities by having a positive impact on jobs, local businesses, skills, and in sustaining family farms (Dobbs and Pretty, 2001), although research in this area is limited. Whilst some research has looked at the more easily quantifiable economic impacts of AES (Agra CEAS Consulting, 2005; Crabtree et al., 2000; Harrison-Mayfield et al., 1998; Marggraf, 2003), there is still a paucity of research exploring the social dimensions of AES. This is despite the fact that one of the central objectives of agricultural policy in the EU has been to maintain farm incomes and keep

* Tel : + 44 (0) 1242 71437; fax _44 (0) 1242 714222.

E-mail address: jmills@glos.ac.uk

0743-0167/\$ e see front matter 2012 Published by Elsevier Ltd.

<http://dx.doi.org/10.1016/j.jrurstud.2012.08.001>

farmers on the land (i.e. a socially sustainable agriculture) (Gray, 2000; Ogaji, 2005; Potter and Tilzey, 2007). This paucity of research has also been identified by Hyder Consulting (2008) in their ex-post evaluation of the 2000-2006 Rural Development Programme in England who found that the socio-economic impacts of AES have rarely been considered as part of programme evaluation.

The social research literature on AES in recent years has tended to focus on adoption and retention characteristics of AES participants. Researchers have considered farmers' motives, capacity and willingness to adopt voluntary AES (Ahnstrom et al., 2009; Wilson and Hart, 2001). Much of this research has focused on assessing the characteristics of farms and farmers in relation to the adoption of AES to gain an understanding of the extent to which farm level structural and economic factors and farmer socio-cultural factors affect participation. It is recognised that these characteristics are important determinants of behaviour in the context of AES and in particular sustained change and commitment to the aims of the scheme (Burton et al., 2008; Burton and Paragahawewa, 2011; Morris and Potter, 1995). For example, Burton et al. (2008) argue that prescription-based AES inhibit the development of embodied cultural capital by limiting identity-enhancing behaviour. However, there has been less focus on the impact of AES on the social fabric of farm and rural communities and thus their contribution to sustainable rural development. The aim of this paper, therefore, is to explore the social benefits of AES within farming communities in England and to identify some measures by which the social impacts of AES could be assessed. More specifically, the paper identifies the extent to which AES can contribute to sustainable agriculture by having a positive impact on on-farm employment and farm incomes, developing social capital and knowledge networks, and farmer knowledge and skills base. The next section sets out the academic context for considering the social impact of AES. This is followed by an explanation of the methodology used to explore the social benefits of an AES in England and a discussion of the results.

2. Conceptualising the social impacts of AES

For purposes of this paper, the Interorganizational Committee on Principles and Guidelines for Social Impact Assessment (1994, p. 107) definition of social impact is used: "the consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another, organize to meet their needs and generally cope as members of society. The term also includes cultural impacts involving changes to the norms, values, and beliefs that guide and rationalise their cognition of themselves and their society." Whilst it is recognised that the outcomes of AES have social impacts on wider society, for example through its contribution to ecosystem cultural services, such as aesthetic values and spiritual enrichment (Millennium Ecosystem Assessment, 2003), the focus of this paper is on the social benefit to farm businesses and their contribution to sustainable agriculture.

Different variables have been proposed for measuring social impact (Burdge, 1994; Gramling and Freudenburg, 1992; Vanclay, 2002). The definition of "social" used in this paper is fairly broad and includes the social change processes identified by Vanclay.

- (A) Demographic processes (changes in the number and composition of people on the farm);
- (B) Economic processes (relating to the way in which farmers make a living and economic activity in the rural community);
- (C) Geographical processes (changes in land use patterns e.g. extensification, diversification);

- (D) Institutional and legal processes (relating to the efficiency and effectiveness of institutional structures including government agencies and advisory services);
- (E) Emancipatory and empowerment processes (increasing influence in AES decision-making processes by farming communities);
- (F) Socio-cultural processes (affecting the culture of farming communities); and (G)
- (G) Other processes.

(Adapted from Vanclay, 2002 p. 193).

The EU Impact Assessment report (CEC, 2002, p.15) suggests the following for measuring the social impact of policy which includes some of Vanclay's social change processes: "Social impacts: impacts on human capital, impact on fundamental/human rights, compatibility with Charter of Fundamental Rights of the European Union changes in employment levels or job quality, changes affecting gender equality, social exclusion and poverty, impacts on health, safety, consumer rights, social capital, security (including crime and terrorism), education, training and culture, as well as distributional implications such as effects on the income of particular sectors, groups of consumers or workers etc."

Whilst not all these measures are relevant to AES, there are four main areas where AES could have a social impact on farming communities: on-farm employment levels; ensuring stability of income; human capital through training and skills development; and social capital development. Each of these is represented in Fig. 1 and considered in turn. In addition, two other potential measures are discussed in the final section relating to changes in empowerment and socio-cultural processes.

2.1. On-farm employment

The agricultural labour force in England is in long-term decline and currently contributes to 1.7% of the total UK workforce. The industry is characterised by an ageing population, particularly in upland areas, which is in part due to low earnings and barriers to entry which have created ongoing difficulties in recruiting young people into farming. The average age of farm holders in 2007 in England was 59 years old, ranging from 54 to 60 years across the



Fig. 1. Conceptualising the social impacts of AES on farming communities.

different farm types (Department of Environment Farming and Rural Affairs, 2011). There is also a continuing increase in part-time workers at the expense of full-time employment, reflecting ongoing restructuring of the industry. This ageing population is also reflected throughout rural areas. Rural areas in England are experiencing a net in-migration from urban areas which has resulted in a higher proportion of older people in rural compared to urban areas. Around 46% of people in rural areas are 45 or over, compared with 38% in urban areas. This is a result both of a larger proportion of older people, but also a smaller proportion of those in the 16-29 age group (Commission for Rural Communities, 2010).

A number of commentators suggest that AES can contribute to broader rural development through the creation of additional jobs, achieving social benefits that go beyond purely delivering environmental ones (Agra CEAS Consulting, 2005; Banks and Marsden, 2000; Dobbs and Pretty, 2001). Agra CEAS Consulting (2005), in an evaluation of the Tir Gofal agri-environment scheme in Wales, found additional jobs created in the rural economy due to the scheme, mostly as a result of capital grants for work such as stone walling and hedging. These additional jobs are of particular benefit in small rural communities, where other employment opportunities are limited. However, to date there is little evidence of the impact of AES on on-farm job creation.

2.2 Security of income

Since 1996, the total income from farming has also been in decline, mainly due to low prices at the farm gate, although it rose slightly between 2008 and 2010 (Department of Environment Farming and Rural Affairs, 2011). Incomes have been struggling particularly in the upland areas of England. As AES payments only compensate for income foregone and/or additional costs of implementing management in line with the World Trade Organisation (WTO) rules and European Union (EU) Regulations (Council regulation (EC) No 1698/2005 Article 39 paragraph 4), the contribution of AES to sustainable farming through supporting farm business income is relatively modest. However, AES in England still contribute to around 5% of gross margins, although the contribution is higher in Less Favoured Areas, up to 20% of gross margins (Hyder Consulting & ADAS, 2010). These regular AES payments may offer some security of income, thus offering a level of social protection, both in terms of providing adequacy to meet basic needs and helping to ensure resilience to shocks.

2.3 Developing human capital

Human capital is defined by the OECD (1998, p. 9) as “the knowledge, skills and competences and other attributes embodied in individuals that are relevant to economic activity.” It encompasses both social as well as technical skills. More precisely, skills are defined as a specific ability developed through experience or training (Lantra, 2011). Lantra (2011) identified a current skills gap in the land-based sector in UK to enable adaptation to climate change and to meet further environmental and land management requirements, such as a reduction in nitrate leaching and soil erosion. This ability to farm in an environmentally sensitive or sustainable way is considered to require a broader knowledge base than conventional farming where the skills are often learnt through trial and error, as part of being socialised into a family farm. Environmentally sensitive practices are thought to be more complex, locally specific and information intensive than intensive agriculture, with more emphasis on observation, monitoring and judgement (Morris and Winter, 1999; Park et al., 1997).

Previous research suggests that AES participation can contribute positively to the management skills base of farmers and increase their environmental knowledge, learning and awareness

(Dwyer, 2001; Herzon and Mikk, 2007; Hodge and Reader, 2007). Indeed, it is recognised that farmers who have been in schemes sometimes for 10 years or more represent a valuable reservoir of knowledge and experience (Dwyer, 2001). Although most studies report positive human capital impacts of AES, there has been the suggestion that farmers do not benefit from new skills or knowledge where AES management prescriptions have been imposed and conflict with the farmers’ own traditional local knowledge (Burgess et al., 2000; Riley, 2006). Indeed, it could be argued that such imposed management can lead to the erosion of traditional knowledge.

2.2. Social capital development

In this paper, social capital is defined as social connections and the attendant norms, trust and reciprocity associated with these connections (Burgess et al., 2000; Putnam, 1993). In the context of sustainable land management, social capital refers to the links between: farmers and farmers (bonding social capital); farmers and society, particularly the local community (bridging social capital) and; farmers and institutions (linking social capital) (Putnam, 1993). There is evidence that some farmers are becoming increasingly socially isolated within rural communities due to a rationalisation of farmers’ traditional social networks. A number of reasons for this have been identified, including the shedding of farm workers, wives working off-farm, erosion of community ties and collective working arrangements and fewer meeting places, such as auction markets that have closed (Appleby, 2004; Burton et al., 2005; Lobley et al., 2005). Increased social isolation can lead to depression and further reduction in social contacts. In contrast, those farmers that have diversified are increasing their social network through new types of customers for products and services (Lobley et al., 2005).

The benefits of social capital are generally identified with its role in facilitating change by reducing transaction costs among actors and in helping to overcome collective action problems. As such, studies in relation to AES have tended to examine how social capital can lead to AES uptake, rather than looking at social capital as an outcome of AES participation (e.g. Magnani and Struffi, 2009). However, arguably, enhanced social capital in the form of knowledge, skills and institutions can also be an outcome of AES participation (Hodge and Reader, 2007). There is most evidence for this from studies of agri-environmental co-operatives. By linking people together to achieve common objectives and networking, agri-environmental co-operatives are thought to contribute to social cohesion, and thus to build social capital (Franks and Mc Gloin, 2007; Mills et al., 2011). The interaction between social capital and government support and funding has also been identified as important to scheme success, where the trigger of financial support has led to positive social capital outcomes (Appleby, 2004; Sobels et al., 2001).

An individual’s participation in AES itself does not create social capital benefits; it is their involvement in the schemes and the links that this creates that result in these benefits. Arguably, by linking AES participants to Project Officers, newsletters, training and farm visits, they have greater access to resources than non-participants, which is one measure of social capital. Also, participants in some conservation initiatives have been found to develop good linking social capital through the ability to engage with agencies and government (Hall and Pretty, 2009). Research has shown the benefits that new networks and linkages and flows of information can have in changing social and business activity (Oreszczyn et al., 2010). Whereas familiar networks can provide reassurance and affirmation, new people bring with them novel flows of information and perspectives (Granovetter, 1973). Farming families’ networks tend to be characterised by a small, stable group

of people with whom they have frequent contact. This group can provide the stability to sustain the farm business, but it can also have social consequences in terms of well-being and the operation of a land-based business. Narrow or small social networks can leave families isolated, particularly if a key person is absent or normal communication is disrupted. It also means that business decisions are made in the context of a limited range of information. Agri-environment schemes can therefore either re-enforce the existing networks of farmers or open up the opportunity for change.

The rest of this paper explores the extent to which social benefits are derived from AES based on primary data sources, particularly focussing on human capital and social capital aspects of AES as there is a paucity of research in these areas.

3. Research methods

The findings presented in this paper are based on a research project conducted for Department of Environment, Food and Rural Affairs (Defra) in England, undertaken between 2009 and 2010 to assess the economic and social benefits of Environmental Stewardship (ES), an AES operating in England (Mills et al., 2010). In England, in 2005 the old agri-environment schemes were closed to new entrants and replaced by Environmental Stewardship schemes, comprising Entry Level Stewardship (ELS), a basic non-competitive 'broad' and 'shallow scheme, and Higher Level Stewardship (HLS), a more demanding and targeted scheme. Organic farms were eligible for higher rates of payments under the Organic Entry Level Scheme (OELS) and Organic Higher Level scheme (OHLS). A hedge management option under the ELS scheme might for example specify hedge cutting every second year, whilst a hedge management option under HLS might provide funding for laying, coppicing and planting up gaps in hedgerows.

As social impacts are often inherently more difficult to quantify compared to environmental and economic impacts, a mixed methods approach was adopted using a telephone survey for the more easily quantifiable measures in order to understand the patterns of social benefits across landscape types and AES type, followed by more in-depth qualitative interviews to understand the reasons for any variation. In total 360 interviews were conducted with ES agreement holders: 288 telephone interviews and 72 face-to-face interviews, representing around a 1% sample of the total agreement holder population.

Stratification variables used to select the sample were based on the 4 scheme types (ELS, HLS, OELS and OHLS), six UK agricultural landscape types (modified from Swanwick et al., 2007), and the agreement value. This study identified the following six landscape types based on their agricultural characteristics:

- Chalk and limestone mixed agricultural landscapes (20%);
- Eastern arable agricultural landscapes (16%);
- South eastern wooded mixed agricultural landscapes (14%);
- Upland fringe dairying and stock rearing agricultural landscapes (16%);
- Upland agricultural landscapes (17%); and
- Western dairying and mixed agricultural landscapes (18%).

To ensure the survey captured agreement holders who had commenced work on their agreements, Defra supplied data only on those agreements that had started before August 2008 - a year before the survey date. The period of study ran from January 2005 to August 2009 (a maximum of 4.5 years) for ELS/OELS agreements. To ensure the full range of schemes was represented in each landscape type, a weighting factor was applied to the data to reflect

the true distribution of HLS and ELS agreements in the total population.

The telephone survey lasted around 20 min and contained mostly closed questions with some open questions. The face-to-face interviews took place on the farm with the agreement holder. These questions were more open than the telephone survey and provided an opportunity to explore issues in more depth, such as the reasons for the scheme's negative or positive impact on workload and the nature of any increased social interaction resulting from scheme participation. The closed questions were analysed using SPSS. Where appropriate, an indication of the sampling error is provided by quoting 95% confidence intervals in the text and displaying these confidence intervals within the charts. The open questions were transcribed and analysed with the software package Nvivo to provide greater explanation of findings through quotes.

3.1. On-farm employment

Results from the telephone survey found that ES participation increased workload on the farm in some cases (Fig. 2). In total, around 27% ($\pm 5\%$) of agreement holders reported an increased workload on the farm as a result of their ES schemes. Not surprisingly, the Higher Level schemes, which are more demanding than the Entry Level schemes, experienced the highest increases in workload of 68% ($\pm 9\%$). Reasons stated for this increased workload included an intensification of boundary work, such as hedges and walling, and more scrub management. Reasons given for decreases in workload included less hedge cutting, reduced grassland inputs and stock numbers.

Further questioning identified who was undertaking this additional work and the majority was undertaken by on-farm labour (74%), with the remainder undertaken by contractors. However, only 14% of agreement holders employed additional workers or made additional payments to existing employees to help specifically with ES work, which suggests that most of the work was undertaken by existing labour. Interestingly, qualitative responses in the face-to-face interviews revealed this increased workload was often viewed in a positive light, particularly in areas of widespread underemployment, such as the more marginal upland areas of England. In these places, ES was seen as providing work for underemployed farm workers and family members. Many of the activities associated with ES, particularly those relating to farm boundaries, occur during the autumn and winter, traditionally a quieter period in the agricultural calendar as the following quotes illustrate.

"We do all the hedging, stone walling and pond work ourselves. There really is only enough work for one and a half people on the farm, so we do all the ES work in our spare time, especially during the winter".
(Upland grazing livestock farmer, OHLS agreement)

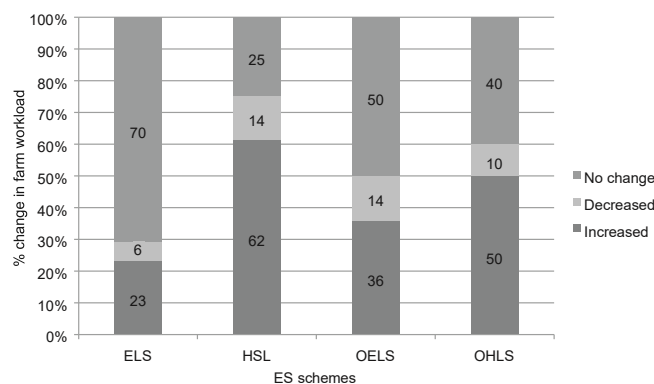


Fig. 2. Changes in farm workload due to ES schemes (%).

“There is a large amount of boundary maintenance work in the winter. It keeps a worker employed, we would have considered making him part-time if we weren’t in the scheme”. (Mixed farmer, HLS agreement)

“It’s keeping us going for 4 months when there would not be enough work for a second full time person”. (Mainly arable farmer, HLS agreement)

Also, for some, entering the scheme was part of the strategy to bond family units by keeping family members on the farm and help stem out-migration.

“Providing extra work for the family was the purpose of entering the scheme”. (Lowland grazing livestock farmer, HLS agreement)

“A lot of the employment that has been created is actually allowing farmers to pay their offspring a living wage. Before, they remained on the farm but were not earning a wage only bed and board because the farm could not afford it and there was no other work locally”. (Upland grazing livestock farmer, HLS agreement)

3.2. Security of income

There is also evidence from the survey that AES are used by family farms as part of their adjustment or survival strategy. Some respondents, particularly hill farmers and those in remote areas of the South West of England, appeared to value ES for the regular income it provided. The ES payments are based on income foregone, which replaces lost income. However, although the payments received are not always additional, they are sometimes described as “income”. In the telephone survey of 288 agreement holders, 61% (±7%) agreed with the statement that “ES has increased their income”. This was more so for grassland based rather than arable farm systems; this may reflect the more demanding nature of some of the arable options which require greater management changes. The qualitative interview responses revealed that the payments helped to stabilise income and offered the security of a regular income twice a year. The payments also made it easier to budget for lean months and the 10-year time horizon helped with financial planning.

“The income from the scheme helps with the economic viability of the farm. The 10-year time horizon helps with financial planning and provides us with a relatively optimistic outlook for the future”. (Upland grazing livestock farmer, HLS agreement)

“Regular income from ELS makes it easier for the farm to budget during the lean months when there is little income. The farm is very dependent on autumn livestock sales”. (Upland grazing livestock farmer, ELS agreement)

“The scheme helps to keep the [hill] farm viable. The timing of the payments helps to smooth out the market fluctuations”. (Mixed farmer, HLS agreement)

Although not designed to fulfil this role, the scheme seemed to be supporting vulnerable family farming businesses in areas that are heavily dependent on agriculture. The incomes of these farms were obviously low, with the money from the scheme becoming part of the pot of money that keeps the farm going, and they tended to talk of the payments as contributing to a fraction of a person’s wage. Their commitment to the farmed environment was wrapped up in the importance of the schemes funding to their income, and certainly without the payments they would be farming differently.

“The scheme is vital in keeping the farm viable and going into the next generation. The economics of hill farming mean that no one has made

any money for the last 3 years. Extremely worried for the future of hill farming without the scheme”. (Upland grazing livestock farmer, HLS agreement).

The income security benefit of ES was less of an issue for predominantly arable farms as the following quote illustrates. Instead, these farms tend to find HLS less financially viable, which is consistent with other research findings that show a negative correlation between HLS participation and areas of high agricultural productivity (Quillérou et al., 2011).

“Arable farming is not suited to ES. It is not an easy option, especially for HLS. Only farmers that already have an environmental interest will join. It is not financially viable for most arable farmers”. (Arable farmer, HLS agreement.)

3.3. Development of human capital

The findings support previous research that suggests that AES contribute positively to the management skills base of farmers and increases their environmental knowledge, skills and awareness. Survey respondents were asked to identify the extent to which the scheme had impacted on their own and employees’ environmental skills and knowledge base, as well as that of other farmers in the local area. As Fig. 3 shows, a high percentage of HLS (85% ±5%) and OHLS (87% ±5%) agreement holders appeared to have gained environmental skills and knowledge from joining the scheme, enabling them to farm more sustainably. It was felt that ES had been effective in increasing their general awareness and appreciation of the environment, making them more conscious of the environmental impact of their management actions, as the following quotes illustrate.

“I’m a better farmer for taking part in the scheme, it has forced me to think about the environment, particularly the soil”. (Upland grazing livestock farmer, OELS agreement)

“It has increased my awareness of the farmed environment. The Farm Environment Plan survey found evidence of otters that no one was aware of”. (Mainly dairy farmer, HLS agreement)

“The staff are a lot more aware of environmental issues now - they can see they have to do things in a certain way”. (Arable farmer, ELS agreement).

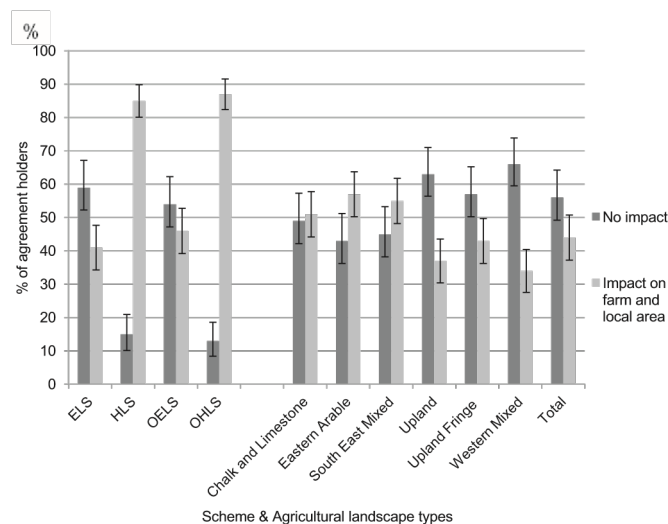


Fig. 3. Impact of ES on skills and knowledge development by scheme and landscape type (%).

Respondents, particularly HLS agreement holders, reported learning new management skills in terms of managing wetlands, woodlands, grassland and hedges, with some having to re-learn these skills as a result of converting arable land to grassland.

"I know a lot more about managing farm land for birds. The different types of management required on different habitats at different times of the year". (Upland grazing livestock farmer, HLS agreement).

Some had also increased their practical skills in, for example, fencing, pond clearing and new stocking handling skills.

"The farm business had lost a lot of practical management skills during this generation. We can plough and reap cereals but not much else. Farm staff are having to re-learn a lot of practical skills, such as hedge management and grassland management". (Arable farmer, HLS agreement)

"We have had to learn new stock handling skills, managing the highland cattle is far less hands on than working with the sheep but requires a different set of skills. These skills have been passed on to me by my Father". (Upland grazing livestock farmer, HLS agreement).

Those who reported no or little impact on skills and knowledge (59% ±8%) were mainly ELS agreement holders, and most felt that they already had the skills required to implement their schemes. This suggests that the extent to which they had to change their established farming practices was small and therefore there was minimal opportunity for gains in knowledge or skills. As Fig. 2 indicates, this was particularly the case for livestock farming areas (Upland, Upland fringe and Western Mixed), where agreement holders appear to have already had the boundary, grassland and stock management skills required to implement their schemes and to farm sustainably.

The telephone survey asked agreement holders about the extent to which there is transferability of skills from schemes to other projects/areas of farm work. Of those that responded to this question, 44% felt that there was transferability of skills. They reported applying the scheme management principles when carrying out other tasks around the farm, although some of these changes may be tied up with other environmental programmes operating on the farm, such as cross-compliance. These changes applied particularly to field operations, such as cultivation of field edges, spraying and chemical usage, drilling and the timing of field operations, as the following quotes illustrate.

"Yes, have been able to take the lessons across the whole farm, I hate to say it but the whole farm is much more sustainable than it was before. We are using 20% less fertiliser across the farm as a whole". (Arable farmer, HLS agreement)

"Yes, there is overlap. I think about biological pest control now, I'm very conscious of buffer strips and pest control". (Arable farmer, ELS agreement)

"We are a lot more careful about what sprays and chemicals we use. Much more aware of the wildlife. If we come across an animal or bird nest we can go and put it somewhere. We put baskets over eggs when spraying (lapwing)". (Mixed farmer, HLS agreement).

Also, those respondents who had undertaken educational access options had learnt new skills in dealing with people, which were seen as rewarding and transferable skills utilisable in other areas of life.

As Fig. 4 shows, less than (17% ±8%) a quarter of respondents or their employees had received some training or attended advisory days as a result of signing up to the scheme. This was particularly

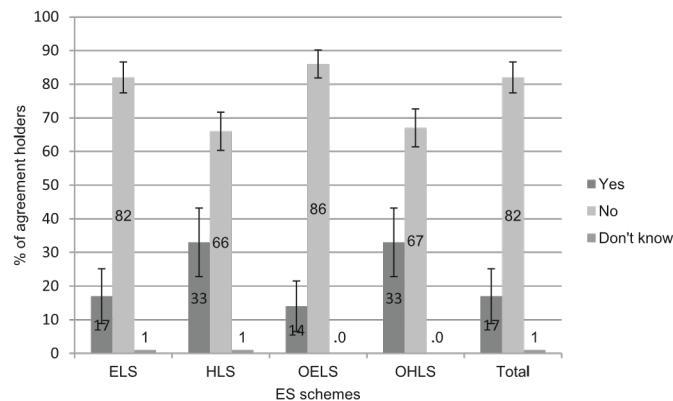


Fig. 4. Attended training course or advisory day as a result of ES by scheme.

the case for those in HLS schemes with around a third (33% ±10%) having received training or attended an advisory day.

Agreement holders in the arable landscape areas were more likely to attend a training course or open day than those in livestock areas. This pattern correlates with those that thought the schemes had had a positive impact on skills and knowledge (Fig. 3). This possibly reflects the more demanding nature of the arable options where agreement holders are required to do more than their usual farming practices.

3.4. Development of social capital

The survey explored the extent to which the AES can play a part in leading to new social contacts being made, and with them a broadening of the social networks of the business and the family.

