

Biodiversity Conservation in Agricultural Landscapes; an Exploration of Farmer Motivations in Norfolk and Suffolk

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Abstract

Focusing on farmer behaviour is a popular avenue for exploring new ways of achieving biodiversity outcomes. This study is contextualised in the agricultural landscape of Norfolk and Suffolk and explores factors that influence motivation for pro-environmental behaviour and decision making. Specifically, management for woodland and semi-natural habitat cover was discussed as a way to increase biodiversity and habitat complexity on farms and surrounding areas. Semi-structured interviews, between thirty and fifty minutes long, were carried out with eleven participants, including nine farmers and two key consultants. Interviews were recorded, transcribed, and thematically coded in NVIVO. Findings were analysed with the help of a theoretical framework combining Michie et al.'s (2011) *COM-B Method* and Kollmuss & Agyeman's (2002) *Model of Pro-Environmental Behaviour*. It was found that financial motivation was a significant factor in motivating farmers to enact pro-environmental behaviour in woodland and semi-natural habitat management. However, this can more accurately be understood as what facilitates motivation rather than the root source of it. Risk aversion, moral framing, and social and environmental factors were also found to play a role in farmer motivations. Two findings stood out as being relatively unexplored in the existing literature. The first was that farmer opinions of governments and policy seemed to somewhat influence how they interacted with them. The second was that non policy-driven factors may have potential for supporting and motivating farmers in transitioning to increased management for biodiversity. This may include cluster groups or other collaborative and socially influenced organisations, but further research is required to fully understand application.

Keywords: *conservation, agriculture, woodland and semi-natural habitats, pro-environmental behaviour.*

Introduction

As population numbers rise and resources are increasingly maldistributed, modern food production systems have become reliant on intensive agriculture and monocultures. Short-term crop productivity is prioritised, with detrimental consequences for environment and long-term agricultural productivity. Such practices are particularly detrimental to ecosystems and biodiversity, which is facing rapid rates of decline (Varah, 2013; Rohila, 2017, 80). About 70% of the UK is covered in farmland which has become increasingly simplified and intensified in the last half century. As such, agriculture continues to be the biggest national threat to biodiversity (EU, 2019; WWF, no date).

Historical Context

Agriculture has been a significant characteristic of the English landscape for thousands of years. The prehistoric forested ecosystems of the UK have not been intact since 1000-1300 AD, when clearing took place for wood fuel and agricultural expansion (Williams, 2000; Raven & Wagner, 2021). Nevertheless, up until the mid-1900s, farms supported abundant biodiversity and varied habitats (Barthlott et al., 1998; Raven & Wagner, 2021). Coppices and hedgerows, wet meadows, unmanaged ditches and grazed grassland, known as 'semi-natural' habitats, were abundant, and the UK's biodiversity profile became characterised by areas managed for early succession in combination with some woodland (Raven & Wagner, 2021; Natural England, 2010).

This dramatically changed when WWII shortages shifted political focus to food security. The EU's Common Agricultural Policy (CAP), adopted in 1962, prioritised food supply and internal price stability (Holland, 2001). For decades, CAP's production-linked payments heavily incentivised agricultural intensification through means of large, monocropped fields, habitat conversion, simplified rotations, regional specialisation and high chemical inputs. This successfully prevented widespread food shortages, but also resulted in habitat homogeneity and polluted environments became unable to support wildlife. Between 1935-1985, ancient woodland in the UK declined by 45%, between 1947-1987 hedgerows in England and Wales declined by 30%, and between 1947-1983 lowland grassland and hay meadows declined by 95% (Evans, 1992; Price, 2003). Though this shift in practices may have been welcomed by some farmers due to the drop in required labour intensity and increased financial stability, it is important to note the significant monetary incentivisation that characterises the rapid transition as being politically instigated.

Wildlife on Farms

It can therefore be understood that the current ecological characteristics of the English landscape, in which natural spaces are overtly in conflict with agricultural areas, is a recent construction. The dire consequences this has for national biodiversity levels highlights the necessity for a shift towards less intensive practices. The diversification of agricultural landscapes is an approach that may contribute to regenerating biodiversity levels and associated factors like soil quality and pollinator abundance (Varah et al., 2013; Rohila et al., 2017). This includes increasing woodland cover on farms, which can improve biodiversity and carbon sequestration (Staddon et al., 2021; Tresise et al. 2021). Strategies for increasing woodland on farms include sectioning off areas