The telephone survey asked the extent to which contractors or advisors recruited to help with AES implementation were previously known to the agreement holders. As Table 1 shows, most (78%) of the contractors engaged to carry out work on the scheme were known to the agreement holder before their entry into the programme. This suggests that they turned to those people whom they knew could conduct the work, and that most of these tasks do not demand specialist skills or knowledge. In sharp contrast, 37% of the advisors used by the agreement holders were not known to them previously, indicating that the agreement holders had to reach out beyond the established social networks around their farm or business for this expertise.

The group that did not know their advisor beforehand and had to push most beyond their normal networks were those in the HLS scheme (49%). Consideration of this question by farm type in Table 2 indicates that those farmers who are mainly dairy or lowland livestock were those who most frequently had to find an advisor from outside of their established networks. This suggests that for many entering the HLS scheme, and to a lesser degree the ELS, their established support networks could not encompass the

Table 1
Contractors and advisors known to agreement holders before ES by scheme.

	ELS (%)	HLS (%)	OELS (%)	OHLS (%)	Total mean (%)
Contractors					
Yes	77	80	78	77	78
No	14	20	0	23	15
Don't know	9	0	22	0	7
Advisors					
Yes	75	46	60	52	60
No	23	49	33	44	37
Don't know	2	4	7	4	3

Table 2

Advisors known to agreement holders before ES by farm type.

	Mainly arable (%)	Mainly dairy (%)	Grazing livestock (lowland) (%)	Grazing livestock (LFA) (%)	Mixed (%)	Total (%)
Advisors known to agreement holder	69	44	51	56	67	60
Advisors not known to agreement holders	28	50	48	41	28	37
Don't know	3	6	2	3	5	3

demands for environmental information required by the scheme. Entering the scheme brought a new range of actors into the circle of advice and influence over the management of the land, increasing both their bonding and linking social capital.

When asked whether they were in contact with more people through the scheme, outside the formality and regularity of advisory meetings or a discussion group, the widening of the contacts was more pronounced. As shown in Fig. 5, of those participating in the ELS, 31% reported more contact with other farmers and/or members of the public; this doubled to 66% with those in the HLS. The organic schemes demonstrated a similar pattern, with 33% in the OELS reporting increased contact and 63% in the OHLS. This is particularly striking as many of those in the higher schemes had already participated in previous agri-environmental schemes. This may reflect the targeted nature of HLS which has meant that local groups and forums have been established in order to encourage farmers' entry into the scheme.

The mechanism for contact with the public would appear to be educational links, either through visits to schools or parties coming to the farm. The qualitative responses alongside these answers suggest that members of the public with an interest in conservation, particularly ornithologists, play an important role in these contacts. Walkers are an important category of contact, but also the only ones who attract criticism, as they walk over some of the new conservation areas. A number of farmers who had chosen the educational access options in HLS, which provide funding for the hosting of visits to the farm, mentioned that they enjoyed meeting the public and school children. This seemed to come as a surprise to some who had not expected to obtain such personal reward out of the options. One farmer talked about how he had grown in confidence as a result of having to talk to the public - "I have the confidence now to deal with different types of people" (HLS agreement holder).

The influence on organic farmers points to the pattern being about more than pro-environmental dispositions, as organic farmers have already signed up for a series of environmental

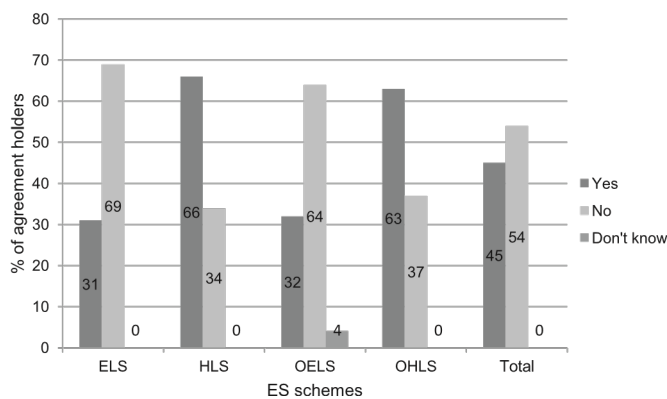


Fig. 5. Increased contact with other farmers or general public due to ES.

restrictions. Yet, they show a differentiated social impact with regard to the scheme, with those in the higher-level schemes demonstrating a similar increase in group membership and contact with the public/other farmers as those in the HLS scheme. Given that it is known that organic farmers tend to be younger and more highly formally educated (Kings and Ilbery, 2010), one can postulate that it is mechanisms within the scheme and adoption of the scheme itself, particularly the higher levels that are leading to the widening of these networks and increased social footprint of the farm. Counter-posed to this is that for a majority in the ELS scheme, the social impact of scheme participation is minimal.

4. Discussion and conclusions

This paper has explored the social benefits of AES on farming communities in England and has shown that the level of social benefits is differentiated by scheme type, farm type and agricultural landscape type. In particular, the research has focused on the generation of social benefits through increased on-farm employment, stability of income, and human and social capital development.

The research findings have indicated the extent to which the AES schemes in England create or support employment in farming communities. There is evidence of a differential impact on employment by scheme type and region. The more demanding HLS schemes increase workload on farms, much of which is absorbed by existing workforce. It appears that it is not simply the economic aspects of AES that translate into social benefit. There appears to be a more complex set of relationships at work which can be regionally specific. In some areas of England characterised by intensive agriculture, such as the East of England, the increased workload associated with HLS added to existing work pressure, whereas in areas of farm underemployment, such as the uplands of England, the additional work generated by AES helped to keep farm workers or family members fully employed and appeared to play a role in family bonding, retention of family members and providing a sense of purpose.

These findings indicate the need for impact assessments of AES to identify not only the level of additional workload created from scheme implementation but also a greater understanding of who is undertaking this work and the subsequent impact. Is it external contractors undertaking this work thereby creating additional employment in the local economy, or is the work being absorbed by existing farm or family labour? Is it putting the farm businesses with a shortage of labour under increased pressure, or is it helping to create work for underemployed family members in areas where there are few other possibilities of gainful employment? Answers to these questions will provide policy makers with an insight into the social impact of AES. These findings support Vanclay's (2002) assertion that simply measuring the social change processes, in this case an increase in workload, is inadequate as the social impact will vary depending on the specific context. To achieve this level of understanding, impact assessments cannot rely solely on

quantitative surveys, but will also require qualitative survey techniques to understand the more complex relationships involved, for example whether an increase in workload will have a negative or positive social impact on farming communities.

An attempt was made to understand the extent to which AES payments help to maintain farm businesses and improve security of income. This situation is often complex and not simply a case of understanding the impact of AES payments on farm gross margins. In some cases, it is also the regularity of AES payments throughout the length of the agreement that is valued because it assists with financial planning and is of particular value to the more vulnerable farms where income levels are beholden to vagaries of the weather and world market prices.

Consideration was also given to the extent to which the AES programme improved the knowledge and skills of those participating. The more demanding HLS scheme is most likely to develop the environmental management skills of the farmer. Also, there was an increased likelihood of regions dominated by arable farms to have experienced an increase in skills and knowledge, rather than the predominantly livestock areas. It appears that the extent to which the farming system has changed under AES impacts on the degree of learning and increased awareness. To ascertain the extent of farmer behavioural change, impact assessments should consider the extent to which the skills and knowledge obtained through AES participation are embedded by being transferred to other areas of the farm, or farming activity. This is an important consideration for policy makers because where limited change has taken place it is likely that limited benefits will accrue, so creating minimal opportunity for a positive attitudinal shift. As Burton and Paragahawewa (2011, p. 101) point out, attitudinal changes can be encouraged by allowing "farmers to develop 'skills' in conservation provision and for these skills, in turn, to contribute to social status generation within the community". This can be achieved by increasing the flexibility within AES for farmers to develop their own solutions to achieving environmental outcomes, rather than focussing on prescription-based management practices.

The contribution of ES to the development of social capital is also considered by exploring the extent to which the schemes either reinforce the existing networks of farmers or open the opportunity for change. Differences identified in the changes to the knowledge networks of the farmers suggest divergent routes through the scheme and so a differentiated social impact of these initiatives. For some participants, a majority in ELS and OELS, they do not have to reach beyond their established networks of advice. Therefore, the flow of information into their business and lives remains unchanged and there is limited bonding or linking social capital development. A minority have to reach beyond the boundaries of their network and these people are particularly in the HLS scheme, and those in dairy farming. As previous AES in England were not targeted at dairy farms, it is unsurprising that they are now having to develop new advisory networks.

Those in HLS schemes also have wider social contacts with other farmers and the general public as a result of the scheme compared to ELS. This difference between ELS and HLS schemes may be due to the targeted nature of HLS schemes which meant that more local groups or forums have been established to get farmers on board. Furthermore, it appears that increasingly in a period where long established farms are disappearing and farmers are becoming more isolated (loneliness was mentioned by some as an issue) the social contact prompted by scheme membership (hosting or going on farm walk, meetings to discuss options) was valued. In the upland areas in particular there was evidence of the AES promoting greater linking social capital. Farmers often talked about the scheme officers as friends as well as professional colleagues. Frequent comments

were made about how they wanted to see more of their project officers, which seemed to include more than just for project advice. Perhaps in a time when farmer social contacts were declining, contact with project officers is becoming more important. Thus it would appear that the HLS scheme compared to ELS was particularly effective in promoting greater bonding and linking social capital, through extending social networks with other farmers, advisors and project officers, with some limited promotion of bridging social capital through farm visits.

Other social impact variables pertinent to AES that could have been incorporated into the conceptual diagram (Fig. 1) relate to empowerment and socio-cultural change processes. Empowerment processes are those that lead to an increase in the ability of local people to contribute to AES decision-making. There was for example, some concern expressed about the lack of flexibility within the AES framework to adapt options to local conditions. Consideration could also have been given to socio-cultural processes that relate to those affecting the culture of the farming community. For example, Burton et al. (2008) and Burton and Paragahawewa (2011) explored the need for AES to generate cultural capital in order to embed environmental attitudes and behaviours into farming communities. Furthermore, future social impact assessments of AES would benefit from comparison of the counterfactual, that is the situation that would have prevailed without the AES. For example, comparing the levels of human and social capital amongst those involved with AES with nonparticipants, some of whom may voluntarily undertake environmental measures on their farms, would help to reveal the true extent of AES social impact.

Whilst the paper has focused on the social benefits of AES, there may also be social disbenefits which should be included in any evaluation of the social impacts of AES. One example is that of social exclusion, and consideration should be given to the disadvantages of those outside of networks. Recent work has found that individuals and groups with low levels of human or social capital may face significant barriers to accessing rural development aid (Dwyer et al., 2004). For example, some form of social exclusion can occur where farmers, who are unable to understand or have insufficient time to deal with complexities and costs of AES applications, are excluded from their benefits. Also the issue of inequities arising from AES participation should be explored. Some emerging evidence suggests that smaller farms feel disadvantaged by AES in England, either because they are ineligible or are unaware of their eligibility for AES or find that their option choices are limited without causing unacceptable changes to their existing management practices (Mills et al., 2012). It has also been suggested that selective targeting of AES can have some negative impacts for the farming community. For example, selective targeting of the previous Environmentally Sensitive Areas (ESAs) in England created a rift in the farming community, with those outside the boundaries of the scheme envying those who have made substantial profits from the ESA (Skerratt, 1994).

As Dwyer and Findeis (2008) state, one of the challenges for policy and programme evaluation is the perceived lack of measurable outcomes from social capital development, although they believe that human capital development outcomes are more easily measurable. This paper has identified a number of social impacts that could be captured when evaluating AES programmes in the EU. These are important aspects which can contribute to the development of human and social capital in farming and rural communities and thereby contribute to the development of sustainable agriculture. However, to obtain this level of understanding, impact assessments need to incorporate some level of qualitative analysis to understand the complex set of processes and relationships at work.

The research adopted a mixed methods approach using both a telephone survey and in-depth face-to-face interviews with agreements holders. The closed questions within the telephone survey enabled one to obtain a statistically representative pattern of the impacts of ES and to generalise to the whole population. However, through use of face-to-face interviews the different contexts in which farmers operate and the local conditions in which they make their decisions were identified. This enables a much deeper understanding of the differences in the social benefits of ES within scheme type, farm type and agricultural landscape type. By asking not only “what the impacts are”, but also “under what circumstances” one is better able to understand the complex relationships involved. As Bryman (1988) states “When quantitative and qualitative research are jointly pursued, much more complete accounts of social reality can ensue.”

AES policy is rightly focused on delivering the schemes primary environmental and landscape objectives and not on maximising the human and social capital. However, an improved understanding of the social benefits of AES may allow scheme options to be designed that maximise the potential social benefits alongside the delivery of environmental objectives. There is the potential to take a more holistic view of AES as a delivery mechanism and in this way contribute to the goal of sustainable agriculture. By having a greater understanding of the social impacts of AES, it may be possible to identify policy opportunities that more closely link social and environmental stewardship objectives within the framework of AES and within the restrictions of WTO rules.

Acknowledgements

The research that this paper draws on was funded by the Department of Environment, Food and Rural Affairs (Defra) and Natural England. The author would like to thank Brian Ilbery and Pete Gaskell for their helpful comments and suggestions on an early draft of the paper and other colleagues at the CCRI who contributed to the research in a variety of ways, and in particular to the contributions of Matt Reed and Julie Ingram. Also thank you to the three anonymous referees for their valuable comments on the paper. The views expressed in this paper are the author’s own.

References

Agra CEAS Consulting, 2005. Socio-economic Evaluation of Tir Gofal. Countryside Council for Wales and Welsh Assembly Government.

Ahnstrom, J., Hockert, J., Bergea, H.L., Francis, C.A., Skelton, P., Hallgren, L., 2009. Farmers and nature conservation: what is known about attitudes, context factors and actions affecting conservation? *Renewable Agriculture and Food Systems* 24, 38-47.

Appleby, M., 2004. Norfolk Arable Land Management Initiative (NALMI) Final Project Report June 1999-May 2004.

Banks, J., Marsden, T., 2000. Integrating agri-environment policy farming systems and rural development: Tir Cymen in Wales. *Sociologia Ruralis* 40, 466-480.

Boatman, N., Gaskell, P., Parry, H., Jones, N., Bishop, J., Mills, J., Short, C., Dwyer, J., 2008. A Review of Environmental Benefits Supplied by Agri-environment Schemes. Report to the Land Use Policy Group, England. Central Science Laboratory and Countryside and Community Research Institute, London.

Bryman, A., 1988. *Quantity and Quality in Social Research*. Routledge, London.

Burdge, R., 1994. *A Community Guide to Social Impact Assessment*. Social Ecology Press, Middleton.

Burgess, J., Clark, J., Harrison, C.M., 2000. *Knowledges in action: an actor network analysis of a wetland agri-environment scheme*. *Ecological Economics* 35, 119-132.

Burton, R.J.F., Paragahawewa, U.H., 2011. Creating culturally sustainable agri-environmental schemes. *Journal of Rural Studies* 27, 95-104.

Burton, R., Mansfield, L., Schwarz, G., Brown, K., Convery, I., 2005. *Social Capital in Hill Farming: Report for the International Centre for the Uplands*, Aberdeen.

Burton, R.J.F., Kuczera, C., Schwarz, G., 2008. Exploring farmers’ cultural resistance to voluntary agri-environmental schemes. *Sociologia Ruralis* 48, 16-37.

Commission for Rural Communities, 2010. *State of the Countryside 2010*. In: Commission for Rural Communities (Ed.), Cheltenham, UK.

Commission of the European Communities (CEC), 2002. *Communication from the Commission on Impact Assessment*. COM (2002) 276 Final, Brussels.

Crabtree, J., Thorburn, A., Chalmers, N., Roberts, D., Wynn, G., Barron, N., Barraclough, F., Macmillan, D., 2000. Socio-economic and Agricultural Impacts of the Environmentally Sensitive Areas Scheme in Scotland. In: *Economic and Policies Series* 6.

Davey, C.M., Vickery, J.A., Boatman, N.D., Chamberlain, D.E., Parry, H.R., Siriwardena, G.M., 2010. Assessing the impact of Entry Level Stewardship on lowland farmland birds in England. *Ibis* 152, 459-474.

Department of Environment Farming and Rural Affairs, 2011. *Agriculture in the United Kingdom 2010*. Department of Environment Farming and Rural Affairs, London, UK.

Dobbs, T.L., Pretty, J.N., 2001. The United Kingdom’s Experience with Agri-environmental Stewardship Schemes: Lessons and Issues for the United States and Europe. South Dakota State University Economics Staff Paper and University of Essex Centre for Environment and Society Occasional Paper 2001-1.

Dwyer, J., Findeis, J., 2008. Human and Social Capital in Rural Development e EU and US Perspectives. In: *EuroChoices*, vol. 7.

Dwyer, J., Slee, R., Buller, H., Baldock, D., Swales, V., 2004. *Helping Farmers Adapt e Comparative Report*. National Audit Office, London.

Dwyer, J., 2001. *Paying for the Stewardship of the Countryside: a Greenprint for the Future of Agri-environment Schemes in England*.

Franks, J.R., Mc Gloin, A., 2007. Environmental co-operatives as instruments for delivering across-farm environmental and rural policy objectives: lessons for the UK. *Journal of Rural Studies* 23, 472-489.

Gramling, R., Freudenburg, W.R., 1992. Opportunity-threat, development, and adaptation: toward a comprehensive framework for social impact assessment. *Rural Sociology* 57, 216e234.

Granovetter, M.S., 1973. The strength of weak ties. *The American Journal of Sociology* 78, 1360-1380.

Gray, J., 2000. The common agricultural policy and the re-invention of the rural in the European community. *Sociologia Ruralis* 40, 30-52.

Hall, J., Pretty, J., 2009. Then and now: Norfolk farmers’ changing relationships and linkages with government agencies during transformations in land management. *Journal of Farm Management* 13, 393-418.

Harrison-Mayfield, L., Dwyer, J., Brookes, G., 1998. The socio-economic effects of the Countryside Stewardship scheme. *Journal of Agricultural Economics* 49, 157e 170.

Herzon, I., Mikk, M., 2007. Farmers’ perceptions of biodiversity and their willingness to enhance it through agri-environment schemes: a comparative study from Estonia and Finland. *Journal for Nature Conservation* 15, 10-25.

Hodge, I.D., Reader, M., 2007. *Maximising the Provision of Public Goods from Future Agri-environment Schemes*. Cambridge.

Hyder Consulting & ADAS, 2010. *Rural Development Programme for England e 2007e2013. Mid Term Evaluation*. Department of Environment Food and Rural Affairs.

Hyder Consulting, 2008. *Ex Post Evaluation of England Rural Development Programme*. Department of Environment Food and Rural Affairs.

Interorganizational Committee on Guidelines and Principles, 1994. *Guidelines and principles for social impact assessment*. *Impact Assessment Bulletin* 12, 107-152.

Kings, D., Ilbery, B., 2010. The environmental belief systems of organic and conventional farmers: evidence from central-southern England. *Journal of Rural Studies* 26, 437-448.

Lantra, 2011. *A Skills Assessment for the Land-based and Environment Sector*. Lantra.

Lobley, M., Potter, C., Butler, A., Whitehead, I., Millard, N., 2005. *The Wider Social Impacts of Changes in the Structure of Agricultural Businesses*. Centre for Rural Policy Research, University of Exeter.

Magnani, N., Struffi, L., 2009. Translation sociology and social capital in rural development initiatives. A case study from the Italian Alps. *Journal of Rural Studies* 25, 231-238.

Marggraf, R., 2003. Comparative assessment of agri-environment programmes in federal states of Germany. *Agriculture, Ecosystems & Environment* 98, 507- 516.

Millennium Ecosystem Assessment, 2003. *Ecosystems and Human Well-being*. Island Press, Washington DC.

Mills, J., Courtney, P., Gaskell, P., Reed, M., Ingram, J., 2010. *Estimating the Incidental Socio-economic Benefits of Environmental Stewardship Schemes*. Final Report to Defra. Countryside and Community Research Institute.

Mills, J., Gibbon, D., Ingram, J., Reed, M., Short, C., Dwyer, J., 2011. *Organising collective action for effective environmental management and social learning in Wales*. The Journal of Agricultural Education and Extension 17, 69-83.

Mills, J., Gaskell, P., Short, C., Manley, W., Kambites, C., Lewis, N., Clark, M., Boatman, N., 2012. *Attitudes to Upland Environmental Stewardship Scheme*. Natural England, Peterborough.

Morris, C., Potter, C., 1995. Recruiting the new conservationists: farmers’ adoption of agri-environmental schemes in the U.K. *Journal of Rural Studies* 11, 51-63.

Morris, C., Winter, M., 1999. Integrated farming systems: the third way for European agriculture? *Land Use Policy* 16, 193-205.

Ogaji, J., 2005. Sustainable agriculture in the UK. *Environment, Development and Sustainability* 7, 253-270.

Oreszczyn, S., Lane, A., Carr, S., 2010. The role of networks of practice and webs of influencers on farmers’ engagement with and learning about agricultural innovations. *Journal of Rural Studies* 26, 404-417.

Organization for Economic Cooperation and Development (OECD), 1998. *Human Capital Investment: an International Comparison Organization for Economic Cooperation and Development*. Centre for Educational Research and Innovation, Paris.

Park, J., Farmer, D.P., Bailey, A.P., Keatinge, J.D.H., Rehman, T., Tranter, R.B., 1997.

- Integrated arable farming systems and their potential uptake in the UK. *Farm Management* 9, 483-494.
- Potter, C., Tilzey, M., 2007. Agricultural multifunctionality, environmental sustainability and the WTO: resistance or accommodation to the neoliberal project for agriculture? *Geoforum* 38, 1290-1303.
- Putnam, R.D., 1993. *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton University Press.
- Quillérou, E., Fraser, R., Fraser, I., 2011. Farmer compensation and its consequences for environmental benefit provision in the higher level Stewardship scheme. *Journal of Agricultural Economics* 62, 330-339.
- Riley, M., 2006. Reconsidering conceptualisations of farm conservation activity: the case of conserving hay meadows. *Journal of Rural Studies* 22, 337-353.
- Skerratt, S.J., 1994. Itemized payment systems within a scheme: the case of Breadalbane. In: Whitby, M. (Ed.), *Incentives for Countryside Management: the Case of Environmentally Sensitive Areas*. CAB International, Wallingford, UK.
- Sobels, J., Curtis, A., Lockie, S., 2001. The role of Landcare group networks in rural Australia: exploring the contribution of social capital. *Journal of Rural Studies* 17, 265-276.
- Swanwick, C., Hanley, N., Termansen, M., 2007. *Scoping Study on Agricultural Landscape Valuation* London.
- Tamborra, M., 2002. *Socio-economic Tools for Sustainability Impact Assessment. The Contribution of EU Research to Sustainable Development*. European Commission, DG Research. EUR 20437.
- Vanclay, F., 2002. Conceptualising social impacts. *Environmental Impact Assessment Review* 22, 183-211.
- Wilson, G.A., Hart, K., 2001. Farmer participation in agri-environmental schemes: towards conservation-oriented thinking? *Sociologia Ruralis* 41, 254-274.

Developing Farm-Level Social Indicators for Agri-Environment Schemes: A Focus on the Agents of Change

Jane Mills ^{1,*}, Hannah Chiswell ¹, Peter Gaskell ¹, Paul Courtney ¹, Beth Brockett ², George Cusworth ³ and Matt Lobley ⁴

- ¹ Countryside and Community Research Institute, University of Gloucestershire, Cheltenham GL50 4AZ, UK; hchiswell1@glos.ac.uk (H.C.); pgaskell@glos.ac.uk (P.G.); pcourtney@glos.ac.uk (P.C.)
² Natural England, Worcester WR5 2NP, UK; beth.brockett@naturalengland.org.uk
³ Oxford Martin School, University of Oxford, Oxford OX1 3BD, UK; george.cusworth@zoo.ox.ac.uk
⁴ Centre for Rural Policy Research, University of Exeter, Exeter EX4 4PJ, UK; m.lobley@exeter.ac.uk
 * Correspondence: jmills@glos.ac.uk



Citation: Mills, J.; Chiswell, H.; Gaskell, P.; Courtney, P.; Brockett, B.; Cusworth, G.; Lobley, M. Developing Farm-Level Social Indicators for Agri-Environment Schemes: A Focus on the Agents of Change. *Sustainability* **2021**, *13*, 7820. <https://doi.org/10.3390/su13147820>

Academic Editors: José

Manuel Mirás-Avalos and Emily Silva Araujo

Received: 15 June 2021

Accepted: 1 July 2021

Published: 13 July 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

Abstract: Most monitoring and evaluation programmes for agri-environment schemes focus on understanding the environmental outcomes and the cost-effectiveness of these schemes. Evaluation of the social dimensions of agri-environment schemes, particularly the socio-cultural factors that might influence the quality of engagement with the schemes and the social wellbeing impact of scheme engagement, is limited. This is a critical gap in knowledge as there is growing recognition that without more explicit consideration of the farmers involved in land management as agents of change, the required environmental improvements will not be achieved. The aim of this paper was to undertake a systematic literature review to inform the development of a set of social indicators that can be used to measure the level of farmers' engagement with their scheme agreement and the social sustainability outcomes from participation. Following the literature review and a short-listing ranking exercise with two sets of experts, 20 high-level (composite) social indicators and associated sub-level (component) indicators were identified. A series of scale or ranking questions that can be used to capture the indicator data were also developed and tested. This paper presents the first stage in the development of a robust set of social indicators for agri-environment schemes that will also provide a good indicator of long-term environmental outcomes.

Keywords: social indicators; agri-environment; social sustainability; farmer behaviour; socio-cultural; health and wellbeing; monitoring and evaluation

1. Introduction

Agri-environment schemes (AESs), whereby farmers are paid for voluntarily undertaking specified environmental actions, formalised as an agreement between the farmer and the State, were first introduced in Europe in the 1980s due to concerns about environmental damage from agricultural intensification. There is a requirement for European Union (EU) Member States to monitor and evaluate the impacts of their agri-environment programmes using a Common Monitoring and Evaluation Programme for Common Agricultural Policy (CAP) [1]. However, even though sustainable agricultural production, including its economic, environmental, and social dimensions, is recognised as one of the principal objectives for the EU's CAP, the social dimension is often lacking from the CAP's monitoring and evaluation programmes [2].

A wealth of research has explored the environmental and agricultural impact of AESs across the United Kingdom and Europe [3,4]. Studies have also considered the economic impacts of AESs [5]. However, despite increasing evidence that the quality of AES engagement (between the agreement holder and their agreement) influences the quality of environmental outcomes, there is still a paucity of research exploring the social dimensions of AESs, particularly the socio-cultural factors that

might influence the quality of engagement with the schemes and the social

Policy-makers widely accept that indicators are needed to foster and monitor change [9], as evidenced by the EC Monitoring and Evaluation framework for the CAP [1] and the U.K. Government indicator framework for their 25-Year Environment Plan [10]. This requirement has led to the development of indicators as part of England's AES monitoring and evaluation programme to assess scheme performance, such as farmland bird indicators [11]. These indicators help us to both understand and improve scheme efficacy. However, there has been a lack of attention to the conceptual and operational development of social indicators compared with environmental and economic indicators, reflecting the focus of the EU's CAP monitoring and evaluation programme. In fact, this has hindered the systematic evaluation of social change, and in the case of AESs, hindered a deeper understanding of why and how environmental change happens on farms, and with it hindered positive environmental change itself.

Therefore, the aim of this paper is to undertake a comprehensive and systematic literature review to inform the development of a set of social indicators that can be used to measure the level of farmers' engagement with their AES agreement and the social sustainability outcomes from participation. Firstly, the paper identifies indicators that measure the quality of AES engagement based on farmers' willingness and ability to engage with a scheme and their level of connectedness with others. Secondly, social indicators that measure and the impacts of AES engagement on the farmers' quality of life and health and wellbeing are identified. This work forms the basis for the development of an operational framework to underpin the systematic empirical application of the indicators within the field of agri-environment schemes and similar policy tools, such as local water catchment initiatives. This work is timely because in 2018 the U.K. Government launched its ambitious 25-Year Environment Plan to "help the natural world regain and retain good health" [12]. The plan emphasises the Government's renewed interest in developing a transparent and comprehensive set of indicators that will show how the environment is changing and if it is improving over time [10].

The next section sets out the academic context and conceptual framework for the development of the social indicators for AES monitoring and evaluation. This is followed by an explanation of the methodology used to identify the social indicators, a description of the social indicator set, and a discussion of the results.

2. Conceptual Framework

Indicators are defined in many ways, but the definition used for this paper is "A quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect the changes connected to an intervention, or to help assess the performance of a development actor". In this paper, we use the term 'social' in a broad sense to include both sociological and psychological perspectives, and we define a social indicator as a measure "used to monitor the social system, helping to identify changes and to guide intervention to alter the course of social change". When considering the application of social indicators to agriculture, and more specifically to agri-environment schemes, we can refine this definition further to encompass the psychological and behavioural factors affecting AES engagement and the intentional or unintentional social outcomes of an AES as it relates to the social world of the agreement holders. However, there is clearly a lack of sufficient conceptual development and empirical evidence to develop such indicators. Therefore, our starting point is a thorough review of the literature on factors affecting farmers' quality of engagement with AESs and the social sustainability outcomes of AESs.

To understand the environmental behaviours of farmers, consideration needs to be given to both internal factors and the external context in which farmers operate. This has led researchers to examine the relationship between the willingness to adopt or engage with environmental activities and their capacity to adopt or engage. In addition, farmer relations with others and their level of connectedness are increasingly considered an important influence on environmental decision-making, through active engagement in advice and support networks [13]. Indeed, understanding the factors that influence farmer environmental decision-making [13–16] forms an essential backdrop to the development of social indicators of interest here.

Three over-arching and inter-related domains are highlighted by this literature and summarised in the first conceptual framework (Figure 1).

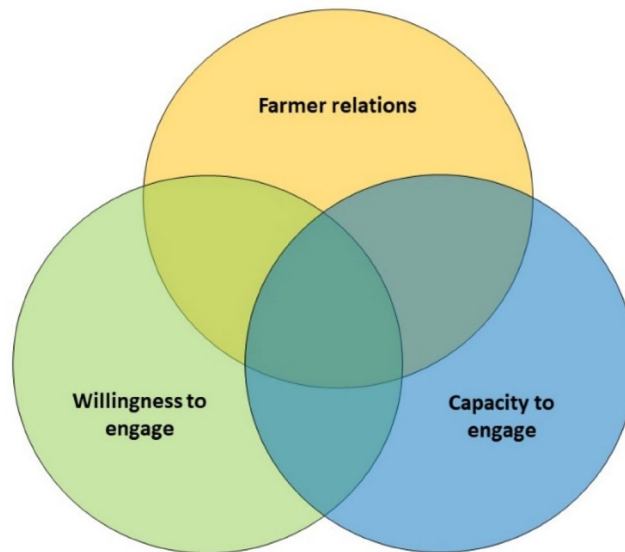


Figure 1. Conceptual framework guiding the literature search on factors affecting AES quality of engagement.

Willingness to engage is focused on the intrinsic factors affecting farmers’ environmental behaviours. It reflects the underlying determinants of behaviour, such as the farmers’ attitudes, beliefs, values, and norms. For example, commitment to the natural environment and a personal interest in wildlife are clear intrinsic factors identified by a number of studies [13,17,18]. Values and norms relating to social status or reputational benefits, or even a sense of moral obligation, have also been shown to influence environmental behaviours [7,16].

In contrast, capacity to engage focuses on the external context in which the farmer operates and how this affects their environmental behaviours. It can relate to farm characteristics and structures, such as farm size, tenure, as well as the economic status, time, and labour, which can facilitate or constrain behavioural changes [15].

Finally, farmer relations are also known to affect environmental behaviours, including the influence of family members, peers, advisers, and government agencies [15,19]. The concept of social capital is useful when thinking about social relations and social networks. For example, increasing social capital through formal and informal farmer-to- farmer interactions can be important for information and advice sharing and normalising environmental behaviours. Studies have also identified the importance of farmer–adviser relationships in influencing environmental behaviours [20].

The second conceptual framework focuses on factors that affect the social sustainability of AESs. These can relate to on-farm conditions or experiences that affect the social world of the agreement holder. Engagement with an AES may have positive or negative social outcomes for the land manager and hence impact the scheme’s social sustainability. Social

sustainability outcomes could, for example, include increased social networks or increased stress due to pressures on time. In the context of this research, our conceptual framework is designed around Bostrom’s definition of social sustainability, including quality of life, social justice, social cohesion, cultural diversity, democratic rights, gender issues, human rights, participation, social capital development, and human capability.

These social sustainability outcomes can have a negative or positive effect on environmental outcomes, which in turn can affect engagement factors and quality of engagement. Thus, it is recognised that there may be an overlap between these factors and the potential for mutual reinforcement or feedback loops. Figure 2 provides a simplified visual representation of these concepts and their links to environmental outcomes.

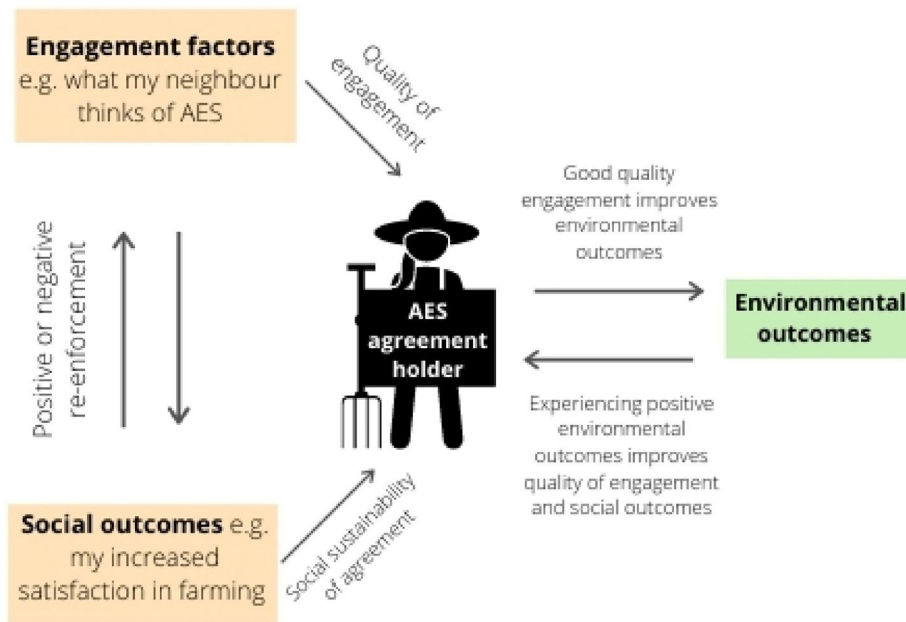


Figure 2. Conceptual framework showing links between AES engagement factors, social sustainability outcomes from AESs, and AES environmental outcomes and feedback loops.

These two high-level conceptual frameworks help to guide a systematic literature review to identify two sets of indicators. The first set aims to measure the nature and ‘quality’ of farmer engagement with their AES and their link to environmental outcomes. The second set of social indicators measures the social sustainability outcomes that result from a land manager’s involvement in an AES.

3. Method

To identify the key factors that might influence AES quality of engagement, we used the following three search strings in the literature review to bring each of the three high-level concepts to life:

- Willingness to Engage Farmer (or land manager, forester) AND “agri environment” (or conservation, biodiversity, agriculture and environment, woodland) AND attitude (or behaviour, awareness, self-identity, mental health, wellbeing, mood disorder, depression, stress, loneliness).
- Capacity to Engage Farmer (or land manager, forester) AND “agri environment” (or conservation, biodiversity, agriculture and environment, woodland) AND knowledge (or training, skills, labour, employment, time, finance, capacity, resilience).
- Farmer Relations Farmer (or land manager, forester) AND “agri environment” (or conservation, biodiversity, agriculture and environment, woodland) AND social capital (or cooperation, groups, collaboration, advice, public, access, antisocial behaviour).

We undertook a further review of the literature to identify social sustainability indicators in relation to the impact of an AES on the agreement holders' quality of life and health and wellbeing.

We conducted the initial literature search between 29 October 2018 and 5 November 2018, using both the Web of Science and Google Scholar. It is considered good practice to use more than one search engine, as different search platforms are known to yield different results. Although Google Scholar is useful, particularly for identifying grey literature, it is acknowledged that its searches are understood as an 'imperfect tool to perform systematic reviews' with potential for selection bias (see Piasecki et al. [21], p. 809). Due to time constraints for conducting the search and analysis, the search was limited to papers published between 2000 and 2018. The search was open to all geographical regions to capture experiences from other parts of the world. A further search of grey literature (including project reports) was also conducted using Google as a search engine and checking the websites of relevant U.K. Government agencies (Natural England, Forestry Commission and Department for Environment, Food and Rural Affairs).

The search terms yielded 262 articles, which were uploaded to the reference management software, EndNote. In addition, relevant draft or unpublished reports suggested by external experts comprised of government agency staff and academics were also added, resulting in a total of 352 documents.

Each article was screened by a team of four who examined the abstracts and excluded those that were not relevant to the purpose of the study.

We examined the reference lists of five key papers that appeared in all three searches (willingness; capacity; farmer relations) [3,6,22–24] for additional relevant references and added 19 of these to EndNote, all within the search timeframe. This process resulted in 175 documents remaining for full-text analysis. In a final step, after a more thorough reading of the full-text, a further 53 articles were excluded for not meeting the inclusion criteria, leaving 122 documents included in the review. A summary of the process is included in Figure 3.

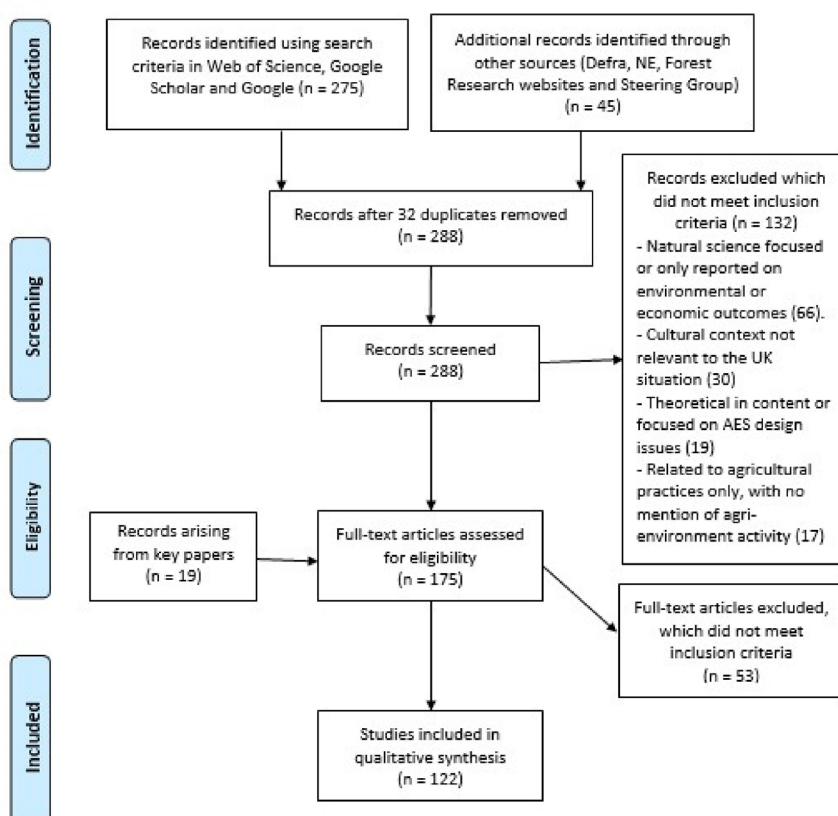


Figure 3. PRISMA flow diagram for the systematic review.

We undertook the literature analysis using the qualitative data analysis software QSR NVivo 11. The same four team members who undertook the literature search and screening also conducted the analysis. Using a coding framework protocol to aid consistency, salient segments from each document were coded to a succinct node. These nodes were then used to produce indicator variables, which formed the basis of the indicators. Using expert judgement, some variables were combined to produce composites in order to present a more robust indicator. One person checked a 10% sample of the papers analysed to assess the consistency of the coding and ratings. Very few differences in the analysis were identified, providing confidence in the approach taken.

For each engagement factor or social sustainability outcome identified, a rating for the level of impact and strength of the link between social and environmental outcomes was assigned based on a five-point scale. We also applied a three-point scale rating based on the strength of the evidence, indicated by the study's design, as recommended by the Department for International Development [25]. All ratings were assigned based on the expert judgement of the social scientists familiar with the subject area and added to QSR NVivo as document attributes via the File Classification feature.

We completed a final short-listing of the indicators using a ranking exercise undertaken by two sets of experts: five AES researchers who were also members of a Government Social Science Expert Panel; and six Natural England Farm Conservation Advisers who advise land managers on AES implementation.

Both sets of experts used a five-point scale to rank the indicators on their (i) usefulness/relevance and (ii) the feasibility of implementing the indicators. The literature had also revealed a need to distinguish between high-level indicators – which related to specific forms of change that were essentially multi-dimensional concepts (for example, *farmers' interest in the environment*) – and sub-level indicators, identified as being components of the multi-dimensional concept, which when taken together provided a single index of change in the high-level indicator (e.g., *awareness of species and habitats, interest in landscape assets, extent of environmental knowledge*). This need to distinguish between high and sub-level indicators was revealed in two ways. First, in some cases concepts were identified that were clearly a relevant indicator of interest, but presented a number of ways that the item might be measured – in addition to the high-level indicator itself. An example is *farmers' interest in (and awareness of) environment*, representing a high-level indicator, but which could also be measured by *extent of environmental knowledge* and *sense of environmental responsibility*. This implied the need for a number of sub-level indicators to ensure reliability of the indicator and (ultimately) validity of the measurement. Second, the literature identified a conceptually relevant indicator, but was inherently devoid of any direct measurement without assembling plausible sub-level indicators to provide the measurement component(s). A relevant example can be found in the higher-level indicator *bonding social capital*, which can be measured through sub-indicators, such as *extent of group working, extent of knowledge sharing, and level of social trust*. In the majority of cases, the high-level indicators are effectively *composite indicators*, with sub-level indicators being *component indicators* compiled to produce a single index of change, in turn providing a robust and comprehensive way of monitoring change in the principal – or high-level – concept of interest. In cases where high-level indicators were identified as single item measures (i.e., *succession*), the respective sub-level indicator simply refers to a more specific measure of the concept (e.g., *planning for succession*).

To help assess their reliability, we also asked the experts to rank each sub-level indicator based on how relevant they thought these sub-level indicators were for capturing changes in the associated high-level indicator. For each indicator, the mean and mode of the range of scores provided by the experts were calculated. Those indicators that received a low score were recommended for removal from the indicator list. The short-listing process resulted in removing or merging 13 of the high-level indicators and removing 14 sub-indicators. In addition, based on the suggestions provided in the ranking exercises, three additional indicators were proposed.

In a final step, a series of scale or ranking questions that can be used to capture the indicator data were developed. When devising each question, consideration was given to the following criteria:

- Is this the most direct and robust way of asking the question?
- Is the question really linked to the quality of AES engagement or to social outcomes of an AES?
- Is the question measuring something that will change as a result of AES involvement?
- Is the question taking too much for granted?
- Is the question unambiguous and in plain English?

We tested these questions with 19 AES agreement holders representing different agricultural systems across England and incorporated their feedback into a revised survey form (see Supplementary Materials).

Whilst it is acknowledged that no indicator is perfect for all purposes, through the literature review we have aimed to identify the indicators that address the most important issues related to achieving environmental and social sustainability outcomes and are scientifically valid.

4. Results

4.1 Quality of AES Engagement Indicators – Willingness to Engage Indicators

We present the key indicators identified as affecting the quality of farmer engagement with an AES related to willingness to engage in Table 1.

Table 1. Indicators and sub-indicators related to the willingness to engage.

High-Level Indicators	Sub-Indicators
Interest in (and awareness of) environment	Level of awareness of and interest in wildlife (species and habitats); Level of awareness of and interest in cultural and landscape assets; Extent of environmental knowledge; Extent of sense of environmental responsibility; Extent of unsubsidised environmental activity.
Attitudes and beliefs about farming (self-identity)	Attitudes to farming and self-identity.
Engagement with advice and training	Level of engagement with environmental advice; Level of rapport with advisor; Level of engagement in training;
Level of AES experience	Length of previous AES experience; Level of confidence in environmental skills/abilities; Level of understanding of the AES rationale.

4.1.1 High-Level Indicator: Interest in (and Awareness of) Environment

The literature review revealed that personal interest in the environment affects farmers' attitude towards the environment and was the most commonly identified indicator affecting farmers' quality of engagement with agri-environment activities. We identified several different factors in the literature as influencing farmers' interest in and awareness of the environment. Sub-indicators that make up the high-level indicator are:

Interest in Wildlife: Many studies identified that the level of farmers' personal interest in wildlife was positively correlated with a willingness to undertake wildlife-friendly measures [17,26–28]. For example, a study of a scheme for meadow bird protection the Netherlands showed that farmers with an “eye for the birds” improved environmental outcomes by protecting more nests and chicks before carrying out farming activities [28].
Interest in and Awareness of Cultural and Landscape Assets: Farmers' quality of engagement with agri-environment activities is also influenced by their interest in and awareness

of the wider landscape and cultural assets such as historic buildings, field and farm boundaries, and archaeology. Three distinct mechanisms were identified. First, interest in conserving features is regarded as important in terms of a landscape's social and cultural history. Second, the appreciation of cultural and landscape assets as connected to personalised accounts of place. Third, linking the beauty and character of landscapes and features to particular traditions of the land management that had produced them [29,30].

Extent of Environmental Knowledge: The evidence revealed that an increase in farmers' environmental knowledge heightened their sense of environmental responsibility. For example, studies have shown that a lack of knowledge concerning bird population trends and some misinterpretation of habitat requirements may limit farmers' sense of responsibility and willingness to adopt an AES [17,31,32].

Sense of Environmental Responsibility: Related to the extent of environmental knowledge, several studies have highlighted the importance of a farmer's sense of environmental responsibility in their engagement with an AES. Feeling high levels of environmental responsibility can relate to a strong sense of belonging or place (e.g., Saxby et al. thus promoting continued AES work). Feeling a lack of environmental responsibility can reduce engagement with agri-environmental activities, such as a failure to address water pollution [33].

Unsubsidised environmental activity: An interest in the environment is often reflected in unsubsidised environmental activity on the farm. Morris et al. [34] found that those who had already undertaken enhancements under their own initiative, and those with some distinguishing environmental feature on the farm, such as a river, were more inclined to engage in an AES.

4.1.2 High-Level Indicator: Attitudes and Beliefs about Farming (Self-Identity)

Self-identity is the extent to which behaviour is considered to be consistent with the self and can be related to the social group that the farmer identifies with. It reflects the farmer's personal value system and worldview based on their own experiences and moral values and acts as an internal frame of reference, determining their perceptions of external factors and their own preferences. It has been suggested that behaviours closely associated with self-identity are more likely to persist over time, as the more the behaviour is repeated, the more important it becomes to the individual's self-concept [35]. Sub-indicators that make up the high-level indicator are:

Attitudes to Farming and Related Self-Identity: Farming identities are partly composed of perspectives on what it is to be a 'good farmer'; an idealised 'identity' that the farmer strives to imitate that can contribute to decisions on whether to engage in agri-environment activities or not. The perceived loss of self-identity as it relates to productivist ('food producer') farming ideals as a result of engaging with an AES can act as a motivational deterrent to fully engage [36,37]. Differing levels of commitment to environmental responsibility, agricultural productivity, and farm business management have clustered around a three-fold identity typology: (i) the profit maximiser, (ii) the food producer, and (iii) the custodian [13,38,39].

4.1.3 High-Level Indicator: Engagement with Advice and Training

The weight of evidence suggests that levels of engagement with advice and training are an important indicator reflecting the quality of engagement with an AES. Sub-indicators that made up this high-level indicator related to the level of engagement with advice or training and the level of rapport with the adviser.

Level of Engagement with Advice: There was evidence that those who have received on-farm advice are more likely to value and engage in environmental activity. For example, Gabel et al. [40], in a study of 133 farmers in Switzerland, found that the group who received on-farm advice for six years were more inclined to believe in the compatibility of biodiversity conservation and production and the importance of biodiversity than those who had not received advice.

Level of Engagement with Training: There is also evidence that active involvement in a formal environmental training course can affect the quality of environmental engagement and environmental outcomes. Lobley et al. [41], in a study of 48 farmers involved in an AES in England, found that training farmers increased their confidence in their abilities, their attitudes to agri-environmental management, and ultimately the agri-environmental outcomes on the farm.

Level of Rapport with Adviser: The level of rapport that the farmer has with the adviser is also an important factor. If the farmer is willing to communicate with the adviser and engage in an open and constructive dialogue, good environmental outcomes can be achieved. For example, a perceived good working relationship between fen owners and managers and their Natural England adviser in England was correlated with the successful delivery of lowland fen maintenance/restoration [42]. Such positive environmental outcomes are particularly likely where farmers have been able to develop a relationship with a particular adviser over a sustained time period [43].

4.1.4 High-Level Indicator: Level of AES Experience

Length of previous AES experience can increase environmental knowledge and skills, response efficacy, and an understanding of the AES rationale. Studies have found that length of experience within an AES can positively affect future AES engagement [18,19,44,45]. Experience is believed to increase the level of skill and knowledge of a particular practice, which, in turn, increases the efficacy of the behaviour [46]. Lobley et al. [41] suggested that farmers with more experience of an AES recognise the importance of relevant knowledge and become more receptive to training and advice. Increased AES experience can relate to ‘response efficacy’ in that farmers following AES practices for a number of years may start to notice the environmental benefits [24]. As Mettepenningen et al. found, the more a farmer is convinced of the effectiveness of the schemes, the higher the probability that he/she will participate in them. Furthermore, through longer-term experience, farmers may develop a greater understanding of the environmental rationale for a practice and undertake it more broadly across the farm, often as unsubsidised activity [24]. Conversely, negative experiences due to AES participation can also influence the quality of engagement. For example, if AES activities lead to increased predation of smaller birds by birds of prey, or increased fox, badger, and rabbit populations, farmers are less likely to engage with an AES [47].

4.2 Quality of AES Engagement Indicators-Capacity to Engage Indicators

Table 2 presents the key engagement factors identified in the literature that affect the nature and quality of farmer engagement in an AES linked to capacity to engage.

Table 2. Indicators and sub-indicators related to the capacity to engage.

High-Level Indicators	Sub-Indicators
Succession	Planning for succession
Lifecycle	Stage in lifecycle
Land manager education	Level of formal education
Farm tenure	Farm Tenure status
Financial security	Level of financial security

4.2.1 High-Level Indicator: Succession Status

Evidence of the effects of succession status on environmental behaviour is often contradictory. Some research suggests that farmers without successors are more likely to disengage from full-time agriculture and extensify, thus benefitting the environment [48–50]. However, Riley’s study of hay meadows in the Peak District found that the lack of a successor was often a reason for farmers not to enter their land into a conservation agreement

due to 'winding-down', poor labour availability, or wanting to have the flexibility to sell the land. Others failed to find any evidence to show that succession and business trajectory were determinants of environmental change on farms or the uptake of woodland incentives [51]. While the succession literature does not amount to an overarching consensus regarding environmental behaviour, pockets of evidence indicating a clear relationship between succession status and a positive or negative relationship with AES engagement, coupled with feedback from the Farm Conservation Advisers, resulted in the indicator being retained.

4.2.1 High-Level Indicator: Lifecycle

Lifecycle stage may be a better indicator of the quality of engagement in an AES than succession status, although it can be very complex to determine on multi-generational farms. According to Farmer-Bowers and Lane, many of the strategic decisions farming families make depend on their family's stage in life or the 'life-cycle'. Expansion and retrenchment are 'switched on and off' at different times in the farming family life-cycle [49,50]. Thus, life-cycle stages can be indicative of different motivations and pathways that have a direct impact on environmental decision-making [52]. These stages might, for example, include periods of major restructuring, farm expansion, and landscape change as the farm is prepared for a successor, which might or might not be compatible with AES engagement. Alternatively, the farmer could be at the stage of approaching retirement and winding down [53] and, hence, more amenable to schemes that involve extensification of the farming system.

4.2.2 High-Level Indicator: Land Manager Education

In many studies, farmers' formal education has proven to be one of the strongest variables determining conservation behaviour [54,55]. It is generally argued that farmers with a comparatively low formal education (e.g., left school without taking exams) are less likely to participate in agri-environmental schemes or to adopt environmentally friendly farming practices. Wilson and Hart [18] found a positive relationship between farmers' level of education and participation in an AES across ten countries in Europe. Those who completed schooling were far more likely to engage in an AES than those who did not complete their schooling.

4.2.3 High-Level Indicator: Farm Tenure

Studies have shown that tenant farmers will demonstrate a lower degree of engagement with AESs than landowner managers [44,56]. In most of the ten EU countries Wilson and Hart investigated, tenure played some role in regard to scheme uptake. Those farmers with more than 50% of their holding as freehold property were more likely to enter into an AES than those owning less than 50% freehold. Most tenant farmers did not enter schemes for two major reasons: uncertainty about long-term tenancy agreements with the landlords and lack of incentive to join if agri-environmental payments were not shared with the tenants. Similarly, results from a study by Fish et al. found that some tenant land managers were reluctant to engage in an AES because activities did not lead to a corresponding reduction in rent or they did not receive any of the benefits. There was also a reluctance to protect or enhance landscape features they did not own, partly because of the high cost of tenanted land.

4.2.4 High-Level Indicator: Financial Security

Although not specifically identified during the literature review, this indicator was added following the short-listing exercise in which the experts felt, based on their experiences, that financially secure farmers were more likely to have the time and resources to more fully engage with their AES than those who were struggling financially. Although this indicator is more economic than social, it was considered an important factor in affecting the quality of AES engagement and therefore added to the list of indicators. There is also

the potential to develop further economic-focused indicators in the future. However, it was also acknowledged that capturing such sensitive data could be problematic.

4.3. Quality of AES Engagement Indicators-Farmer Relations with Others Indicators

The key engagement factors identified in the literature that affect the nature and quality of farmer engagement in an AES, as linked to their connectedness and general level of social engagement, are presented in Table 3.

Table 3. High-level indicators and sub-indicators indicating quality of farmer relations with others.

High-Level Indicators	Sub-Indicators
Bonding social capital	Extent of group working; Extent of information and knowledge sharing; Level of social trust.
Bridging social capital	Extent of engagement in non-agricultural networks; Extent of public acknowledgement.
Linking social capital	Ability/desire to form positive relationships with government agency staff; Level of social trust with government.
Cultural (symbolic) capital	Extent of respect amongst peers; Extent of advising other land managers.

4.3.1 High-Level Indicator: Bonding Social Capital

Evidence from the literature suggests that bonding social capital, characterised by strong ties within groups or families (homogeneous individuals) that are high in reassurance and support, is an important indicator reflecting the quality of engagement with an AES. Sub-indicators that made up this high-level indicator related to the extent of group working and information and knowledge sharing and levels of social trust.

Extent of Group Working: Several studies have shown that the presence of bonding social capital within a group of farmers can result in positive environmental outcomes. Mills et al., in a study of a farmer's group in Wales, found that enhanced environmental outcomes were achieved by collective commitment-making and a sense of collective efficacy. Similarly, Wynne-Jones [57], looking at the same group, found that group membership gave them the support and encouragement needed to undertake work that they would not have done otherwise.

Extent of Information and Knowledge Sharing (Farmers' Group): There is also evidence that increased networking and the building of close relationships among farmers are more likely to lead to information sharing and knowledge exchange, as well as collaborative work [58]. Barnes et al. [33] and Mills et al. [59] found that information sharing within a group and making individual farmer practices visible to their peers can change perceptions of what is deemed as acceptable farming practices (e.g., pro-environmental behaviours).

Level of Social Trust: Bonding social capital is characterised by strong social trust. This social trust enables the information and knowledge sharing outlined above. However, if this trust is absent, there is a danger that group working can have negative effects on environmental achievements. Emery and Franks [60] identified fear of exposure to the judgement of others as a potential barrier to involvement in collective AES agreements. Additionally, there may be a potential lack of effective AES engagement if the scheme's objectives do not fit with the cultural norms of their peer group, a situation that is unlikely to occur in the presence of strong social trust.

4.3.2 High-Level Indicator: Bridging Social Capital

Bridging social capital refers to social connections between individuals who are dissimilar with respect to socio-economic and other characteristics (heterogeneous individuals).

However, such connections contribute an advantage through bringing new information and perspectives and introductions to new networks [61]. The extent of bridging social capital appears to have an overall positive effect on AES engagement. Sub-indicators that make up the high-level indicator:

Extent of Non-Agricultural Networks: Research has shown the benefits that new networks, linkages, and flows of information can have for changing social and farm business activity [62]. Those who are frequently engaged in non-agricultural networks are also thought to be more likely to be involved in AESs as these farmers feel a greater social responsibility [63]. The mechanism for contact with the general public is mainly through educational links and interaction with people interested in conservation and particularly walkers on the farm [64].

Extent of Public Acknowledgement: AES engagement can build up more cooperative and appreciative bridging social ties with the non-farming community [65]. According to Kuhfuss et al., farmers who experience acknowledgment for their contribution to protecting the environment are more likely to maintain the adopted practices even in the absence of payment. They may value external positive judgements and might fear social disapproval if they return to their less environmentally friendly practices.

4.3.3 High-Level Indicator: Linking Social Capital

Linking social capital is a term used to describe networks of people characterised by power differences, such as links between farmers and institutions (e.g., government agencies). Such connections are important for accessing support from institutions through personal contacts. Sub-indicators that make up the high-level indicator:

Ability/Desire to Form Positive Relationships with Government Agency Staff: Hall and Pretty [66], in a study of Norfolk farmers, revealed differences in farmers' ability and desire to form positive working relationships with government agency staff, which affected the level of support they achieved and hence environmental outcomes. Farmers with sustainable farms had success-based identities and stronger feelings of self-efficacy about their interaction with government agency staff and welcomed the prospect of farm visits from advisers and regulators. Conversely, farmers who fundamentally disagreed with the direction of agricultural policy and were aware of polluting and illegal practices on their farms were wary of contact with government agency staff.

Level of Social Trust with Government: Polman and Slangen [63] found that farmers who do not trust the government are less likely to conclude AES contracts. The feeling that government departments lacked the understanding and operational knowledge of farm-level practices often compounded this outcome [62]. In a situation where an AES was co-designed with farmers and government agencies, an agreement on adapted management of ditches and shores to improve water quality and biodiversity was achieved where previously there had been low levels of trust [67].

4.3.4 High-Level Indicator: Cultural (Symbolic) Capital

Cultural capital is a form of symbolic capital that refers to the accumulation of knowledge, behaviours, and skills that demonstrate a farmer's competence, which in turn impacts his/her social status or standing in society. Sub-indicators that make up the high-level indicator:

Respect Amongst Peers: Evidence of respect and positive judgements by other farmers for their AES activities demonstrates prestige (symbolic capital) and reinforces AES engagement. However, loss of prestige or respect amongst peers resulting from AES participation can reduce the quality of AES engagement [68]. Burton et al. [6] found that farmers were demotivated to participate in an AES because of a perceived inability to earn the desired levels of cultural capital through the land management options prescribed compared with productivist techniques they would otherwise pursue. However, more recently, it has emerged that AES engagement and good environmental behaviour is increasingly capable of reproducing cultural capital [69].

Advising Other Farmers: Burton and Paragahawewa [7] suggest that evidence of farmers advising other farmers on the implementation of their scheme demonstrates cultural capital. This interaction reinforces the idea that these practices are socially accepted by their peers, which means that they are more likely to become the focus of farm objectives. Saxby et al. [70] found that farmers involved in the North Yorkshire Cornfield Flowers Project had developed specialist plant skills and their advice was respected both within the project by other farmers and by agencies. However, these farmers also recognised that their counterparts outside of the project might not appreciate their conservation work.

4.4 Social Sustainability Outcome Indicators

As no studies explicitly considered the social sustainability of AESs, the review focused on suitable indicators from studies on the social sustainability of agriculture [71–73]. Even with these broader studies, few have measured social sustainability, partly due to its subjective character and the limited availability of required data. Studies that have looked at the social sustainability of farming have included issues such as measures of the quality of life on farms, including health and safety indicators, measures of the likelihood of farm succession, sectoral resilience and demographic change (ageing, migration, mobility), measures of educational participation and employment creation, risk of isolation, and access to services.

Farming is widely recognised as a stressful occupation that can impact mental and physical health [74]. Farmers face numerous stressors, including long working hours, time constraints, unpredictable weather, uncertain markets, untimely equipment breakdowns, social and geographical isolation, and increasing regulation, among other things [75–77]. Given what is known about the impact of farming on mental health, it is surprising that only two studies were identified that looked at the interlinkages between mental health and wellbeing and AES participation [70,78]. Due to this paucity in AES-specific research, we also drew on studies that have looked at the quality of life and mental health and wellbeing effects of agriculture more generally to make inferences about the impact of AES participation on mental health.

The social indicators identified of relevance to the impact of AES participation on the farm business and land manager’s quality of life and health and wellbeing are presented in Table 4.

Table 4. High-level indicators and sub-indicators indicating social sustainability outcomes of AES participation.

High-Level Indicators	Sub-Indicators
<i>Social sustainability outcomes – Resilience</i>	
Farm business resilience	Response to shocks
<i>Social sustainability outcomes – Quality of life</i>	
Employment and working conditions	Holidays taken Average Peak working hours
Job satisfaction	Work-life balance Being a farmer Freedom of decisions
Quality of life	Satisfaction with quality of life
<i>Social sustainability outcomes – Health and wellbeing</i>	
Happiness	Happiness Worthwhile
Physical and mental health	Physical health Mental

Table 4. *Cont.*

High-Level Indicators	Sub-Indicators
Stress levels due to AES	Workload Administration and bureaucracy Inspections Financial issues Environmental enjoyment

4.4.1 High-Level Indicator: Resilience

Resilience refers to the ability of farm businesses to recover quickly following difficulties and can affect the quality of AES engagement. For example, it might relate to the farm business’s level of financial security, which can affect a farm’s ability to bounce back following a shock. Some evidence suggests that AES payments can help improve a business’s financial security. For example, Mills [64] found that scheme payments in England helped stabilise incomes and offered the security of a regular income twice a year. The payments also made it easier to budget for lean months and the 10-year time horizon of the AES helped with financial planning. Similarly, Ingram et al. [52] found that payments for an AES in Wales offered financial security and were viewed as a way of keeping the farm business going when farm incomes were low. There is also evidence that AES funding can facilitate business restructuring and long-term adjustment to increase farm business resilience, particularly in a shift from productivism to cost-efficiency [52,79].

4.4.2 High-Level Indicator: Quality of Life – Employment and Working Conditions

The literature on social sustainability in agriculture revealed indicators that can serve to measure the impact of AES participation on employment and working, in terms of the extent to which an AES affected the number of holidays taken, or average peak working hours [71,80,81]. For some land managers, an AES can be an opportunity to intensify their farming system and reduce workloads; for others, it can add to existing workloads. For example, Mills [64] found that around 27% of agreement holders for an AES in England reported an increased workload as a result of the scheme. Reasons stated for this increased workload included an intensification of boundary work, such as hedges and walling, and more scrub management. Conversely, reasons given for decreases in workload included less hedge cutting, reduced grassland inputs, and stock numbers.

4.4.3 High-Level Indicator: Quality of Life – Job Satisfaction

Job satisfaction is known to influence quality of life [82]. The FLINT study [71] identified a number of variables that can affect job satisfaction for agricultural workers. We suggest that three of these can be used to identify whether an AES has contributed negatively or positively to job satisfaction: work-life balance, being a farmer, and freedom of decision-making.

Work-life balance: In the context of AESs, satisfaction with work-life balance relates to the extent to which AES engagement allows the farmer to do things that she or he likes doing in comparison to job duties.

Being a farmer: Satisfaction with being a farmer relates to the extent to which AES engagement affects the perception of the profession chosen and its associated lifestyle.

Freedom of decisions: Freedom of decisions refers to farmers’ capacity to make their own decision about joining/rejoining an AES and how they manage their land once in an AES. One outcome from AESs where management practices are heavily prescribed with limited flexibility is a sense that prescriptions are imposed in a top-down way with little consideration given to local or tacit knowledge. A sense of lost control over their land management can prevail, resulting in feelings of dispossession, affecting their engagement with an AES and, therefore, environmental outcomes [36]. In contrast, with

AESs that give farmers the control over delivering the management required, such as results-orientated AESs, a much greater sense of agency is evident, which is likely to lead to improved environmental outcomes. For example, Wezel et al. [83], in a survey of 79 mountain farmers in 5 countries in Europe, found that almost two-thirds of farmers thought that a result-oriented approach to AES would promote more direct and efficient management of biodiversity on their farm.

4.4.4 High-Level Indicator: Quality of Life

Quality of life is commonly assessed through self-reported life satisfaction and is usually dealt with alongside other aspects of subjective and personal wellbeing, themselves self-reported measures and described further below. Heo et al.'s study [84] of U.S. farmers serves to highlight the potential to further explore the life satisfaction of farmers and the importance of stress, risk, and control to the quality of life experienced by them. However, Heo et al.'s focus on finance-related psychological factors has limited relevance to the specific case of AESs.

4.4.5 High-Level Indicator: Health and Wellbeing – Happiness (Subjective Wellbeing)

There is considerable interest among governments in the measurement of subjective wellbeing. The World Happiness Report [85] compiles data from 150 countries and has revealed correlations between happiness and a strong social environment, a connection to the natural environment, and differences between rural and urban dwellers. In the United Kingdom, the annual personal and economic wellbeing report compiles data to monitor the wellbeing of the wider population but with less emphasis on causality. Other work (See for example, [86–88]) has broadly shown happiness to be a product of the success achieved in earning a living, raising a family, being in good health, and working in an interesting and secure job.

These concepts are equally pertinent at the farm level, although there is considerably less evidence compared with the wider population. While economic and environmental aspects have enjoyed fairly wide coverage in relation to the agricultural sector, human well-being (including physical and mental health, discussed below) has received less attention. Markussen's work [89] has suggested the importance of relative income (as opposed to absolute income) in determining the happiness of farmers, but there is virtually no evidence of the relationship between happiness and participation in AES schemes. Nevertheless, the evidence also implies that understanding subjective wellbeing, and what shapes it, implies an awareness of the drivers of mental health, as well as an understanding of the unique blend of economic and social pressures that farmers are exposed to. For example, the literature highlights that subjective wellbeing is often shaped very much by the nature and quality of human interaction and forms of social structure. Thus, indicators of stress and social capital will themselves relate to the happiness of farmers.

4.4.6 High-Level Indicator: Health and Wellbeing – Physical and Mental Health

Working in the agricultural sector is physically and mentally demanding. In addition to the unique sources of mental stress farmers are subjected to, farm environments are characterised by a broad and changeable range of physical, biological, chemical, and mechanical hazards [90]. This environment causes a series of health issues for farmers, such as respiratory problems, poisoning, ergonomic hazards, and musculoskeletal injuries [90]. While they obviously have individual legitimacy, taken together, physical and mental health can be regarded as core elements of personal wellbeing, itself defined as a positive physical, social, and mental state, which stems from a host of collective goods and relations with people and places [91,92]. It requires basic needs to be met and enhanced by conditions that include supportive personal relationships, community empowerment, financial security, rewarding employment, good health, and a healthy and attractive environment [91]. However, as mentioned, the relative lack of attention on personal development and health (especially mental health) issues of farmers and

the wider dynamics of isolation and negative societal perceptions of farming highlights the need for a considerably better understanding.

In relation to AESs, this dearth of evidence is even more acute, although work on Natural Resource Management (NRM) programs in Australia serve to highlight its significant value. Schirmer et al.'s Australian study [93] suggests that NRM programs influence several important determinants of farmer wellbeing, in particular social capital, self-efficacy, social identity, material wellbeing, and physical and mental health itself. The pathways by which NRM influences these determinants are mediated by distal factors such as changes in land conditions, farmer skills and knowledge, and resources accessible to farmers. These, in turn, are moderated by the design and delivery of NRM programs, suggesting the potential to enhance the health benefits of NRM through specific attention to program design.

4.4.7 High-Level Indicator: Health and Wellbeing—Stress Levels Due to AES

Several stressors in a Farmers Stressor Inventory produced by Truchot and Andela [94] were considered relevant and suitable as sub-indicators that are likely to be exacerbated by AES participation. The sub-indicators are:

Stress levels due to AES workload: For some farmers, AES involvement can lead to increases in farm workload with the potential to increase stress levels. It is known that some farmers are already under considerable stress from their existing workloads, working long hours, with little time to relax and recuperate [77]. Therefore, any increased workload from an AES may add to existing stress levels. Alternatively, if an AES is used to restructure the farming system away from intensive production, the AES may reduce the workload.

Stress levels due to AES administration and bureaucracy: A study of the farming community's mental health identified that farmers were increasingly stressed by mounting levels of paperwork [77]. The paperwork was considered to have grown beyond the point it was manageable, especially if IT skills were absent. Stress was also created by systems that were changed before farmers had time to adjust to them and were introduced with insufficient lead-in times. Several AES evaluations have identified an aversion to the paperwork involved and the AES administrative systems employed [95,96]. Therefore, it can be inferred that the level of paperwork and difficulties with an AES's administrative systems can contribute to farmers' stress levels.

Stress levels due to AES inspections: Fear of compliance inspections and inadvertently breaching the AES rules have also added to farmers' stress levels.

Stress levels due to financial issues: Farmers who have financial concerns may face added pressures from the additional demands of an AES. However, as mentioned earlier, there is also evidence that AES payments can help relieve some of the financial pressure on farm businesses [52,64].

Stress levels due to enjoyment of environmental outcomes: Positive impacts on mental health and wellbeing may result from AES participation due to improvements in the on-farm environment, which might include an increase in particular species, such as birds, flowering plants, or particular features, such as ponds or woodlands. For example, Saxby et al. described three farmers involved in an AES project who were motivated to stay at home to enjoy the wildlife attributed to their AES work, when previously they would have visited wildlife sites elsewhere.

5. Discussion

This paper aimed to identify social indicators that can be used to measure the impact of AESs in terms of improved quality of AES engagement and social outcomes. This is an under-researched area within the AES field as most indicators used in current AES monitoring and evaluation relate to environmental and economic outcomes only.

The paucity of research into social indicators can partly be explained by some social scientists' reluctance to engage with the positivist methodological approach on which indicators are normally constructed, a point made by Slee [97] in relation to social

indicators for forestry. However, we argue that if these indicators are excluded from AES policy monitoring and evaluation programmes, these social factors will be marginalised and overlooked by policy-makers. This is particularly important as there is increasing evidence that some of these social factors can positively affect long-term environmental behaviour change, and AES are often criticised for incentivising transactional short-term behavioural change [8]. Social scientists are also concerned that the reductionist and narrowly positivist approach to indicators fails to capture all elements of value and, in particular, the local context. We acknowledge these concerns but view the use of indicators as part of a broader mix of methods for the monitoring and evaluation of AESs, including qualitative assessments to understand the local context in which responses are given, especially when deployed in association with a trusted farm adviser.

The survey questions used to capture the indicators data (see the Supplementary Materials for a refined version of the survey used in field testing) adopted a series of scale or ranking questions. For some indicators or questions, the scores can be weighted if they are considered more important than others. To provide a single measure for composite indicators (i.e., those made up of various sub-indicators) it is suggested that all scale data are transformed into an appropriate functional range of 0-1 and the mean of all sub-indicators taken as the single proportional measure. However, like any reductionist approach, it is also important that the indicator is understood in the context. When giving a score, the respondent land managers usually also provide important qualitative information explaining their responses, which should also be captured.

The indicators outlined in this paper are subject to an ongoing assessment. For example, some of the indicators were used in the evaluation of an AES Test and Trial programme in England [97]. Furthermore, the Catchment Sensitive Farming programme in England is looking to integrate social indicators, based on this work, as part of their next phase of programme evaluation (P Smith pers. comm.). It is recognised that these social indicators will form an important communication tool and will assist policy-makers in improving future AES design. To ensure their legitimacy, credibility, and salience, participatory development of these indicators is required through continued testing and feedback. We recommend that the indicators and the questions are tested in a larger pilot survey, based on a stratified randomised sample that is large enough for statistical validation and can examine correlations between sub and composite indicators to reduce them into a more parsimonious set for future application. Further deployment of the survey will test the reliability and validity of the indicators, ensuring the questions obtain consistently robust results over time, and across space, for example allowing regional comparisons that control for spatial as well as sectoral differences.

We envisage that the resulting set of indicators could be used for various purposes. Importantly, the indicators could be utilized as part of a wider AES monitoring and evaluation programme, including in assessing the likely success of a given scheme, how to improve social and environmental outcomes, and how to increase sustained pro-environmental behaviour. They are currently being considered for use in the monitoring and evaluation of the Catchment Sensitive Farming programme and future Environmental Land Management Schemes' pilots in England to better understand the social outcomes of these programmes and the social indicators that drive success.

A further application could be the development of an index of indicators to provide a relative score for the social sustainability of a given scheme. The majority of metrics that make up the index would be derived from ordinal scales based on self-reported attitudinal, behavioural, and experiential variables (such as *Attitudes to farming and self-identity*) and measured on 1-5 Likert scales. These will be subsequently converted into ratio data in the functional range 0-1 to help compile the index and enable a variety of inferential, descriptive, and statistical techniques to be applied to the data (Ordinal-scale data are transformed into an appropriate functional range of 0-1, whereby scaled variables are transformed in the form $X - \min[X] / (\max[X] - \min[X])$). This produces a

transformation of the ordinal codes 1 through 5 (i.e., Strongly Disagree through Strongly Agree): 1 = 0; 2 = 0.25; 3 = 0.50; 4 = 0.75; 5 = 1.0. Transformation of ordinal-scale variables into the functional range 0–1 also helps to avoid any bias towards the median score as it enables the absolute value of zero.) Other indicators would comprise interval data demonstrating the difference between farm or farmer characteristics, such as *working hours* or *holidays taken*, or nominal data, such as *tenure status* or *level of formal education*.

The indicators could be further tested to identify their ability to predict the agreement trajectory and as proxies for environmental outcomes, including the long-term and 'hidden' outcomes. This could lead to the development of a suite of indicators that could be used by farm advisers to help them assess the quality of engagement an advisee has with their agreement, identify the trajectory of an agreement, as a way of learning about their advisee, and so better support the advisee to improve the delivery of environmental outcomes. For example, the indicators have recently been used in a survey to help understand the characteristics of the farmers who signed up to a conservation land management pilot and how these characteristics link to their levels of engagement with the pilot. Similarly, the indicators could be used as part of adviser training to help advisers understand the social world of agreement holders, the impact of agreements, and how this influences an agreement's success (including encouraging and enabling sustained pro-environmental behaviour change).

6. Conclusions

As the environmental quality of agricultural land continues to decline, there is an ever increasing need to find effective policy mechanisms to encourage environmentally beneficial farming practices. Agri-environment schemes were introduced as such a mechanism throughout Europe, and to ensure their effectiveness, they are subject to monitoring and evaluation programmes. However, in this paper, we argue that these programmes are often insufficient as they fail to focus on the trajectory of the farmers in terms of their quality of engagement with environmental management work. It is increasingly being recognised that without more explicit consideration of the people involved in land management as agents of change, the required environmental improvements will not be achieved.

Current AES monitoring and evaluation programmes are also limited in measuring the social sustainability of AESs at the farm level, particularly in terms of their impact on health and wellbeing and quality of life. This lack of attention to the social aspects of AES monitoring and evaluation has meant an under-development in conceptualising and operationalising social indicators compared with environmental and economic indicators. The aim of this paper, therefore, was, through a comprehensive and systematic literature review, to develop a set of social indicators that can be used to measure the level of farmers' engagement with their scheme agreement and the social sustainability outcomes from participation. Two conceptual frameworks were developed to guide the literature review of 122 documents and, following a short-listing ranking exercise with two sets of experts, 20 high-level (composite) social indicators and associated sub-level (component) indicators were identified.

This paper is a first step in identifying indicators that can measure the quality of AES engagement based on farmers' willingness and ability to engage with a scheme and their agreement, specifically their level of connectedness with others and the impacts of AES engagement on quality of life and health and wellbeing.

In a further step, we have developed a series of survey questions that can be used to capture the indicator data. These questions have been tested and subsequently revised with a small cohort of AES agreement holders. The next step is to further test the reliability and validity of the indicators in a larger survey. The results will be a robust set of social indicators that can be used to measure and assess the quality of an agreement holder's engagement and the social outcomes and sustainability of AESs,

which will provide a good indicator of the long-term AES environmental outcomes. The indicators will help to develop a deeper understanding of why and how environmental change happens on farms.

Supplementary Materials: The following is available online at <https://www.mdpi.com/article/10.3390/su13147820/s1>, Survey form S1: Social Indicators Survey Questions.

Author Contributions: Conceptualization, J.M.; data curation, J.M. and H.C.; funding acquisition, J.M.; investigation, J.M., H.C., P.C., G.C., P.G. and M.L.; methodology, J.M., H.C. and P.C.; project administration, J.M.; resources, J.M.; supervision, J.M.; visualization, J.M. and B.B.; writing—original draft, J.M.; writing—review and editing, J.M., H.C., P.C., P.G., B.B., G.C. and M.L. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Natural England and the Department of Environment, Food and Rural Affairs (Defra), grant number LM0478.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: All subjects gave their informed consent for inclusion before they participated in the study. The interview protocol was reviewed and approved by the University of Gloucestershire’s Research Ethics Committee whose procedures align with the Declaration of Helsinki (REC.19.64.1, 6 June 2019).

Data Availability Statement: The literature review dataset is available upon request.

Acknowledgments: We would like to acknowledge the support of Natural England and the Department of Environment, Food and Rural Affairs (Defra) in funding the research project that contributed to this paper. Particular thanks to Sima Sandhu (Defra), Liz Finch (Defra), Phil Smith (Environment Agency), and Jilly Hall (Natural England) for their contributions. Additionally, a huge thanks to the Natural England advisers and the farmers and land managers, along with the Environmental Land Management Social Science Expert Panel members, who gave their valuable time to provide feedback on the indicators and the survey questions.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; or in the decision to publish the results. They did review the manuscript before submission.

References

1. European Commission. *Technical Handbook on the Monitoring and Evaluation Framework of the Common Agricultural Policy 2014–2020*; European Commission: Brussels, Belgium, 2017.
2. Scown, M.W.; Nicholas, K.A. European agricultural policy requires a stronger performance framework to achieve the Sustainable Development Goals. *Glob. Sustain.* **2020**, *3*, 3. [[CrossRef](#)]
3. Batáry, P.; Dicks, L.V.; Kleijn, D.; Sutherland, W.J. The role of agri-environment schemes in conservation and environmental management. *Conserv. Biol.* **2015**, *29*, 1006–1016. [[CrossRef](#)]
4. Marggraf, R. Comparative assessment of agri-environment programmes in federal states of Germany. *Agric. Ecosyst. Environ.* **2003**, *98*, 507–516. [[CrossRef](#)]
5. Ansell, D.; Freudenberger, D.; Munro, N.; Gibbons, P. The cost-effectiveness of agri-environment schemes for biodiversity conservation: A quantitative review. *Agric. Ecosyst. Environ.* **2016**, *225*, 184–191. [[CrossRef](#)]
6. Burton, R.J.; Kuczera, C.; Schwarz, G. Exploring Farmers’ Cultural Resistance to Voluntary Agri-environmental Schemes. *Sociol. Rural.* **2008**, *48*, 16–37. [[CrossRef](#)]
7. Burton, R.J.; Paragahawewa, U.H. Creating culturally sustainable agri-environmental schemes. *J. Rural. Stud.* **2011**, *27*, 95–104. [[CrossRef](#)]
8. Morris, C.; Potter, C. Recruiting the new conservationists: Farmers’ adoption of agri-environmental schemes in the U.K. *J. Rural. Stud.* **1995**, *11*, 51–63. [[CrossRef](#)]
9. Schumann, A. *Using Outcome Indicators to Improve Policies: Methods, Design Strategies and Implementation*; OECD Regional Development Working Papers; OECD: Paris, France, 2016.
10. Department for Environment Food and Rural Affairs. *Measuring Environmental Change: Outcome Indicator Framework for the 25 Year Environment Plan*; HM Government London: London, UK, 2019.
11. Eaton, M.A.; Noble, D.G. UK Biodiversity Indicators 2020: Technical Background Document: The Wild Bird

- Indicator for the UK and England; Joint Nature Conservation Committee. 2020. Available online: <https://data.jncc.gov.uk/data/7162735c-9fa7-4962- aee7-709d242173f1/UKBI2020-TechBG-C5-A.pdf> (accessed on 6 July 2021).
12. Department for Environment Food and Rural Affairs. *A Green Future: Our 25 Year Plan to Improve the Environment*; HM Government London: London, UK, 2018.
 13. Mills, J.; Gaskell, P.; Ingram, J.; Dwyer, J.; Reed, M.; Short, C. Engaging farmers in environmental management through a better understanding of behaviour. *Agric. Hum. Values* **2016**, *34*, 283–299. [[CrossRef](#)]
 14. Ingram, J.; Short, C.J.; Gaskell, P.; Mills, J.; Lewis, N.; Clark, M.; Dennis, E.; Fisher, R.; Owen, I. *Entry and Exit from Agri- Environmental Schemes in Wales*; Countryside and Community Research Institute: Cheltenham, UK, 2009.
 15. Dwyer, J.; Mills, J.; Ingram, J.; Taylor, J.; Burton, R.; Blackstock, K.; Slee, B.; Brown, K.; Schwarz, G.; Matthews, K. *Understanding and Influencing Positive Behaviour Change in Farmers and Land Managers*; CCRI, Macaulay Institute: Cheltenham, UK, 2007.
 16. Dessart, F.J.; Barreiro-Hurlé, J.; Van Bavel, R. Behavioural factors affecting the adoption of sustainable farming practices: A policy-oriented review. *Eur. Rev. Agric. Econ.* **2019**, *46*, 417–471. [[CrossRef](#)]
 17. Herzon, I.; Mikk, M. Farmers’ perceptions of biodiversity and their willingness to enhance it through agri-environment schemes: A comparative study from Estonia and Finland. *J. Nat. Conserv.* **2007**, *15*, 10–25. [[CrossRef](#)]
 18. Wilson, A.G.; Hart, K. Financial Imperative or Conservation Concern? EU Farmers’ Motivations for Participation in Voluntary Agri-Environmental Schemes. *Environ. Plan. A Econ. Space* **2000**, *32*, 2161–2185. [[CrossRef](#)]
 19. Siebert, R.; Toogood, M.; Knierim, A. Factors Affecting European Farmers’ Participation in Biodiversity Policies. *Sociol. Rural.* **2006**, *46*, 318–340. [[CrossRef](#)]
 20. Sutherland, L.-A.; Mills, J.; Ingram, J.; Burton, R.J.; Dwyer, J.; Blackstock, K. Considering the source: Commercialisation and trust in agri-environmental information and advisory services in England. *J. Environ. Manag.* **2013**, *118*, 96–105. [[CrossRef](#)] [[PubMed](#)]
 21. Piasecki, J.; Waligora, M.; Dranseika, V. Google Search as an Additional Source in Systematic Reviews. *Sci. Eng. Ethics* **2017**, *24*, 809–810. [[CrossRef](#)] [[PubMed](#)]
 22. Bartkowski, B.; Bartke, S. Leverage Points for Governing Agricultural Soils: A Review of Empirical Studies of European Farmers’ Decision-Making. *Sustainability* **2018**, *10*, 3179. [[CrossRef](#)]
 23. Burton, R.J. The influence of farmer demographic characteristics on environmental behaviour: A review. *J. Environ. Manag.* **2014**, *135*, 19–26. [[CrossRef](#)] [[PubMed](#)]
 24. Riley, M. How does longer term participation in agri-environment schemes [re]shape farmers’ environmental dispositions and identities? *Land Use Policy* **2016**, *52*, 62–75. [[CrossRef](#)]
 25. Department for International Development. *Assessing the Strength of Evidence*; DFID: London, UK, 2014.
 26. Mills, J.; Gaskell, P.; Reed, M.; Short, C.; Ingram, J.; Boatman, N.; Jones, N.; Conyers, S.; Carey, P.; Winter, M.; et al. Farmer attitudes and evaluation of outcomes to on-farm environmental management. *Asp. Appl. Biol.* **2013**, *118*, 209–216.
 27. Ahnström, J.; Höckert, J.; Bergeå, H.L.; Francis, C.A.; Skelton, P.; Hallgren, L. Farmers and nature conservation: What is known about attitudes, context factors and actions affecting conservation? *Renew. Agric. Food Syst.* **2008**, *24*, 38–47. [[CrossRef](#)]
 28. Swagemakers, P.; Wiskerke, H.; Van Der Ploeg, J.D. Linking birds, fields and farmers. *J. Environ. Manag.* **2009**, *90*, S185–S192. [[CrossRef](#)]
 29. Fish, R.; Seymour, S.; Watkins, C. Conserving English Landscapes: Land Managers and Agri-Environmental Policy. *Environ. Plan. A Econ. Space* **2003**, *35*, 19–41. [[CrossRef](#)]
 30. Gaskell, P.; Edwards, B.; Courtney, P. *Evaluating the Effectiveness of Environmental Stewardship for the Conservation of Historic Buildings, Final Report to Natural England*; University of Gloucestershire: Cheltenham, UK, 2014.
 31. Jacobson, S.K.; Sieving, K.E.; Jones, G.A.; Van Doorn, A. Assessment of Farmer Attitudes and Behavioral Intentions toward Bird Conservation on Organic and Conventional Florida Farms. *Conserv. Biol.* **2003**, *17*, 595–606. [[CrossRef](#)]
 32. Smallshire, D.; Robertson, P.; Thompson, P. Policy into practice: The development and delivery of agri-environment schemes and supporting advice in England. *Ibis* **2004**, *146*, 250–258. [[CrossRef](#)]
 33. Barnes, A.; Toma, L.; Willock, J.; Hall, C. Comparing a ‘budge’ to a ‘nudge’: Farmer responses to voluntary and compulsory compliance in a water quality management regime. *J. Rural. Stud.* **2013**, *32*, 448–459. [[CrossRef](#)]
 34. Morris, J.; Mills, J.; Crawford, I. Promoting farmer uptake of agri-environment schemes: The Countryside Stewardship Arable Options Scheme. *Land Use Policy* **2000**, *17*, 241–254. [[CrossRef](#)]
 35. Charng, H.-W.; Piliavin, J.A.; Callero, P.L. Role Identity and Reasoned Action in the Prediction of Repeated Behavior. *Soc. Psychol. Q.* **1988**, *51*, 303. [[CrossRef](#)]
 36. Burgess, J.; Clark, J.; Harrison, C.M. Knowledges in action: An actor network analysis of a wetland agri-environment scheme. *Ecol. Econ.* **2000**, *35*, 119–132. [[CrossRef](#)]
 37. Burton, R.J. Seeing through the ‘good farmer’s’ eyes: Towards developing an understanding of the social symbolic value of ‘productivist’ behaviour. *Sociol. Rural.* **2004**, *44*, 195–215. [[CrossRef](#)]
 38. Schmitzberger, I.; Wrбка, T.; Steurer, B.; Aschenbrenner, G.; Peterseil, J.; Zechmeister, H. How farming styles

- influence biodiversity maintenance in Austrian agricultural landscapes. *Agric. Ecosyst. Environ.* **2005**, *108*, 274–290. [[CrossRef](#)]
39. Page, G.; Bellotti, W. Farmers value on-farm ecosystem services as important, but what are the impediments to participation in PES schemes? *Sci. Total. Environ.* **2015**, *515–516*, 12–19. [[CrossRef](#)]
 40. Gabel, V.M.; Home, R.; Stolze, M.; Birrer, S.; Steinemann, B.; Köpke, U. The influence of on-farm advice on beliefs and motivations for Swiss lowland farmers to implement ecological compensation areas on their farms. *J. Agric. Educ. Ext.* **2018**, *24*, 233–248. [[CrossRef](#)]
 41. Malkanthi, S.P.; Routray, J.K. Visitor satisfaction in agritourism and its implications for agritourism farmers in Sri Lanka. *Int. J. Agric. Manag.* **2012**, *2*, 17. [[CrossRef](#)]
 42. Wheeler, B.R.; Wilson, P.J. *Establishment of a Monitoring Sample of Sites Being Managed under HLS to Maintain or Restore Lowland Fen. Report to Natural England LM0442*; Belinda Wheeler: Tavistock, UK, 2016. Morris, C. Negotiating the boundary between state-led and farmer approaches to knowing nature: An analysis of UK agri-environment schemes. *Geoforum* **2006**, *37*, 113–127. [[CrossRef](#)]
 43. DeFrancesco, E.; Gatto, P.; Runge, F.; Trestini, S. Factors Affecting Farmers? Participation in Agri-environmental Measures: A Northern Italian Perspective. *J. Agric. Econ.* **2007**, *59*, 114–131. [[CrossRef](#)]
 44. Smithers, J.; Furman, M. Environmental farm planning in Ontario: Exploring participation and the endurance of change. *Land Use Policy* **2003**, *20*, 343–356. [[CrossRef](#)]
 45. Jongeneel, R.A.; Polman, N.B.; Slangen, L.H. Why are Dutch farmers going multifunctional? *Land Use Policy* **2008**, *25*, 81–94. [[CrossRef](#)]
 46. Franks, J.; Emery, S.; Whittingham, M.; McKenzie, A. Farmer attitudes to cross-holding agri-environment schemes and their implications for Countryside Stewardship. *Int. J. Agric. Manag.* **2016**, *5*, 78–95.
 47. Beedell, J.; Rehman, T. Using social-psychology models to understand farmers' conservation behaviour. *J. Rural. Stud.* **2000**, *16*, 117–127. [[CrossRef](#)]
 48. Potter, C.; Lobley, M. The conservation status and potential of elderly farmers: Results from a survey in England and Wales. *J. Rural. Stud.* **1992**, *8*, 133–143. [[CrossRef](#)]
 49. Potter, C.; Lobley, M. The Farm Family Life Cycle, Succession Paths and Environmental Change in Britain's Countryside. *J. Agric. Econ.* **1996**, *47*, 172–190. [[CrossRef](#)]
 50. Wynn, G.; Crabtree, B.; Potts, J. Modelling Farmer Entry into the Environmentally Sensitive Area Schemes in Scotland. *J. Agric. Econ.* **2008**, *52*, 65–82. [[CrossRef](#)]
 51. Ingram, J.; Gaskell, P.; Mills, J.; Short, C. Incorporating agri-environment schemes into farm development pathways: A temporal analysis of farmer motivations. *Land Use Policy* **2013**, *31*, 267–279. [[CrossRef](#)]
 52. Barreiro-Hurle, J.; Espinosa-Goded, M.; Dupraz, P. Does intensity of change matter? Factors affecting adoption of agri-environmental schemes in Spain. *J. Environ. Plan. Manag.* **2010**, *53*, 891–905. [[CrossRef](#)]
 53. Wilson, G.A. Factors Influencing Farmer Participation in the Environmentally Sensitive Areas Scheme. *J. Environ. Manag.* **1997**, *50*, 67–93. [[CrossRef](#)]
 54. Dupraz, P.; Vanslebrouck, I.; Bonnieux, F.; Van Huylenbroeck, G. Farmers' participation in European agri-environmental policies. *Zaragoza* **2002**, *28*, 31.
 55. Walford, N. Agricultural adjustment: Adoption of and adaptation to policy reform measures by large-scale commercial farmers. *Land Use Policy* **2002**, *19*, 243–257. [[CrossRef](#)]
 56. Wynne-Jones, S. Understanding farmer co-operation: Exploring practices of social relatedness and emergent affects. *J. Rural. Stud.* **2017**, *53*, 259–268. [[CrossRef](#)]
 57. Swales, V. *Realising Agricultural Landscape-Scale Conservation*; RSPB: Sandy, UK, 2009.
 58. Mills, J.; Gibbon, D.; Ingram, J.; Reed, M.; Short, C.; Dwyer, J.; Reed, M. Organising Collective Action for Effective Environmental Management and Social Learning in Wales. *J. Agric. Educ. Ext.* **2011**, *17*, 69–83. [[CrossRef](#)]
 59. Emery, S.B.; Franks, J.R. The potential for collaborative agri-environment schemes in England: Can a well-designed collaborative approach address farmers' concerns with current schemes? *J. Rural. Stud.* **2012**, *28*, 218–231. [[CrossRef](#)]
 60. Granovetter, M.S. The Strength of Weak Ties. *Am. J. Sociol.* **1973**, *78*, 1360–1380. [[CrossRef](#)]
 61. Oreszczyn, S.; Lane, A.; Carr, S. The role of networks of practice and webs of influencers on farmers' engagement with and learning about agricultural innovations. *J. Rural. Stud.* **2010**, *26*, 404–417. [[CrossRef](#)]
 62. Polman, N.; Slangen, L. Institutional design of agri-environmental contracts in the European Union: The role of trust and social capital. *Wagening. J. Life Sci.* **2008**, *55*, 413–430. [[CrossRef](#)]
 63. Mills, J. Exploring the social benefits of agri-environment schemes in England. *J. Rural. Stud.* **2012**, *28*, 612–621. [[CrossRef](#)]
 64. De Krom, M. Farmer participation in agri-environmental schemes: Regionalisation and the role of bridging social capital. *Land Use Policy* **2017**, *60*, 352–361. [[CrossRef](#)]
 65. Hall, J.; Pretty, J. Then and now: Norfolk farmers' changing relationships and linkages with government agencies during transformations in land management. *J. Farm Manag.* **2008**, *13*, 393–418.
 66. Westerink, J.; Opdam, P.; van Rooij, S.; Steingröver, E. Landscape services as boundary concept in landscape governance: Building social capital in collaboration and adapting the landscape. *Land Use Policy* **2017**, *60*, 408–418.

- [CrossRef]
67. Kuhfuss, L.; Préget, R.; Thoyer, S.; Hanley, N.; Le Coent, P.; Désolé, M. *Nudges, Social Norms and Permanence in Agri-Environmental Schemes*; University of St. Andrews: St. Andrews, UK, 2015.
 68. Cusworth, G. Falling short of being the 'good farmer': Losses of social and cultural capital incurred through environmental mismanagement, and the long-term impacts agri-environment scheme participation. *J. Rural. Stud.* **2020**, *75*, 164–173. [CrossRef]
 69. Saxby, H.; Gkartzios, M.; Scott, K. 'Farming on the Edge': Wellbeing and Participation in Agri-Environmental Schemes. *Sociol. Rural.* **2017**, *58*, 392–411. [CrossRef]
 70. Herrera, B.; Gerster-Bentaya, M.; Knierim, A. Social indicators of farm-level sustainability. *FLINT Deliverable D* **2016**, *5*. Available online: <https://www.flint-fp7.eu/downloads/reports/D5.2e.pdf> (accessed on 6 July 2021).
 71. Hayati, D. *Literature Review: A Literature Review on Frameworks and Methods for Measuring and Monitoring Sustainable Agriculture*; Technical Report; Food and Agriculture Organization of the United Nations: Rome, Italy, 2017.
 72. Lebacqz, T.; Baret, P.; Stilmant, D. Sustainability indicators for livestock farming. A review. *Agron. Sustain. Dev.* **2013**, *33*, 311–327. [CrossRef]
 73. Gregoire, A. The mental health of farmers. *Occup. Med.* **2002**, *52*, 471–476. [CrossRef]
 74. Parent-Thirion, A.; Fernandez-Macias, E.; Hurley, J.; Vermeylen, G. *Fourth European Working Conditions Survey; Office for Official Publication of the European Communities: Luxembourg, Belgium, 2007.*
 75. Kearney, G.D.; Rafferty, A.P.; Hendricks, L.R.; Allen, D.L.; Tutor-Marcom, R. A Cross-Sectional Study of Stressors Among Farmers in Eastern North Carolina. *N. C. Med. J.* **2014**, *75*, 384–392. [CrossRef]
 76. Parry, J.; Lindsey, R.; Taylor, R. *Farmers, Farm Workers and Work-Related Stress*; Health and Safety Executive: Liverpool, UK, 2005.
 77. Hounsome, B.; Edwards, R.T.; Edwards-Jones, G. A note on the effect of farmer mental health on adoption: The case of agri-environment schemes. *Agric. Syst.* **2006**, *91*, 229–241. [CrossRef]
 78. Gorman, M.; Mannion, J.; Kinsella, J.; Bogue, P. Connecting environmental management and farm household livelihoods: The Rural Environment Protection Scheme in Ireland. *J. Environ. Policy Plan.* **2001**, *3*, 137–147. [CrossRef]
 79. Hřebíček, J.; Valtinyová, S.; Křen, J.; Hodinka, M.; Trenz, O.; Marada, P. Sustainability Indicators: Development and Application for the Agriculture Sector. In *Sustainability Appraisal: Quantitative Methods and Mathematical Techniques for Environmental Performance Evaluation*; Springer: Berlin/Heidelberg, Germany, 2013; pp. 63–102.
 80. Dillon, E.J.; Hennessy, T.; Buckley, C.; Donnellan, T.; Hanrahan, K.; Moran, B.; Ryan, M. Measuring progress in agricultural sustainability to support policy-making. *Int. J. Agric. Sustain.* **2015**, *14*, 31–44. [CrossRef]
 81. Hansen, B.G.; Stræte, E.P. Dairy farmers' job satisfaction and the influence of automatic milking systems. *Wagening. J. Life Sci.* **2020**, *92*, 1–13. [CrossRef]
 82. Wezel, A.; Vincent, A.; Nitsch, H.; Schmid, O.; Dubbert, M.; Tasser, E.; Fleury, P.; Stöckli, S.; Stolze, M.; Bogner, D. Farmers' perceptions, preferences, and propositions for result-oriented measures in mountain farming. *Land Use Policy* **2018**, *70*, 117–127. [CrossRef]
 83. Heo, W.; Lee, J.M.; Park, N. Financial-related psychological factors affect life satisfaction of farmers. *J. Rural. Stud.* **2020**, *80*, 185–194. [CrossRef]
 84. Helliwell, J.F.; Layard, R.; Sachs, J.; De Neve, J.-E. (Eds.) *World Happiness Report; Sustainable Development Solutions Network: New York, NY, USA, 2020.*
 85. Blanchflower, D.G.; Oswald, A.J. Well-being over time in Britain and the USA. *J. Public Econ.* **2004**, *88*, 1359–1386. [CrossRef]
 86. Tennant, R.; Hiller, L.; Fishwick, R.; Platt, S.; Joseph, S.; Weich, S.; Parkinson, J.; Secker, J.; Stewart-Brown, S. The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): Development and UK validation. *Health Qual. Life Outcomes* **2007**, *5*, 63. [CrossRef] [PubMed]
 87. Easterlin, R.A. Explaining happiness. *Proc. Natl. Acad. Sci. USA* **2003**, *100*, 11176–11183. [CrossRef]
 88. Markussen, T.; Fibæk, M.; Tarp, F.; Tuan, N.D.A. The Happy Farmer: Self-Employment and Subjective Well-Being in Rural Vietnam. *J. Happiness Stud.* **2017**, *19*, 1613–1636. [CrossRef]
 89. Nastis, S.A.; Michailidis, A.; Mattas, K. Hazardous agrochemicals, smoking, and farmers' differences in wage-risk tradeoffs. *Oper. Res.* **2013**, *13*, 139–152. [CrossRef]
 90. Abu Bakar, A.; Osman, M.M.; Bachok, S.; Ibrahim, M.; Mohamed, M.Z. Modelling Economic Wellbeing and Social Wellbeing for Sustainability: A Theoretical Concept. *Procedia Environ. Sci.* **2015**, *28*, 286–296. [CrossRef]
 91. Dodge, R.; Daly, A.P.; Huyton, J.; Sanders, L.D. The challenge of defining wellbeing. *Int. J. Wellbeing* **2012**, *2*, 222–235. [CrossRef]
 92. Schirmer, J.; Berry, H.L.; O'Brien, L.V. Healthier land, healthier farmers: Considering the potential of natural resource management as a place-focused farmer health intervention. *Health Place* **2013**, *24*, 97–109. [CrossRef] [PubMed]
 93. Short, C.; Lewis, N.; Reed, M. *Initial Evaluation of the Implementation of Countryside Stewardship in England in 2015/16: Applicant and Non-Applicant Survey. Final Objective 1 Report (Phase 1&2)*; Countryside and Community Research Institute: Cheltenham, UK, 2018.
 94. Staley, J.T.; Lobley, M.; McCracken, M.E.; Chiswell, H.; Redhead, J.W.; Smart, S.M.; Pescott, O.L.; Jitlal, M.; Amy,

- S.R.; Dean, H.J.; et al. *The Environmental Effectiveness of the Higher Level Stewardship Scheme; Resurveying the Baseline Agreement Monitoring Sample to Quantify Change between 2009 and 2016; Full Technical Final Report*. Natural England project ECM 6937; Defra: London, UK, 2018.
95. Slee, B. Social indicators of multifunctional rural land use: The case of forestry in the UK. *Agric. Ecosyst. Environ.* **2007**, *120*, 31–40. [[CrossRef](#)]
96. Nye, C.; Wheeler, R.; Lobley, M. *Clinton Devon Estates ELMS Test and Trial Project: Identifying Stakeholder Aspirations, Concerns and Socio-Economic Indicators of Success. Phase One Evaluation*; Centre for Rural Policy Research, University of Exeter: Exeter, UK, 2020.

8 Discussion

8.1 Introduction

Within the UK, AES have developed over more than 30 years to become an established support mechanism for farmers to improve the environmental outcomes of farming. As AES develop further to become a central funding source for farmers, in the years ahead, this thesis has aimed to look beyond the environmental impacts of AES by exploring the social factors that affect farmers' willingness and ability to engage with environmental activities. The thesis explores if AES engagement can facilitate sustained behavioural change leading to long-lasting environmental outcomes beyond the life of any particular payment scheme or whether they will function simply as a transactional arrangement between farmers and the state. Paper 2 identified that, although financial reasons do dominant farmers motivation for engaging in AES, nonetheless the decision-making process is complex as agronomic, social and environmental motivations can also influence individual farmer's pro-environmental behaviour, offering potential added value beyond the obligations of the AES contract itself. With an understanding of these complex interactions comes an appreciation that the social contract represented by AES engagement goes wider than the environmental obligations and has relevance for, for example, farmers' social relationships, their social standing and perceived social value.

Given the increasing interest in the social sustainability and resilience of the farming community during a period of significant agricultural transition (Rose *et al.*, 2021), this thesis also focuses on understanding the social sustainability outcomes of AES for the farming community. The thesis then draws together these findings to develop a conceptual frame within which meaningful social indicators are identified and refined, so that policy-makers can use these to assess the effectiveness of AES in influencing farmers' willingness to engage in environmentally-friendly management practices and in contributing to the social sustainability of farming communities.

The aim of the rest of this chapter is to draw out the key findings from the four research papers presented in the previous chapters and to synthesise them to answer the three thesis

research questions:

1. What social and psychological factors affect farmers' pro-environmental behaviour in the context of agri-environment schemes?
2. What are the social sustainability outcomes of AES and how do these inter-relate with environmental outcomes?
3. What lessons can be drawn from the research to inform the development of AES to achieve long-term farmer behavioural change more effectively in a post-Brexit era?

First the chapter will summarise the key psycho-social factors identified as affecting pro-environmental behaviour. The next section will then summarise the findings related to social outcomes of AES engagement and the chapter will end by drawing out key lessons to inform the development of new AES to achieve sustained environmental outcomes.

8.2 What social factors affect farmers' pro-environmental behaviour in the context of agri-environment schemes?

The simplicity of the conceptual framework used in Papers 1 and 4 has proved effective in understanding different elements of farmers' environmental decision-making. It has enabled the identification of a range of psycho-social factors that affect farmers' pro-environmental behaviours, framing them within the context of farmers' willingness and ability to change by reference to their individual situations, as well as their relationships with people, all of which influence behaviour and are underpinned by theory (which will be reflected on later in the section). As the research presented in Paper 1 was one of the first studies to apply behavioural models in relation to explaining farmer agri-environmental activities, this paper has since contributed to the conceptual models of a number of subsequent papers (e.g., Bonke and Musshoff, 2020; Yoder *et al.*, 2019).

Some of the psycho-social factors examined in the thesis exist in various behavioural change models although often configured into different interrelationships (Michie *et al.*, 2014). The Theory of Planned Behaviour (TPB) is one of the most commonly used behavioural models in agricultural research (Sok *et al.*, 2021), but has been criticised for being too individualistic, not

accounting for ways in which social relations, material infrastructures and context are intrinsic to behavioural outcomes (Hargreaves, 2011). Another model, the COM-B model, originally developed for the public health field, and specifically focused on behavioural change intervention, is increasingly used in research by policy-makers, including Defra and Natural England. In this model, the factors that affect behaviour change are split into 3 broad groups: capability (the know how?), opportunity (the can do?) and motivation (the want to?) which acting together determine the behaviour then exhibited. These groupings are closely related to the conceptual model used in Papers 1 and 4, although I would argue that the model in these papers is more directly closely focused than the COM-B model on understanding the salience of social influences on behaviour through direct social interaction and social learning, which has emerged from this research as an important influencing factor within the farming community. This element of the model recognises that lasting change requires a process of engagement and focuses on the social relationships that facilitate and strengthen this engagement.

One limitation of this and other behavioural change models is the exclusion of the broader structural context in which farmers operate, where macro-level systemic forces (market, national laws, regulations) provide the context for the decision environment of farmers (Marsden *et al.*, 1996). There are situations where structural change must precede or at least be implemented in parallel with behavioural change to achieve the desired outcomes. Some aspects of structural constraints are included in the 'ability' component of the thesis model (e.g., finance), but the focus is at the individual level and is therefore insufficient in capturing with any precision the broader systemic factors operating at different spatial scales, from global to local that influence farmers' willingness, ability and engagement processes to undertake environmental management practices. It may be important looking ahead to more carefully assess the agri-food or rural and regional systems in which individual farmers sit to better capture how these systems affect their willingness and ability to change and to adopt the pro-environmental engagement processes that lead to sustained environmental outcomes.

The papers in this thesis started over ten years ago with the premise that farmers are not

simply driven as ‘homo economicus’ in their AES behaviours. Whilst economic incentives are demonstrably an important influence as identified in Paper 2, my research has identified a range of psycho-social factors that affect farmers’ pro-environmental behaviours and, in turn, that AES engagement can positively impact. Other contemporary authors have also reported on research which refers to my work and have subsequently identified further psycho-social factors that influence farmers’ pro-environmental behaviour. Of particular note is the review undertaken by Dessart *et al.*, (2019) on the behavioural factors affecting the adoption of sustainable farming practices. Other examples include research exploring the influence of farmers’ beliefs in the efficacy of agri-environmental measures (van Dijk *et al.*, 2016); a study showing the importance of programme ‘fit’ with farmer’s needs and values (Chapman *et al.*, 2019); work that has identified the need to consider both internal and external drivers of farmers’ decision making processes in relation to nutrient management planning (Daxini *et al.*, 2019); and research highlighting the intergenerational views on environmental management (Wheeler *et al.*, 2018), as well as the importance of tailored advice in influencing farmer agri-environmental behaviour (Balezentis *et al.*, 2020; Simmons *et al.*, 2020).

Reflecting on my research, particularly Papers 1 and 2, the key psycho-social factors that I have identified as affecting farmer pro-environmental behaviour in the context of AES are summarised in Table 2.

Table 2: Key psycho-social factors affecting pro-environmental behaviour

Willingness	Ability/Capacity	Social relations
Interest in environment	Finance	Social capital
Farming self-identity	Labour/Time	Adviser relationships
Social norms	Skills	Collaborative working
Perceived behavioural control	Biophysical assets	

Although these psycho-social factors are described as individual factors, it is evident from my research that they are all interlinked and reinforcing. Also, my work has shown that their demonstrable influence on farmer actions means that policies that rely solely on economic

incentives based on assumptions of simple economic rationality will be insufficient to achieve long-term behaviour change. In other words, they will not achieve the necessary change in values, beliefs and attitudes to sustain the changed behaviour.

Another clear finding from the work reported in this thesis is the considerable heterogeneity in the psycho-social factors affecting farmers' environmental behaviour. The prominence of the psycho-social factors identified in Papers 1, 2 and 4 in affecting pro-environmental behaviours is shown to depend on the cultural context in which they are examined. This has important implications for policy-makers, indicating a need to understand the cultural setting in which farmers operate in order to influence environmental behaviours, rather than applying a one-size-fits-all approach to identifying psycho-social factors and designing policy actions to respond to them.

Developing from these key findings, I will now discuss the psycho-social factors that have emerged from my work as having the most influence on farmers' pro-environmental behaviours in the context of AES and discuss their theoretical underpinnings. The discussion particularly focuses on the willingness factors, which can influence farmers' intrinsic motivations, some of which are under-researched in the AES context and on the social relations aspect affecting pro-environmental behaviour as a relatively new area of research.

8.2.1 Willingness factors

8.2.1.1 Interest in and awareness of environment

My research has added to a growing body of evidence (e.g., Ahnström, 2009; Herzon and Mikk, 2007) identifying that farmers with a particular interest in the environment and, therefore, an awareness of it, are more likely to engage with AES and undertake farming practices to benefit the environment. This is especially the case if the farmer has an interest in specific species, such as birds and wildflowers, or has particular habitats of environmental interest, such as woodlands or meadows. My research found that such farmers connected to their farm environment on a cognitive and emotional level which stimulated their interest in, and awareness of, the environment.

The research detailed in Paper 1 involved interviews with some farmers whose environmental interest stemmed from childhood. Farmers were (often subconsciously) attuned to their home farm environment from the day-to-day experiences of managing the land, for example observing the birds following the tractor as they are ploughing. Other studies have since also identified the importance farmers' personal appreciation of the environment from long-term experiential engagement with their land (Wheeler *et al.*, 2018).

My research also identified an interest in and awareness of the environment leading to acceptance of environmental responsibility, which can influence pro-environmental behaviour. A strong sense of belonging or place appeared to contribute to this sense of environmental responsibility. This was particularly the case for family farms with several generations of farming on the land. This 'sense of place' represents not only farmers' beliefs and emotions, but also their behavioural commitments to a particular geographical setting (Jorgensen and Stedman, 2006).

If farmers believe that their farming practices can potentially have a harmful impact on the environment that they connect with on an emotional and cognitive level, then they are more likely to change their behaviours. As discussed in Paper 1, the Value-Belief-Norm theory postulates that in people who have an awareness of needs, consequences, and acceptance of environmental responsibility, personal norms are activated which leads to behaviour change. This change, however, first requires knowledge about the impact of their farming practices on the environment.

8.2.1.2 Farming self-identity

Farming self-identity was identified as another key psycho-social factor in influencing farmer pro-environmental behaviour. Self-identity is the extent to which behaviour is considered part of the self and can relate to the social group that the farmer identifies with. It reflects the farmer's personal value system and worldview based on their own experiences and moral values. It acts as an internal frame of reference, determining their perceptions of external factors and their attitudes to agri-environmental activities. Adding to existing literature (e.g., Page and Bellotti, 2015; Schmitzberger *et al.*, 2005), my research has tried to

summarise farmer self-identities in relation to farmer pro-environmental behaviour based on underlying values. These self-identities have been broadly equated to three poles of contrast: Profit maximisers, Food producers; and Custodians. A profit maximiser is less inclined to engage with environmental management objectives unless there is a clear financial benefit, and then it is considered a transactional arrangement. A farmer with a food producer identity is reluctant to engage with AES objectives if this requires relinquishing land that can be used to produce food, even if, in some cases, there is a financial advantage from doing so. Custodian farmers stress the importance of handing the land to the next generation of their family in 'good heart'. They highlight the importance of taking care of the land and farming responsibly. Farmers with a strong view on the importance of custodianship also generally had a positive attitude to environmental management activities. Inevitably, these three categories are an over-simplification of farmers' self-identify with most farmers situating themselves in between these three poles.

It is known that generally behaviours associated with self-identity are likely to persist over time, as the more the behaviour is repeated, the more important it becomes to the individual's self-concept (Charng *et al.*, 1988). However, self-identities themselves are not fixed and can change over time. Wynne-Jones (2017) argues that the farming self is an "unfolding and dialogic process", citing Stock and Fonrey (2014, p161) that "identity... is a doing, not a fixed sense of a role". My research identified changes in self-identities, particularly amongst older farmers whose concept of a 'good farmer' has changed over time. This mutable nature is reflected in the Social Identity Model of Identity Change theory which proposes that there is often a link between identity change and the development of social connections or a sense of belonging (Barnett *et al.*, 2021). In their review, Barnett, Boduszek and Willmott (2021) found that in general developing connections/forming relationships with others was a key route to identity change. This finding has particularly important implications for policy-makers seeking to support identity change towards more pro-environmental values, as it highlights the importance of facilitating such social connections and relationships as part of a strategy.

8.2.1.3 *Social norms*

Social norms were also identified as having an impact on farmers' pro-environmental behaviour, recognising that they are affected by the socio-cultural context and social connections within which farmers operate. Cialdini, Reno and Kallgren (1990) identified three types of social norms that influence behaviour: injunctive norms related to behaviour that people feel they ought to do; descriptive norms related to what people feel that most people do; and personal or moral norms, conceptualised as behaviours that people feel morally obliged to do. My research identified the importance of social norms in influencing pro-environmental behaviour in the farming community resulting in a re-composition in long-held cultural beliefs about environmental management on the farm. Farmers were engaging more with AES because it was something they felt they ought to be doing. The change stemmed from an activation of personal norms due to increased knowledge of and a greater sense of responsibility and accountability for the environment. My research also identified that in particular, the 'broad and shallow' approach to delivering ELS which created mass participation in AES for the first time led to a mainstreaming of environmental awareness and an understanding of environmental management activities. This wide uptake of ELS led to the activation of descriptive norms creating a greater acceptance of AES as part of the farming system. A finding that has since been supported by the work of (Cusworth, 2020).

8.2.1.4 *Perceived behavioural control*

In my research, perceived behavioural control, that is perceptions of the ease or difficulty of carrying out the action, which is one of the constructs of TPB, was found to have less influence on farmers' overall pro-environmental behaviour than other willingness factors. Farmers were generally confident in their abilities to undertake environmental management activities. My research found that through experience of AES over time, knowledge is gained about the ease or difficulty of implementing a particular practice creating a positive attitudinal change. However, there were underlying concerns about sanctions if mistakes were made in management implementation or establishment failures occur due to factors outside of the farmers' control, such as weather conditions.

8.2.2 Capacity

The capacity or ability of farmers to undertake environmental activities can also affect pro-environmental behaviours. In particular, this can depend on whether they have the time and financial resources to undertake environmental activities and engage with environmental advice. Resource-poor farms that are struggling financially may face difficulties in prioritising pro-environmental behaviour. My research highlighted how farmers who are struggling financially and/or are under considerable work pressure and are labour resource deficient often do not have the resource and mental capacity to join AES to undertake environmental activities. In contrast, more financially secure farms were able to devote resources and time to environmental activities.

8.2.3 Social relations

A major contribution of this thesis to AES behavioural models is the addition of new constructs focused on social relations. My research has explored not only the personal emotion, feelings and values of farmers in relation to the environment, but also the influence of farmers' social relations, recognising that farmers' pro-environmental behaviour is part of a social process. I found evidence that through the development of social relationships, pro-environmental behaviour can be normalised through incremental changes to social norms, making environmental practices more acceptable behaviours.

Social relationships can also act as a source of knowledge. In particular, my research has identified the effectiveness of advice and support received from others through social connections in a process of social learning, or directly from an adviser in influencing environmental behaviours. This process of change in understanding can be achieved particularly when farmers develop long-term and trusting relationships with advisers.

Furthermore, my research has found that the development of social relationships through farmer groups has led to peer-to-peer learning and collaborative working (Mills *et al.*, 2011). These findings are supported by others who have confirmed that liked-minded farmers working together helps to reinforce pro-environmental behaviours and lead to an appreciation of the features associated with agri-environmental management on their farms

(Westerink *et al.*, 2021). Collective AES, in particular, can have several positive social outcomes, including an increase in collaborative working and an increased sense of collective efficacy, in that the environmental improvements are more likely to be achieved if farmers are working collectively (Mills *et al.*, 2011).

This section has summarised some of the key psycho-social factors that have emerged from my research as affecting pro-environmental behaviour in the context of AES. Reflecting on the amount of supporting evidence for these factors that has emerged since my earliest research work on these factors in 2007, I believe a consensus is emerging among both scientists and policy makers that these are key factors in influencing farmers' pro-environmental behaviour. The next section focuses on the second research questions which tries to understand more clearly how AES participation can deliver social outcomes and how these might relate to environmental outcomes

8.3 What are the social outcomes of AES and how do these inter-relate to environmental outcomes?

Just as previous considerations of the factors influencing farmer AES decision-making overlooked social factors, so it is with the evaluation of AES outcomes. To date, AES evaluations have focused on identifying the environmental and economic outcomes of AES. My research has explored the social outcomes of AES engagement in relation to farm resilience and farmer quality of life and health and wellbeing and Paper 3 was one of the first papers published in the UK to look at AES from this perspective. A key finding was the potential of AES to offer social support to farming communities through their contribution to income stability and by helping to retain employees on marginal farms. These schemes also offer an opportunity for social interaction and increased confidence through the development of new skills and knowledge. The research findings identified that these social outcomes are differentiated by region, with arable areas experiencing greater pressures on workload than marginal uplands areas due to different AES option requirements. In contrast, the AES in marginal uplands played a role in family bonding, retention of family members and providing a sense of purpose. Thus, an increase in workload due to AES work could have

either a negative or positive social impact depending on the context. Any new scheme design needs to consider the social sustainability outcomes for farming communities of these schemes and also recognise that the social impact will vary depending on the specific context.

The research also considered the health and wellbeing outcomes of AES. Whilst piloting the social indicators developed in Paper 4, Mills *et al.* (2019) found that AES can offer farmers some increased job satisfaction and quality of life. This finding is also supported recently by Coyne *et al.* (2021) who identified incidences of personal satisfaction amongst dairy farmers gained from undertaking agri-environmental behaviours within AES. My research also identified incidences of increased farmers' self-esteem achieved through public or formal recognition that they are benefitting the environment and making a positive contribution that is publicly valued (Mills *et al.*, 2019). In contrast, it is also clear that AES can have negative outcomes on health and wellbeing. I interviewed farmers who had experienced significant stress and even financial hardship caused by the schemes' administration, bureaucracy and late payments (Mills *et al.*, 2019). While these findings highlight a link between scheme engagement and social outcomes, specific evidence of the inter-relationship between social and environmental outcomes was not identified and requires further exploration.

As mentioned earlier, other research I have undertaken has identified the potential of AES as a mechanism for improving social interaction. Paper 3 highlighted the importance of AES in potentially extending social networks. My subsequent work evaluating the Countryside Stewardship Facilitation Fund (CSFF) groups supported this finding, identifying social benefits derived from group membership (Breyer *et al.*, 2020). This included increased bonding social capital between farmers and building new relationships with a much broader range of people with different knowledge systems. The research also identified a reduction in social isolation due to group membership which was particularly important for groups located in more remote areas of the country, although not exclusive to these areas. This finding supports other research that points to collaborative working resulting in reduced isolation and improved farmer wellbeing (Saxby *et al.*, 2018; Wynne-Jones, 2017).

8.4 What lessons can be drawn to inform the development of AES to achieve long-term farmer behavioural change and social sustainability in a post-Brexit era?

As mentioned in Chapter 1, following Brexit, the four countries of the UK are currently developing new support schemes to replace those developed under the EU CAP, with a strengthened focus on approaches in which environmental outcomes are the primary goal. Lessons can be drawn from my thesis findings to inform the development of these new AES and particularly in achieving sustained environmental outcomes.

The UK's approach to encouraging environmentally positive behaviour has been three-pronged, through voluntarism, incentives and regulation. As well as the use of regulations, the central policy approach to achieving environmental outcomes on agricultural land has focused on incentives, through a simple transactional arrangement between the State and the farmer based on income foregone. The reasoning is that if farmers' costs for undertaking the environmental activities are reimbursed, the environmental outcomes will be delivered. However, this reasoning excludes the temporal dimension to achieving environmental outcomes. If an AES ends, or crop prices rise, then an economically rational farmer will cease the environmental activities and revert back to previous practices, losing any previous environmental gains achieved, as illustrated with the arable reversion option, where grassland was reverted back to arable land once the scheme ended (Marshall *et al.*, 2020).

A key lesson from my research for future AES is to ensure that these schemes are viewed as more than a simple transactional arrangement. Environmental management activities need to become an integral part of the farm business on a voluntary basis and not just a short-term income opportunity. This can be achieved by ensuring that farming businesses remain economically viable, as there are financial risks associated with engaging in environmental activities. Farmers need to earn sufficient income from their farming activities and have adequate support to enable them to invest in the time, effort and resources required for implementing these activities in the long-term. Additionally, it is essential to encourage

farmers' long-term commitment to the environment and their custodianship of their land. In fact, it is often argued that the two go hand in hand, that achieving environmental sustainability can contribute to the long-term viability of farming businesses.

There is also increasing Government interest in exploring and developing more public-private partnerships and co-funding arrangements to deliver environmental outcomes at a reduced cost to the public purse. My research has identified the importance of recognising how psycho-social factors can influence farmer environmental decision-making, potentially overriding purely economic considerations and financial incentives as well as influencing the quality and durability of environmental outcomes. These psycho-social factors could be essential in securing the scale and pace of change that some are now calling for in UK farming, such as converting agricultural land to grow trees or energy crops. Furthermore, research is needed to know how these factors might discourage or enable farmers to engage with private versus public schemes or how the characteristics of private schemes might influence farmer behaviours. For example, as new actors emerge onto the scene, farmers may lack trust to engage with these commercial organisations, and other partners may need to be engaged as brokers, potentially including environmental NGOs and/or farmer-led groups and networks and their facilitators.

8.4.1 Lessons for achieving longer-term environmental commitments through AES

Based on the psycho-social factors that contribute to farmers' pro-environmental behaviour identified in this research, it is possible to draw out some key lessons for fostering genuine engagement with AES, relating to encouraging a personal interest in the environment, societal signalling and developing group working.

8.4.1.1 Encouraging a personal interest in environment – the importance of knowledge

As identified in Paper 2, some farmers have the willingness to undertake environmental management and may view that they are already successfully managing for the environment by, for example, taking field corners and margins out of production. However, my research found that these farmers may not be actively managing these areas to improve or at least maintain, environmental quality. As Wheeler *et al.* (2018) argue, there may be a level of

complacency amongst such farmers who lack the incentive to improve their practice.

AES could be designed to further increase farmers' interest in the environment on the farm and increase a sense of environmental responsibility through a number of approaches. For example, by supporting the development of farm plans that highlight not only areas for environmental concern but also existing environmental assets, it may be possible to increase farmers' engagement and interest in the environment. My work in evaluating the CSFF farmer groups found that on-farm wildlife ID surveys successfully raised awareness of particular species on group members' farms and encouraged management changes to accommodate these species (Breyer *et al.*, 2020). While this type of linear information exchange model offers clarity, it is based on the rational choice theory that providing information will generate knowledge that will shape attitudes and lead to behaviour changes (see e.g., Kollmuss and Agyeman, 2002). In practice, it is widely noted that information alone is insufficient to lead to action (Kollmuss and Agyeman, 2002). However, information can be a source of knowledge and a prerequisite for many behaviours (Darnton, 2008).

My research has also highlighted the need to support long-term and trusting farmer-adviser relationships to improve farmers' environmental knowledge and stimulate long-term interest. These types of relationships enable what the Elaboration Likelihood Model of Persuasion (Petty and Cacioppo, 1986) describes as the central route processing of messages which requires effortful deliberation. Attitudes formed through such deliberative processing are considered more stable and less resistant to counterpressure than attitudes formed using the less conscious peripheral route processing, such as heuristics (e.g., "My adviser is usually right") which avoids the effort required to process the information (Petty and Cacioppo, 1986).

AES farmers often use advisers simply for applying to AES, relying mainly on peripheral processing, whereas further support should be offered for longer-term advice and feedback on implementation to allow for deliberative processing of information. Such development of advisory relationships can lead to a good level of rapport and open and constructive relationships resulting in positive environmental outcomes. Furthermore, as farmers

become more engaged in environmental activities, there is evidence of a greater willingness to undertake more complex activities (Jarratt, 2014).

8.4.1.2 Societal signalling – influencing social norms

As I have stated earlier, my research has identified a normative shift within the farming community in accepting AES as part of land management practices. Such a change in social norms is starting to establish environmental management as acceptable behaviour within the “good farmer” identity (Wheeler *et al.*, 2018). Continued strong signalling by the government and the general public of the societal expectation for farmers to deliver public goods might lead to a further shift in social norms. There is already an increasing acceptance amongst the farming community of their potential role in delivering public goods as long as it goes hand-in-hand with food production. If farmers receive positive feedback and public recognition for their environmental activities, they are more likely to maintain these adopted practices into the future (Kuhfuss *et al.*, 2015).

8.4.1.3 Group working – increasing knowledge and influencing social norms

My work has also highlighted the influence of group working on improving farmer environmental knowledge and developing ingroup norms towards environmental behaviour. Future AES should support opportunities for further group working. The proposed Landscape Recovery scheme, as part of the ELM scheme in England, which is focused on large scale land use change, and the collaborative projects, as part of the Sustainable Farming Scheme in Wales, are open to farmer groups. These groups should be supported in their development with funding for a group facilitator who is crucial to the success of a group’s development, and over a long enough time period to develop supporting and trusting relationships between the group members and members and the facilitator (Breyer *et al.*, 2020).

8.4.2 Lessons for supporting social sustainability through AES

At a time of agricultural transition, it is more important than ever to ensure that the social dimensions of AES policy are adequately considered to support the agricultural community through this change. Within UK, AES policy is underpinned by the notion that the continuation of farming is a precondition for protecting landscapes and habitats (Potter and

Wolf, 2014; Potter and Lobley, 2004). In other words, to deliver the environmental goods that society needs, farm businesses need to thrive. My research has shown that AES can impact farm social sustainability in a number of ways and future AES should be developed to maximise social benefits. There is a need to ensure that any new AES developed are more closely linked to social objectives and foster social sustainability in their implementation. Some key considerations for future AES development are provided below related to farmer health and wellbeing, justice, equity and farmer agency considerations and the development of social relationships.

8.4.2.1 Farmer health and wellbeing considerations

AES must be designed with consideration to farmers' health and wellbeing needs and the impact on their quality of life. As previously mentioned, my research identified evidence of the considerable stress placed on some farmers due to failures in past AES administrative procedures. This can not only affect farmers' health and wellbeing, but also erode trust in schemes which will have a long-lasting impact. This issue is particularly important at a time of agricultural transition when farmers potentially face periods of chronic stress, which is known to have a detrimental effect on decision-making (Morgado *et al.*, 2015). Future schemes need to ensure simple and accurate administrative procedures and timely payments.

AES payments should also be sufficient enough to improve or maintain business security and help stabilise farm incomes. Economic gains should outweigh the potential stress and costs of the bureaucracy involved in AES participation. The AES implementation requirements should also not place additional labour burdens on already overburdened farmers.

I have also identified the positive farmer wellbeing impacts from increased self-esteem achieved through public or formal recognition that they are benefitting the environment and making a positive contribution that is publicly valued. This is an area where new AES could do more to facilitate the farming community's engagement with the general public and increase their social wellbeing by acknowledging their custodianship and delivery of public goods.

8.4.2.2 *Justice and equity considerations*

Socially sustainable AES need to consider justice and equity issues in their design. This is particularly important as UK subsidies decline and are partly replaced by funding to provide public goods. It is known that there is a heterogeneous group of farmers, identified as 'harder to reach' who, through a variety of practical and behavioural reasons, do not engage with government initiatives. These have been identified by Hurley *et al.* (2022) as older farmers, smaller farms, part-time farmers, remote farmers and farmers under pressure. My research has also identified individuals who could be classed into these 'harder to reach' types. AES implementation needs to proactively ensure that these types of farmers are engaged in new AES, so that they are not missing out on funding. This might require different engagement approaches, such as working through peer networks or trusted advisers or intermediaries in their spheres of influence.

8.4.2.3 *Bolstering farmer agency*

An important element of social sustainability in agriculture is the issue of decision-making and control (Meul *et al.*, 2008; Van Cauwenbergh *et al.*, 2007; Källström and Ljung, 2005), or as referred to in social science, agency, the capacity of individuals to act independently and to make their own free choices. In the context of AES agency, I suggest that it refers to the capacity for farmers to make their own decision as to how they manage their land within an AES. This incorporates control over the design of their agreement, including integrating their knowledge into the appropriate implementation strategies to achieve the environmental outcomes.

My research has revealed numerous examples where farmers are frustrated by the limited flexibility in their AES agreements to adapt prescriptions for improved environmental outcomes based on their local or tacit knowledge (e.g., Paper1). Defra (2018b) has indicated that the ELM scheme will allow farmers greater flexibility in how they deliver environmental outcomes. This needs to go beyond simple involvement in the scheme co-design process or allowing farmers choice in which tier of ELMS they engage with. It also needs to allow management practices to be tailored to individual situations to bolster farmers' sense of

agency. Future AES should be designed with the flexibility to allow farmers to use their local knowledge to adapt scheme management requirements to suit their local situation.

8.4.2.4 Developing social relationships

My research has highlighted the importance of supporting trusted relationships in AES for both social and environmental outcomes. These relationships can build on bonding social capital between farmers, leading to peer-to-peer learning and the normalisation of pro-environmental behaviour. Consequently, AES should support opportunities for group interactions, either through group meetings or collaborative working in groups, such as the CSFF groups.

Bridging social capital is also vital in developing relationships with those outside the usual sphere of influence, who may introduce new ideas and resources to facilitate change. Of particular importance is the role of trusted environmental advisors, who can provide feedback on implementation and take farmers through the environmental transition journey. Government support for these advisers is crucial as evidence suggests that farmers are unwilling to contribute financially to such advice (Chivers and Collins, 2022). Also, caution is required in introducing farmers to new actors involved in AES, such as public-private partnerships involving water or carbon credit companies. For example, emerging evidence from the US identifies an unwillingness amongst farmers to share their data with organisations that typically operate carbon markets (Niles and Han, 2022). There is a role for trusted advisers or intermediaries to facilitate participation in such schemes by facilitating dialogue and understanding between farmers and these new stakeholders.

Finally, the presence of linking social capital is needed to develop trusting relationships between farmers and AES policy-makers. Defra has made strides in this area in its approach to co-designing ELM schemes with farmers, but it has started from a low base of mistrust (Hall and Pretty, 2008), therefore, still has some way to go. Farmers should continue to be encouraged and empowered to work in a more equal partnership with government agencies to deliver long-term environmental benefits. To achieve this outcome government needs to be seen as a catalyst, convener and facilitator rather than a controller and regulator (Arnott

et al., 2021).

8.5 Lessons for AES monitoring and evaluation

This thesis has explored the neglected social dimensions of AES policy in the UK. Since I started research in the early 2010s, there has been progress in increased recognition of the importance of psycho-social and behavioural considerations in AES design and implementation. This recognition is reflected in a recent recruitment drive for social scientists within the relevant government agencies, with some trained social scientists now embedded within Defra and Natural England. However, this ‘social turn’ in AES policy-making has yet to reach AES monitoring and evaluation programmes. A monitoring and evaluation framework is needed that assesses the agreement holders’ distance travelled in terms of fully engaging with the long-term objectives of AES and in measuring the social sustainability outcomes of AES.

The development of social indicators for such an AES monitoring and evaluation framework is in its infancy. Paper 4 is the first step in the UK towards developing such indicators. Further work is required with a larger dataset to test these indicators, including examining the correlations between the composite indicators to develop a statistically validated set of social indicators.

Whilst policy-makers require quantitative measures of performance provided by indicators, it is important, as Scott (2012, pg. 8) cautions in terms of measuring wellbeing, that indicators are not “pursued at the expense of other forms of knowledge and judgement”. There is a need to recognise that these indicators are trying to measure social complexity. Whilst they may have their uses in identifying broad patterns of change over time, a more nuanced interpretation requires an understanding of the cultural context in which data are collected. This cultural context is known to influence the mechanisms and biases that underpin the impact of behavioural factors on decision-making (e.g., conforming to social norms or attitudes to risk) (Dessart *et al.*, 2019). Furthermore, as explained in Chapter 2, perceptions of social issues are heterogeneous in different contexts (Bertocchi *et al.*, 2016). These challenges highlight the importance of taking a pragmatist’s mixed method approach to data

collection, collecting qualitative data alongside indicator data to understand the cultural context in which responses are given. My experience during the pilot testing of the social indicators developed in Paper 4 demonstrated that farmers spontaneously qualified their score responses with contextual detail and these data should also be captured and analysed alongside the quantitative data (Mills *et al.*, 2020).

Papers 3 and 4 focus on many of Boström's identified aspects of social sustainability listed in Chapter 2, but there are also gaps in the developed AES social indicators regarding inter- and intra-generational justice, equality of rights (for example, land user and tenure rights), equity of endowments (for example, small farms vs large farms) and equity of processes (for example, equal access to advisory support). Further work is required to develop AES indicators in relation to these aspects of social sustainability.

Finally, the AES social sustainability indicators developed in Paper 4 were only focused on the farm-level. Further research is also required to develop indicators that assess AES social sustainability outcomes at the societal level. For example, what is the impact of AES on societal health and wellbeing and quality of life? Clearly identifying positive social outcomes at this wider societal level may stimulate farmers to undertake longer-term environmental activities on their farms.

This chapter has provided an overview of the key research findings in response to the three thesis research questions referring to further evidence from other research to support the findings. Whilst economic incentives are important in incentivising environmental behaviour change, it is clear that there are psycho-social factors that influence farmers' environmental decision-making on their land, which should not be ignored. Farmers' interest in and understanding of their farm environment, their self-identity and their social norms can all play an important part in influencing their pro-environmental behaviours. Achieving long-term pro-environmental behaviour sometimes requires a shift in values and beliefs. Implementing engagement strategies within AES that develop social relationships can not only encourage this shift but also lead to positive social sustainability outcomes in terms of social capital development and health and wellbeing. The social sustainability outcomes of

AES are not always positive and there are clear examples of the scheme's bureaucracy and administration causing farmers considerable stress. These social sustainability outcomes of AES need to be carefully monitored and evaluated. A key contribution of this thesis is the development of social indicators for use in measuring the quality of farmer engagement in AES and the social sustainability outcomes of AES.

The following concluding chapter draws on the findings of the thesis to provide some final policy recommendations as well suggestions for future research into the psycho-social factors that influence long-term farmer environmental behaviour and the continued development of social indicators for implementation in AES monitoring and evaluation programmes.

9 Conclusions

This final chapter will offer some concluding remarks about the thesis's research contributions and identify some key recommendations for policy and for future research to advance knowledge on influencing farmers' pro-environmental behaviour.

This thesis has investigated the often-neglected social dimensions of AES. It identifies the psychological and social factors that affect farmers' engagement with long-term environmental activities and the social sustainability outcomes of AES. The research findings are particularly relevant at a time of new AES development in the UK.

In the introductory chapter, the three main research questions of the thesis were outlined, namely: 1) what are the social and psychological factors that affect farmers' pro-environmental behaviour in the context of agri-environment schemes? 2) what are the social sustainability outcomes of AES and how do these inter-relate with environmental outcomes? and 3) what lessons can be drawn to inform the development of AES to achieve long-term behavioural change and social sustainability more effectively?

Establishing a new conceptual framework which extended previous behavioural models was an important contribution of this thesis and an essential step in answering the first research question to identify the psycho-social factors affecting farmers long-term environmental behaviour in an AES context. Previous research into farmer environmental decision-making had focused on the more easily measured economic motivations, and more recently, attitudinal motivators. This thesis examined the social psychology literature to identify constructs beyond attitude, including social norms, self-identity and control beliefs that influence farmers' willingness to engage in environmental practices. Based on empirical evidence, the model was further extended to incorporate the influence of social relations, recognising the importance of acquiring new knowledge through social connections and the influence of social relationships in normalising behaviour through changes to social norms.

The second research question was achieved largely through the collection of empirical data

and a comprehensive literature review and expert consultation to identify potential social outcomes of AES. A key contribution of this thesis was the development of these social factors into indicators that can be used to measure the social sustainability of AES. In a further step, scale questions to capture indicator data were developed and piloted. These have recently been adopted by Natural England and are being incorporated into on-going AES monitoring and evaluation work.

The research findings were used to draw lessons for achieving long-term farmer pro-environmental behavioural change and the social sustainability outcomes of AES. These lessons centred on encouraging a personal interest in the environment, societal signalling and developing group working to achieve long-term environmental behaviour amongst the farming community. Improvements to the social sustainability outcomes of AES focused on issues of farmer health and wellbeing, justice and equity and farmer agency and the development of social relationships. Drawing on these lessons, it has been possible to identify four policy recommendations and suggestions for future research as set out in the following sections.

9.1 Policy Recommendations

The third research question was posed at a time of significant change to AES design within UK, following Brexit. I was keen to offer lessons from my research for future AES policy design that might more effectively achieve long-term pro-environmental behavioural change and social sustainability, and these lessons form the basis of the following four recommendations:

1) One of the most important policy implications of this research lies in identifying the importance of psycho-social factors in affecting farmers' engagement with environmental practices. While economic incentives are important in encouraging engagement with AES, as highlighted in Paper 2, it is also clear that policy-makers cannot assume that farmers will adopt new policies based solely on the level of economic incentives offered, particularly if the payment rate is simply based on income foregone. As this research has shown, there are psycho-social factors influencing farmers' decision-making that go against the assumption of

rational utility-maximising behaviour. During the current period of AES development in the UK, it is more important than ever to recognise the psycho-social factors that influence farmer environmental decision-making, as these might override economic considerations and financial incentives. In this way, policy tools can be designed to appeal to multiple farmer values and beliefs. Behavioural intervention approaches, in addition to economic incentives, should be considered, such as demonstration, enablement, education, and training. Requiring farmers to change land use, whether it be for broader environmental or specific net zero targets, will require not only economic incentives, but also strong societal signalling that it is the right thing to do for the benefit of society; and enabling positive acknowledgement by society of their environmentally-friendly practices.

2) The research has highlighted that farmer behaviour change is part of a social process and identified the importance of advice and support in influencing behaviour. Developing connections and forming relationships with others is a key route to knowledge accrual and even identity change. This finding highlights the importance of facilitating such social connections and relationships. Therefore, a further policy recommendation is to support a coherent advisory system to assist farmers in their transition to more sustainable farming practices. Long-term, trusting advisory relationships are required, where the adviser is able to adapt engagement approaches and messages to the values, beliefs and attitudes of the individual farmer. These types of relationships take time to develop, so a long-term approach to establishing agri-environmental support is needed. Guidance should be developed to assist these advisers in delivering engagement strategies for improved environmental outcomes that match the different values and beliefs of farmers. The indicators developed in Paper 4 to measure the quality of AES engagement could be used by advisers to assess the quality of engagement an advisee has with their AES agreement and to learn about their values, beliefs and attitudes, and so better support them to improve the delivery of environmental outcomes. The social sustainability indicators developed in Paper 4 could also be used by advisers to understand the social world of the agreement holders and the impact of AES agreements on farmers' health and wellbeing and how this influences the success of an agreement. Pilot work with Natural England advisers highlighted the value of the indicators in learning about the agreement holder's farm history, individual values and future

plans, potentially enabling them to tailor advice to the individual (Mills *et al.*, 2019).

3) Policy-makers should take a more holistic view of AES as a delivery mechanism, supporting not only environmental outcomes, but also positive socio-economic outcomes: seeing farms as integrated social-ecological production systems (Dwyer *et al.*, 2020). In this way, AES can contribute to the three pillars of sustainable agriculture. By having a greater understanding of the social impacts of AES, it may be possible to identify policy opportunities that more closely link social and environmental stewardship objectives within the framework of AES. For example, my work on co-operative AES has identified the social benefits of farmer group interaction through the development of social capital and the reduction of social isolation (Breyer *et al.*, 2020; Mills *et al.*, 2011). In addition, social capital can positively affect the environmental awareness of farmers, and thus on the adoption of new environmentally-friendly agricultural practices. Future policies should continue to support and expand farmer environmental groups, such as the CSFF groups. This support should provide funding for a facilitator and for long enough for groups to develop trusting relationships.

4) Monitoring and evaluating the quality of farmer engagement and the social sustainability outcomes of AES should become an integral part of any AES monitoring and evaluation programmes. Currently, AES monitoring is focused on environmental and economic outcomes, with some attitudinal questions focused on the AES process. The evaluation programmes should be expanded further to monitor not only any changes in environmental behaviour over time, but also the behavioural determinants affecting change, such as the agreement holder's knowledge of the environment and their attitude to environmental practices, as well as the social sustainability outcomes of AES. This would require a baseline survey of new AES groups or members to understand progression. However, it is also important that this monitoring is not so intrusive that it risks alienating farmers from future AES.

9.2 Recommendations for future research

Four main areas have emerged from this research as requiring further investigation in order

to maximise the utility of psycho-social factors in delivering environmental outcomes via AES and are outlined below:

1) The thesis has identified the potential impact of social norms on farmers' pro-environmental behaviour and there is an opportunity for further exploration to inform behavioural interventions. Potential research questions relate to identifying the conditions that facilitate or impede the internalisation of personal norms. For example, my research has highlighted the importance of personal norms in activating pro-environmental behaviours, but to what extent are advisory or capacity-building approaches likely to lead to an activation of personal norms? Paper 4 identified that farmer group working can lead to positive environmental outcomes, but how and when does farmer group identification activate both descriptive and personal norms, which leads to pro-environmental behaviour? Paper 1 highlighted the broader influence of society's views on farmers' attitudes to environmental management, but to what extent is farmers' long-term pro-environmental behaviour influenced by perceptions of society's approval of such behaviour?

2) A related research question is to the extent to which farmers are acknowledged by the local community for their environmental activities. My research has identified that farmers value public recognition for their environmental work and it is known that farmers who experience such acknowledgement are more likely to maintain the adopted practices (Kuhfuss *et al.*, 2015). Some conservation organisations partly achieve this acknowledgement through offering environmental rewards, but what about positive feedback from the local public? How can such public acknowledgement of farmers' environmental achievements, which my work has shown to be important, be facilitated? This would require a societal awareness of the role farmers play in providing environmental goods. What are effective mechanisms for increasing local public awareness of AES activity and the potential benefits?

3) This research has identified not only the importance of social relationships in developing pro-environmental behaviours but also how a personal interest in the environment can activate a sense of personal responsibility. An area which requires further investigation is

the extent to which farmers' relational values towards their land affects pro-environmental behaviour. For example, does having a connectedness-to-nature or an emotional attachment to nature or place affect farmers' pro-environmental behaviour? Numerous studies have found correlations between the effect of the public's connectedness to nature and pro-environmental behaviours (e.g., Pereira and Forster, 2015; Kals *et al.*, 1999). However, evidence that identifies the impact of connectedness-to-nature and place attachment on land manager pro-environmental behaviours, is limited (Gosling and Williams, 2010). Does a farmer's past experience and relationship with their land affect their environmental decision-making? If so, can indicators of connectedness-to-nature and place attachment be developed to measure farmers' environmental attitudes and, ultimately pro-environmental behaviours.

4) Finally, further research is required to develop effective, theoretically-informed engagement strategies that align with the different values, beliefs and attitudes of farmers that I have identified in this research. Lessons can be drawn from other academic fields, such as social marketing, science communication and social psychology to identify the most appropriate communication and engagement strategies, including message framings that connect with what is known about different farmer self-identities and their cognition, emotions and values. For example, messaging for farmers with a productivity mindset might initially emphasise 'the fit' of AES options with their production goals and the 'win:win' outcomes in terms of goods and services that the environment delivers to farmers. Those with a personal interest in, say, the wildlife on their farm might become further engaged by acquiring new knowledge about species through on-farm surveys or becoming trained in self-monitoring of their environmental activities. Further research into different forms of presenting scientific information to the farming community would also be beneficial, such as responses to whether scientific information is communicated with a focus on the positive consequences of a particular action or the negative consequences of inaction (Spence and Pidgeon, 2010).

The social sustainability outcomes of AES have to date been under-researched and this thesis has contributed to new knowledge on this topic. However, the following three main areas

require further investigation in order to develop a more complete picture of the social sustainability outcomes of AES:

1) Papers 3 and 4 focused on the social sustainability impacts of AES at the farm-level. Missing from this research which requires further investigation is the wider social sustainability impact on rural communities. To what extent do AES activities affect local communities' health and wellbeing and quality of life and how can this be measured, for example, through providing employment, enhanced opportunity for contact with nature or other cultural ecosystem services?

2) One limitation of this research to date is the identification of a clear link between social outcomes and environmental outcomes. For example, to what extent does increased social wellbeing from AES activity result in increased environmental outcomes and vice versa? Whilst causality is implied, very little research has specifically explored the link between the two. The review in Paper 4 identified only one study that was designed specifically to look at a social factor - farmers' level of skills confidence following training - on environmental outcomes (Lobley *et al.*, 2013). This is an area of research that requires further exploration.

3) Finally, further research is required into other aspects of AES social sustainability impacts not explored in this thesis. As new schemes in the UK replace previous subsidy payments, research is required into the equality and justice aspects of these new schemes. Will smaller farms feel disadvantaged by the new schemes (an issue identified in previous schemes (Mills *et al.*, 2012)? If there is an increase in private schemes rewarding farmers for delivering ecosystem services, will there be equity issues, with smaller, less well-connected farms missing out on these schemes?

Furthermore, the gap in knowledge on the impact of AES on farmer health and wellbeing needs to be filled. In the review for Paper 4, only two studies were identified that looked at the interlinkages between mental health and wellbeing and AES participation. For example, does AES participation increase or decrease job satisfaction? Does it engender a feeling of satisfaction that results in an inner sense of wellbeing, as De Young (1996) identified in relation to actions that reduce consumption. What is the impact of AES participation on

stress levels, are stress levels reduced from the enjoyment derived from observing increased wildlife on the farm or increased as a result of AES bureaucracy and administrative burdens and fear of unintentional prescription breaches?

Through this additional research, it is hoped that new knowledge will continue to increase our understanding of the social world of farmers and the social processes that influence pro-environmental behaviour, as this thesis has sought to explore.

In conclusion, this research has highlighted the complexities of farmer environmental behaviour and offered insights from behavioural science on the psychological and social factors that shape farmers' engagement with AES. Through this research it has been possible to identify strategies that go beyond merely short-term AES payments that can influence farmer behavioural change and support healthy and sustainable agricultural environments and communities. The thesis also makes a unique contribution to knowledge by developing a set of indicators that can be used to evaluate the social sustainability of AES. It is hoped that these insights will support future policy making in this post-Brexit era to deliver long-term environmental and social outcomes in rural areas.

References

- Abdukadirov, S. (2016) *Nudge Theory in Action: behavioral design in policy and markets*. Springer.
- Ahnström, J. (2009) *Farmland biodiversity – in the hands and minds of farmers. Effects of landscape structure, management and the farmer's interest in nature*. Thesis Swedish University of Agricultural Sciences, Uppsala.
- Ajzen, I. (1988) *Attitudes, personality, and behavior*. Chicago, IL: Dorsey Press.
- Ajzen, I. (1991) 'The theory of planned behavior', *Organizational behavior and human decision processes*, 50(2), pp. 179-211.
- Ariely, D. (2008) *Predictably Irrational: The Hidden Forces That Shape Our Decisions*. New York: Harper Collins.
- Arnott, D., Chadwick, D. R., Wynne-Jones, S., Dandy, N. and Jones, D. L. (2021) 'Importance of building bridging and linking social capital in adapting to changes in UK agricultural policy', *Journal of Rural Studies*, 83, pp. 1-10.
- Baker, D. J., Freeman, S. N., Grice, P. V. and Siriwardena, G. M. (2012) 'Landscape-scale responses of birds to agri-environment management: a test of the English Environmental Stewardship scheme', *Journal of Applied Ecology*, 49(4), pp. 871-882.
- Báldi, A. and Batáry, P. (2011) 'The past and future of farmland birds in Hungary', *Bird Study*, 58(3), pp. 365-377.
- Balezentis, T., Ribasauskiene, E., Morkunas, M., Volkov, A., Streimikiene, D. and Toma, P. (2020) 'Young farmers' support under the Common Agricultural Policy and sustainability of rural regions: Evidence from Lithuania', *Land Use Policy*, 94, p. 104542.
- Bamberg, S. and Möser, G. (2007) 'Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour', *Journal of Environmental Psychology*, 27(1), pp. 14-25.
- Barnett, G., Boduszek, D. and Willmott, D. (2021) 'What works to change identity? A rapid evidence assessment of interventions', *Journal of Applied Social Psychology*, 51(7), pp. 698-719.
- Batáry, P., Dicks, L. V., Kleijn, D. and Sutherland, W. J. (2015) 'The role of agri-environment schemes in conservation and environmental management', *Conservation Biology*, 29(4), pp. 1006-1016.
- Battershill, M. R. and Gilg, A. W. (1997) 'Socio-economic constraints and environmentally friendly farming in the Southwest of England', *Journal of Rural Studies*, 13(2), pp. 213-228.
- Baumgarten, M. (2012) *Paradigm wars-validity and reliability in qualitative research*. GRIN Verlag.
- Bear, C., Clark, K. and Jones, D. (2010) 'Indicators of Engagement', *Proceedings ascilite Sydney*, 2010, 86.
- Bertocchi, M., Demartini, E. and Marescotti, M. E. (2016) 'Ranking farms using quantitative indicators of sustainability: the 4Agro method', *Procedia-Social and Behavioral Sciences*, 223, pp. 726-732.
- Bonke, V. and Musshoff, O. (2020) 'Understanding German farmer's intention to adopt mixed cropping using the theory of planned behavior', *Agronomy for Sustainable Development*, 40(6), pp. 1-14.
- Boström, M. (2012) 'A missing pillar? Challenges in theorizing and practicing social sustainability: introduction to the special issue', *Sustainability: Science, practice and policy*, 8(1), pp. 3-14.
- Bräuer, I., Müssner, R., Marsden, K., Oosterhuis, F., Rayment, M., Miller, C. and Dodoková, A. (2006) 'The use of market incentives to preserve biodiversity', *Ecologic, Berlin*.
- Breyer, J., Metcalf, K., Nolan, T., Mills, J., Morse, A., Gaskell, P., Underwood, S. and Kaczor, K. (2020) *Countryside Stewardship Facilitation Fund - Phase 3 Final Report. Final Report LM04101*. Natural England.
- Brotherton, I. (1991) 'What limits participation in ESAs?', *Journal of Environmental Management*, 32(3), pp. 241-249.
- Bryman, A. (2016) *Social research methods*. Oxford University Press.
- Burgess, J., Clark, J. and Harrison, C. M. (2000) 'Knowledges in action: an actor network analysis of a wetland agri-environment scheme', *Ecological Economics*, 35(1), pp. 119-132. DOI: 10.1016/S0921-8009(00)00172-5.

- Burton, R. J. (1998) *The role of farmer self-identity in agricultural decision making in the Marston Vale Community Forest*. Unpublished Ph.D. Thesis, DeMontfort University, Leicester.
- Burton, R. J., Kuczera, C. and Schwarz, G. (2008) 'Exploring farmers' cultural resistance to voluntary agri-environmental schemes', *Sociologia Ruralis*, 48(1), pp. 16-37.
- Burton, R. J. and Wilson, G. A. (2006) 'Injecting social psychology theory into conceptualisations of agricultural agency: towards a post-productivist farmer self-identity?', *Journal of Rural Studies*, 22(1), pp. 95-115.
- Campbell, A. and Converse, P. E. (1972) *The human meaning of social change*. Russell Sage Foundation.
- Chapman, M., Satterfield, T. and Chan, K. M. (2019) 'When value conflicts are barriers: Can relational values help explain farmer participation in conservation incentive programs?', *Land Use Policy*, 82, pp. 464-475.
- Charng, H.-W., Piliavin, J. A. and Callero, P. L. (1988) 'Role identity and reasoned action in the prediction of repeated behavior', *Social Psychology Quarterly*, pp. 303-317.
- Chivers, C.-A. and Collins, A. L. (2022) '(Un) willingness to contribute financially towards advice surrounding diffuse water pollution: the perspectives of farmers and advisors', *The Journal of Agricultural Education and Extension*, pp. 1-24.
- Cialdini, R. B., Reno, R. R. and Kallgren, C. A. (1990) 'A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places', *Journal of Personality and Social Psychology*, 58(6), p. 1015.
- Coyne, L., Kendall, H., Hansda, R., Reed, M. S. and Williams, D. (2021) 'Identifying economic and societal drivers of engagement in agri-environmental schemes for English dairy producers', *Land Use Policy*, 101, p. 105174.
- Creswell, J. W. (2009) *Mapping the field of mixed methods research*. SAGE publications Sage CA: Los Angeles, CA.
- Creswell, J. W. and Creswell, J. D. (2017) *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.
- Cusworth, G. (2020) 'Falling short of being the 'good farmer': Losses of social and cultural capital incurred through environmental mismanagement, and the long-term impacts agri-environment scheme participation', *Journal of Rural Studies*, 75, pp. 164-173.
- Darnton, A. (2008) 'GSR Behaviour Change Knowledge Review. Reference Report: An overview of behaviour change models and their uses', *London, Centre for Sustainable Development, University of Westminster*,
- Davis, R., Campbell, R., Hildon, Z., Hobbs, L. and Michie, S. (2015) 'Theories of behaviour and behaviour change across the social and behavioural sciences: a scoping review', *Health Psychology Review*, 9(3), pp. 323-344.
- Daxini, A., Ryan, M., O'Donoghue, C. and Barnes, A. P. (2019) 'Understanding farmers' intentions to follow a nutrient management plan using the theory of planned behaviour', *Land Use Policy*, 85, pp. 428-437.
- de Snoo, G. R. H., I.: Staats, H.: Burton, R. J. F.: Schindler, S.: van Dijk, J.: Lokhorst, A. M.: Bullock, J. M.: Lobley, M.: Wrba, T.: Schwarz, G.: Musters, C. J. M. (2013) 'Toward effective nature conservation on farmland: making farmers matter', *Conservation Letters*, 6(1), pp. 66-72. DOI: 10.1111/j.1755-263X.2012.00296.x.
- De Young, R. (1996) 'Some psychological aspects of reduced consumption behavior: The role of intrinsic satisfaction and competence motivation', *Environment and behavior*, 28(3), pp. 358-409.
- Defra (2018a) *A Green Future: Our 25 Year Plan to Improve the Environment*. Defra (Department for the Environment, Food and Rural Affairs), London.
- Defra. (2018b) *Health and Harmony: the future for food, farming and the environment in a Green Brexit*. London: Department for Environment, Food & Rural Affairs.
- Defra (2021) *Environmental Land Management schemes: An overview [online]*. Department for Environment, Food and Rural Affairs (Defra).

<https://www.gov.uk/government/publications/environmental-land-management-schemes-overview/environmental-land-management-scheme-overview>.

- Dessart, F. J., Barreiro-Hurlé, J. and van Bavel, R. (2019) 'Behavioural factors affecting the adoption of sustainable farming practices: a policy-oriented review', *European Review of Agricultural Economics*, 46(3), pp. 417-471. DOI: 10.1093/erae/jbz019.
- Dwyer, J., Mills, J., Ingram, J., Taylor, J., Burton, R., Blackstock, K., Slee, B., Brown, K., Schwarz, G. and Matthews, K. (2007) 'Understanding and influencing positive behaviour change in farmers and land managers', *CCRI, Macaulay Institute*,
- Dwyer, J., Short, C., Berriet-Sollicec, M., Déprés, C., Lataste, F.-G., Hart, K. and Prazan, J. (2020) 'Fostering resilient agro-food futures through a social-ecological systems framework: Public–private partnerships for delivering ecosystem services in Europe', *Ecosystem Services*, 45, p. 101180.
- Ferriss, A. L. (1988) 'The uses of social indicators', *Social Forces*, 66(3), pp. 601-617.
- Fiedler, K. (2007) 'Construal level theory as an integrative framework for behavioral decision-making research and consumer psychology', *Journal of Consumer Psychology*, 17(2), pp. 101-106.
- Fossey, E., Harvey, C., McDermott, F. and Davidson, L. (2002) 'Understanding and evaluating qualitative research', *Australian & New Zealand Journal of Psychiatry*, 36(6), pp. 717-732.
- Fuentes, M. (2004) *OECD Expert Meeting on Farm Management Indicators and the Environment*: OECD.
- Fuller, R. M. (1987) 'The changing extent and conservation interest of lowland grasslands in England and Wales: a review of grassland surveys 1930–1984', *Biological Conservation*, 40(4), pp. 281-300.
- Gasson, R. (1973) 'Goals and values of farmers', *Journal of Agricultural Economics*, 24(3), pp. 521-542.
- Gordon, W. (2011) 'Behavioural economics and qualitative research—a marriage made in heaven?', *International Journal of Market Research*, 53(2), pp. 171-185.
- Gorsuch, R. L. and Ortberg, J. (1983) 'Moral obligation and attitudes: Their relation to behavioral intentions', *Journal of Personality and Social Psychology*, 44(5), p. 1025.
- Gosling, E. and Williams, K. J. (2010) 'Connectedness to nature, place attachment and conservation behaviour: Testing connectedness theory among farmers', *Journal of Environmental Psychology*, 30(3), pp. 298-304.
- Hall, J. and Pretty, J. (2008) 'Then and now: Norfolk farmers' changing relationships and linkages with government agencies during transformations in land management', *Journal of Farm Management*, 13(6), pp. 393-418.
- Hargreaves, T. (2011) 'Practice-ing behaviour change: Applying social practice theory to pro-environmental behaviour change', *Journal of Consumer Culture*, 11(1), pp. 79-99.
- Herzon, I. and Mikk, M. (2007) 'Farmers' perceptions of biodiversity and their willingness to enhance it through agri-environment schemes: A comparative study from Estonia and Finland', *Journal for Nature Conservation*, 15(1), pp. 10-25.
- HM Treasury (2020) *Magenta Book: Central Government guidance on evaluation*. London: HM Treasury.
- Homburg, A. and Stolberg, A. (2006) 'Explaining pro-environmental behavior with a cognitive theory of stress', *Journal of Environmental Psychology*, 26(1), pp. 1-14.
- Horrigan, L., Lawrence, R. S. and Walker, P. (2002) 'How sustainable agriculture can address the environmental and human health harms of industrial agriculture', *Environmental Health Perspectives*, 110(5), pp. 445-456.
- Hurley, P., Lyon, J., Hall, J., Little, R., Tsouvalis, J., White, V. and Rose, D. C. (2022) 'Co-designing the environmental land management scheme in England: the why, who and how of engaging 'harder to reach' stakeholders', *People and Nature*, 4(3), pp. 744-757.
- Jarratt, S. (2014) *Linking the environmentally friendly farming careers of farmers to their effective delivery of wildlife habitats within the East of England*. University of Nottingham.
- Johansson, M., Rahm, J. and Gyllin, M. (2013) 'Landowners' participation in biodiversity conservation examined through the Value-Belief-Norm Theory', *Landscape Research*, 38(3), pp. 295-311.
- Jorgensen, B. S. and Stedman, R. C. (2006) 'A comparative analysis of predictors of sense of place dimensions: Attachment to, dependence on, and identification with lakeshore properties', *Journal of Environmental Management*, 79(3), pp. 316-327.

- Kahneman, D. (2003) 'Maps of bounded rationality: Psychology for behavioral economics', *American Economic Review*, 93(5), pp. 1449-1475.
- Källström, H. N. and Ljung, M. (2005) 'Social sustainability and collaborative learning', *AMBIO: A Journal of the Human Environment*, 34(4), pp. 376-382.
- Kals, E., Schumacher, D. and Montada, L. (1999) 'Emotional affinity toward nature as a motivational basis to protect nature', *Environment and Behavior*, 31(2), pp. 178-202.
- Kleijn, D., Baquero, R., Clough, Y., Díaz, M., De Esteban, J., Fernández, F., Gabriel, D., Herzog, F., Holzschuh, A. and Jöhl, R. (2006) 'Mixed biodiversity benefits of agri-environment schemes in five European countries', *Ecology Letters*, 9(3), pp. 243-254.
- Kollmuss, A. and Agyeman, J. (2002) 'Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior?', *Environmental Education Research*, 8(3), pp. 239-260.
- Kuhfuss, L., Préget, R., Thoyer, S., Hanley, N., Le Coent, P. and Désolé, M. (2015) 'Nudges, Social Norms and Permanence in Agri-Environmental Schemes', *University of St Andrews*,
- Kwon, H. R. and Silva, E. A. (2020) 'Mapping the landscape of behavioral theories: Systematic literature review', *Journal of Planning Literature*, 35(2), pp. 161-179.
- Läpple, D. and Kelley, H. (2013) 'Understanding the uptake of organic farming: Accounting for heterogeneities among Irish farmers', *Ecological Economics*, 88, pp. 11-19.
- Latour, B. (2007) *Reassembling the social: An introduction to actor-network-theory*. Oup Oxford.
- Latruffe, L., Diazabakana, A., Bockstaller, C., Desjeux, Y. and Finn, J. (2016) 'Measurement of sustainability in agriculture: a review of indicators', *Studies in Agricultural Economics*, 118(3), pp. 123-130.
- Lobley, M., Saratsi, E., Winter, M. and Bullock, J. (2013) 'Training farmers in agri-environmental management: the case of Environmental Stewardship in lowland England', *International Journal of Agricultural Management*, Volume 03, pp. 12-20. DOI: DOI: 10.5836/ijam/2013-01-03.
- Lokhorst, A. M., Hoon, C., le Rutte, R. and de Snoo, G. (2014) 'There is an I in nature: The crucial role of the self in nature conservation', *Land Use Policy*, 39, pp. 121-126.
- Mackenzie, N. and Knipe, S. (2006) 'Research dilemmas: Paradigms, methods and methodology', *Issues in educational research*, 16(2), pp. 193-205.
- Marsden, T. and Munton, R. (1991) 'The farmed landscape and the occupancy change process', *Environment and Planning A*, 23(5), pp. 663-676.
- Marsden, T., Munton, R., Ward, N. and Whatmore, S. (1996) 'Agricultural Geography and the Political Economy Approach: A Review', *Economic Geography*, 72(4), pp. 361-375. DOI: 10.2307/144519.
- Marsden, T., Murdoch, J., Lowe, P., Munton, R. C. and Flynn, A. (2005) *Constructing the countryside: An approach to rural development*. Routledge.
- Marshall, S., Grant, M., Short, C. J. and Cameron, I. (2020) *Assessment of Arable Reversion Retention: Environmental Stewardship Monitoring & Evaluation Framework*. Natural England.
- Matzdorf, B., Müller, K., Kersebaum, K. C., Kiesel, J. and Kaiser, T. (2009) 'Improving agri-environmental benefits within the CAP', *New Perspectives on Agri-environmental Policies: A Multidisciplinary and Transatlantic Approach*, 22, p. 219.
- Meul, M., Van Passel, S., Nevens, F., Dessein, J., Rogge, E., Mulier, A. and Van Hauwermeiren, A. (2008) 'MOTIFS: a monitoring tool for integrated farm sustainability', *Agronomy for Sustainable Development*, 28(2), pp. 321-332.
- Michie, S., Johnston, M., Abraham, C., Lawton, R., Parker, D. and Walker, A. (2005) 'Making psychological theory useful for implementing evidence based practice: a consensus approach', *BMJ Quality & Safety*, 14(1), pp. 26-33.
- Michie, S., West, R., Campbell, R., Brown, J. and Gainforth, H. (2014) *ABC of behaviour change theories*. Silverback publishing.
- Mills, J. (2012) 'Exploring the social benefits of agri-environment schemes in England', *Journal of Rural Studies*, 28(4), pp. 612-621. DOI: 10.1016/j.jrurstud.2012.08.001.
- Mills, J., Chiswell, H., Gaskell, P., Courtney, P., Brockett, B., Cusworth, G. and Lobley, M. (2021) 'Developing farm-level social indicators for agri-environment schemes: a focus on the agents of change', *Sustainability*, 13(14), p. 7820.

- Mills, J., Gaskell, P., Courtney, P., Chiswell, H., Cusworth, G., Short, C., Reed, M. and Lobley, M. (2019) *Social Indicators for Agri-environment Schemes. Final Report. Report to Natural England and Department of Environment, Food and Rural Affairs.*
- Mills, J., Gaskell, P., Ingram, J. and Chaplin, S. (2018) 'Understanding farmers' motivations for providing unsubsidised environmental benefits', *Land Use Policy*, 76, pp. 697-707. DOI: 10.1016/j.landusepol.2018.02.053.
- Mills, J., Gaskell, P., Ingram, J., Dwyer, J., Reed, M. and Short, C. (2017) 'Engaging farmers in environmental management through a better understanding of behaviour', *Agriculture and human values*, 34(2), pp. 283-299.
- Mills, J., Gaskell, P., Short, C., Manley, W., Kambites, C., Lewis, N., Clark, M. and Boatman, N. (2012) *Attitudes to Uplands Entry Level Stewardship*. Peterborough: Natural England.
- Mills, J., Gibbon, D., Ingram, J., Reed, M., Short, C. and Dwyer, J. (2011) 'Organising collective action for effective environmental management and social learning in Wales', *Journal of Agricultural Education and Extension*, 17(1), pp. 69-83.
- Morgado, P., Sousa, N. and Cerqueira, J. J. (2015) 'The impact of stress in decision making in the context of uncertainty', *Journal of Neuroscience Research*, 93(6), pp. 839-847.
- Morris, C. and Potter, C. (1995) 'Recruiting the new conservationists: farmers' adoption of agri-environmental schemes in the UK', *Journal of Rural Studies*, 11(1), pp. 51-63.
- Morris, J., Marzano, M., Dandy, N. and O'Brien, L. (2012) 'Theories and models of behaviour and behaviour change', *Forest Research: Surrey, United Kingdom*, pp. 1-27.
- Munro, S., Lewin, S., Swart, T. and Volmink, J. (2007) 'A review of health behaviour theories: how useful are these for developing interventions to promote long-term medication adherence for TB and HIV/AIDS?', *BMC Public Health*, 7(1), pp. 1-16.
- Nash, N., Whitmarsh, L., Capstick, S., Hargreaves, T., Poortinga, W., Thomas, G., Sautkina, E. and Xenias, D. (2017) 'Climate-relevant behavioral spillover and the potential contribution of social practice theory', *Wiley Interdisciplinary Reviews: Climate Change*, 8(6), p. e481.
- Niles, M. and Han, G. (2022) 'Interested but Uncertain: Carbon markets and data sharing among US row crop farmers, SocArXiv Available from: osf.io/preprints/socarxiv/mhv2w [Accessed: 13.11.2022]', Organisation for Economic Co-operation Development. (2001) *Improving the Environmental Performance of Agriculture: Policy Options and Market Approaches*. OECD Publishing.
- Page, G. and Bellotti, B. (2015) 'Farmers value on-farm ecosystem services as important, but what are the impediments to participation in PES schemes?', *Science of the Total Environment*, 515, pp. 12-19. DOI: 10.1016/j.scitotenv.2015.02.029.
- Parry, J., Lindsey, R. and Taylor, R. (2005) 'Farmers, farm workers and work-related stress',
- Pereira, M. and Forster, P. (2015) 'The relationship between connectedness to nature, environmental values, and pro-environmental behaviours', *Reinvention: An international journal of undergraduate research*, 8(2),
- Petty, R. E. and Cacioppo, J. T. (1986) 'The elaboration likelihood model of persuasion', in *Communication and Persuasion*. Springer, pp. 1-24.
- Pike, T. (2008) *Understanding behaviours in a farming context: bringing theoretical and applied evidence together from across Defra and highlighting policy relevance and implications for future research*. Department of Food and Rural Affairs Agricultural Change and Environment Observatory Discussion Paper.
- Plieninger, T., Draux, H., Fagerholm, N., Bieling, C., Bürgi, M., Kizos, T., Kuemmerle, T., Primdahl, J. and Verburg, P. H. (2016) 'The driving forces of landscape change in Europe: A systematic review of the evidence', *Land Use Policy*, 57, pp. 204-214.
- Potter, C. (1986) 'Processes of countryside change in lowland England', *Journal of Rural Studies*, 2(3), pp. 187-195.
- Potter, C. and Gasson, R. (1988) 'Farmer participation in voluntary land diversion schemes: some predictions from a survey', *Journal of Rural Studies*, 4(4), pp. 365-375.

- Potter, C. and Lobley, M. (2004) 'Agricultural restructuring and state assistance: competing or complementary rural policy paradigms?', *Journal of Environmental Policy & Planning*, 6(1), pp. 3-18.
- Potter, C. A. and Wolf, S. A. (2014) 'Payments for ecosystem services in relation to US and UK agri-environmental policy: disruptive neoliberal innovation or hybrid policy adaptation?', *Agriculture and Human Values*, 31(3), pp. 397-408.
- Pretty, J. N., Brett, C., Gee, D., Hine, R. E., Mason, C. F., Morison, J. I., Raven, H., Rayment, M. D. and van der Bijl, G. (2000) 'An assessment of the total external costs of UK agriculture', *Agricultural Systems*, 65(2), pp. 113-136.
- Putnam, R. D. (1993) *Making democracy work: Civic traditions in modern Italy*. Princeton University press.
- Putnam, R. D. (2000) *Bowling alone: The collapse and revival of American community*. Simon and Schuster.
- Pywell, R. F., Heard, M. S., Bradbury, R. B., Hinsley, S., Nowakowski, M., Walker, K. J. and Bullock, J. M. (2012) 'Wildlife-friendly farming benefits rare birds, bees and plants', *Biology Letters*, 8(5), pp. 772-775.
- Robinson, R. A. and Sutherland, W. J. (2002) 'Post-war changes in arable farming and biodiversity in Great Britain', *Journal of Applied Ecology*, 39(1), pp. 157-176.
- Röling, N. and Wagemakers, M. A. E. (1998) *Facilitating sustainable agriculture: Participatory learning and adaptive management in times of environmental uncertainty*. Cambridge: Cambridge University Press, .
- Rose, D. C., Wheeler, R., Winter, M., Lobley, M. and Chivers, C.-A. (2021) 'Agriculture 4.0: Making it work for people, production, and the planet', *Land Use Policy*, 100, p. 104933.
- Rossmann, G. B. and Wilson, B. L. (1985) 'Numbers and words: Combining quantitative and qualitative methods in a single large-scale evaluation study', *Evaluation Review*, 9(5), pp. 627-643.
- Saxby, H., Gkartzios, M. and Scott, K. (2018) 'Farming on the Edge': Wellbeing and Participation in Agri-Environmental Schemes', *Sociologia Ruralis*, 58(2), pp. 392-411. DOI: doi:10.1111/soru.12180.
- Schmitzberger, I., Wrbka, T., Steurer, B., Aschenbrenner, G., Peterseil, J. and Zechmeister, H. G. (2005) 'How farming styles influence biodiversity maintenance in Austrian agricultural landscapes', *Agriculture Ecosystems & Environment*, 108(3), pp. 274-290. DOI: 10.1016/j.agee.2005.02.009.
- Schwartz, S. H. (1977) 'Normative influences on altruism', in *Advances in Experimental Social Psychology*. Vol. 10: Elsevier, pp. 221-279.
- Scotland, J. (2012) 'Exploring the philosophical underpinnings of research: Relating ontology and epistemology to the methodology and methods of the scientific, interpretive, and critical research paradigms', *English Language Teaching*, 5(9), pp. 9-16.
- Scott, K. (2012) *Measuring wellbeing: Towards sustainability?* : Routledge.
- Shapiro, J. (2001) *Mao's war against nature: Politics and the environment in revolutionary China*. Cambridge University Press.
- Sieber, S. D. (1973) 'The integration of fieldwork and survey methods', *American Journal of Sociology*, 78(6), pp. 1335-1359.
- Siebert, R., Toogood, M. and Knierim, A. (2006) 'Factors affecting European farmers' participation in biodiversity policies', *Sociologia Ruralis*, 46(4), pp. 318-340.
- Simmons, B. A., Wilson, K. A. and Dean, A. J. (2020) 'Landholder typologies illuminate pathways for social change in a deforestation hotspot', *Journal of Environmental Management*, 254, p. 109777.
- Slee, B. (2007) 'Social indicators of multifunctional rural land use: The case of forestry in the UK', *Agriculture, Ecosystems & Environment*, 120(1), pp. 31-40.
- Snyder, H. (2019) 'Literature review as a research methodology: An overview and guidelines', *Journal of Business Research*, 104, pp. 333-339.
- Sok, J., Borges, J. R., Schmidt, P. and Ajzen, I. (2021) 'Farmer behaviour as reasoned action: a critical review of research with the theory of planned behaviour', *Journal of Agricultural Economics*, 72(2), pp. 388-412.
- Spence, A. and Pidgeon, N. (2010) 'Framing and communicating climate change: The effects of distance and outcome frame manipulations', *Global Environmental Change*, 20(4), pp. 656-667.

- Spencer, J. P., Barich, K., Goldberg, J. and Perone, S. (2012) 'Behavioral dynamics and neural grounding of a dynamic field theory of multi-object tracking', *Journal of Integrative Neuroscience*, 11(03), pp. 339-362.
- Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A. and Kalof, L. (1999) 'A value-belief-norm theory of support for social movements: The case of environmentalism', *Human Ecology Review*, pp. 81-97.
- Stoate, C., Baldi, A., Beja, P., Boatman, N., Herzon, I., Van Doorn, A., De Snoo, G., Rakosy, L. and Ramwell, C. (2009) 'Ecological impacts of early 21st century agricultural change in Europe—a review', *Journal of Environmental Management*, 91(1), pp. 22-46.
- Stoate, C., Boatman, N. D., Borralho, R., Carvalho, C. R., De Snoo, G. R. and Eden, P. (2001) 'Ecological impacts of arable intensification in Europe', *Journal of Environmental Management*, 63(4), pp. 337-365.
- Stobbelaar, D. J., Groot, J. C., Bishop, C., Hall, J. and Pretty, J. (2009) 'Internalization of agri-environmental policies and the role of institutions', *Journal of Environmental Management*, 90, pp. S175-S184.
- Stock, P. V. and Forney, J. (2014) 'Farmer autonomy and the farming self', *Journal of Rural Studies*, 36, pp. 160-171. DOI: <https://doi.org/10.1016/j.jrurstud.2014.07.004>.
- Sulemana, I. and James Jr, H. S. (2014) 'Farmer identity, ethical attitudes and environmental practices', *Ecological Economics*, 98, pp. 49-61.
- Sutcliffe, L. M., Batáry, P., Kormann, U., Báldi, A., Dicks, L. V., Herzon, I., Kleijn, D., Tryjanowski, P., Apostolova, I. and Arlettaz, R. (2015) 'Harnessing the biodiversity value of Central and Eastern European farmland', *Diversity and Distributions*, 21(6), pp. 722-730.
- Terrier, M., Gasselin, P. and Blanc, J. L. (2013) 'Assessing the sustainability of activity systems to support households' farming projects', in *Methods and procedures for building sustainable farming systems*. Springer, pp. 47-61.
- Terry, D. J., Hogg, M. A. and White, K. M. (1999) 'The theory of planned behaviour: self-identity, social identity and group norms', *British Journal of Social Psychology*, 38(3), pp. 225-244.
- Triandis, H. C. (1977) 'Interpersonal Behavior. Brooks', *Cole, Monterey*.
- UK Government. (2021) *The England Trees Action Plan 2021–2024*. UK Government London, UK.
- Van Cauwenbergh, N., Biala, K., Bielders, C., Brouckaert, V., Franchois, L., Ciudad, V. G., Hermy, M., Mathijs, E., Muys, B. and Reijnders, J. (2007) 'SAFE—A hierarchical framework for assessing the sustainability of agricultural systems', *Agriculture, Ecosystems & Environment*, 120(2-4), pp. 229-242.
- van Dijk, W. F., Lokhorst, A. M., Berendse, F. and De Snoo, G. R. (2016) 'Factors underlying farmers' intentions to perform unsubsidised agri-environmental measures', *Land Use Policy*, 59, pp. 207-216.
- Van Herzele, A., Gobin, A., Van Gossum, P., Acosta, L., Waas, T., Dendoncker, N. and de Frahan, B. H. (2013) 'Effort for money? Farmers' rationale for participation in agri-environment measures with different implementation complexity', *Journal of Environmental Management*, 131, pp. 110-120.
- Van Riper, C. J. and Kyle, G. T. (2014) 'Understanding the internal processes of behavioral engagement in a national park: A latent variable path analysis of the value-belief-norm theory', *Journal of environmental psychology*, 38, pp. 288-297.
- Westerink, J., Pleijte, M., Schrijver, R., van Dam, R., de Krom, M. and de Boer, T. (2021) 'Can a 'good farmer' be nature-inclusive? Shifting cultural norms in farming in The Netherlands', *Journal of Rural Studies*, 88, pp. 60-70.
- Wheeler, R., Lobley, M., Winter, M. and Morris, C. (2018) "'The good guys are doing it anyway": the accommodation of environmental concern among English and Welsh farmers', *Environment and Planning E: Nature and Space*, 1(4), pp. 664-687.
- Willock, J., Deary, I. J., McGregor, M. M., Sutherland, A., Edwards-Jones, G., Morgan, O., Dent, B., Grieve, R., Gibson, G. and Austin, E. (1999) 'Farmers' attitudes, objectives, behaviors, and personality traits: The Edinburgh study of decision making on farms', *Journal of Vocational Behavior*, 54(1), pp. 5-36.
- Wilson, G. A. (1997) 'Factors influencing farmer participation in the environmentally sensitive areas scheme', *Journal of Environmental Management*, 50(1), pp. 67-93.

- Wilson, G. A. and Buller, H. (2001) 'The use of socio-economic and environmental indicators in assessing the effectiveness of EU agri-environmental policy', *European Environment*, 11(6), pp. 297-313.
- Wilson, G. A. and Hart, K. (2001) 'Farmer Participation in Agri-Environmental Schemes: Towards Conservation-Oriented Thinking?', *Sociologia Ruralis*, 41(2), pp. 254-274. DOI: 10.1111/1467-9523.00181.
- Wynne-Jones, S. (2017) 'Understanding farmer co-operation: Exploring practices of social relatedness and emergent affects', *Journal of Rural Studies*, 53, pp. 259-268. DOI: 10.1016/j.jrurstud.2017.02.012.
- Yoder, L., Ward, A. S., Dalrymple, K., Spak, S. and Lave, R. (2019) 'An analysis of conservation practice adoption studies in agricultural human-natural systems', *Journal of Environmental Management*, 236, pp. 490-498.
- Żmihorski, M., Kotowska, D., Berg, Å. and Pärt, T. (2016) 'Evaluating conservation tools in Polish grasslands: the occurrence of birds in relation to agri-environment schemes and Natura 2000 areas', *Biological Conservation*, 194, pp. 150-157.

Appendix 1 Co-author declarations

Paper 1 author contributions

Mills, J., Gaskell, P., Ingram, J., Dwyer, J., Reed, M. and Short, C. , 2017. Engaging farmers in environmental management through a better understanding of behaviour. *Agriculture and Human Values*, 34(2), pp.283-299.

Author Contributions: Conceptualization, Jane Mills*, Janet Dwyer and Julie Ingram; data curation, Jane Mills and Janet Dwyer; funding acquisition, Jane Mills and Janet Dwyer; investigation, Jane Mills, Pete Gaskell, Julie Ingram, Janet Dwyer; Matt Reed and Chris Short; methodology, Jane Mills; Janet Dwyer, Julie Ingram and Pete Gaskell; project administration, Jane Mills and Janet Dwyer; supervision, Jane Mills and Janet Dwyer; visualization, Jane Mills and Janet Dwyer; writing—original draft, Jane Mills; writing—review and editing Jane Mills, Pete Gaskell, Julie Ingram, Janet Dwyer, Matt Reed and Chris Short

Jane was the lead author of this paper and responsible for the design and analysis of the farmer interviews, contributed to data collection and led on writing the paper.

Signed by co-authors:

Paper 2 author contributions

Mills, J., Gaskell, P., Ingram, J. and Chaplin, S., 2018. Understanding farmers’ motivations for providing unsubsidised environmental benefits. *Land Use Policy*, 76, pp.697-707.

Author Contributions: Conceptualization, Jane Mills* and Steve Chaplin; data curation, Jane Mills; formal analysis, Jane Mills and Pete Gaskell; funding acquisition, Jane Mills and Steve Chaplin; investigation, Jane Mills, Pete Gaskell and Julie Ingram; methodology, Jane Mills and Pete Gaskell; project administration, Jane Mills.; resources, Jane Mills; supervision, Jane Mills; visualization, Jane Mills; writing—original draft, Jane Mills; writing—review and editing, Jane Mills, Pete Gaskell, Julie Ingram and Steve Chaplin.

Jane was the lead author of this paper and responsible for the design and analysis of the Farm Business Survey and the farmer interviews, contributed to data collection and analysis and led on writing the paper

Signed by co-authors:

Pete Gaskell

Julie Ingram

Steve Chaplin

Paper 4 author contributions

Mills, J., Chiswell, H., Gaskell, P., Courtney, P., Brockett, B., Cusworth, G. and Lobley, M., 2021. Developing farm-level social indicators for agri-environment schemes: a focus on the agents of change. *Sustainability*, 13(14), p.7820.

Author Contributions: Conceptualization Jane Mills* and Beth Brockett; data curation, Jane Mills and Hannah Chiswell; funding acquisition, Jane Mills; investigation, Jane Mills, Hannah Chiswell, Paul Courtney, George Cusworth, Pete Gaskell and Matt Lobley; methodology, Jane Mills, Hannah Chiswell and Paul Courtney; project administration, Jane Mills.; resources, Jane Mills; supervision, Jane Mills; visualization, Jane Mills and Beth Brockett; writing—original draft, Jane Mills; writing-review and editing, Jane Mills, Hannah Chiswell, Paul Courtney, Pete Gaskell, Beth Brockett, George Cusworth and Matt Lobley.

Jane was the lead author of this paper and responsible for the design and analysis of the evidence review and the farmers interviews, contributed to data collection and led on writing the paper.

Signed by co-authors:



Hannah Chiswell



Pete Gaskell



Beth Brockett



Paul Courtney



George Cusworth



Matt Lobley

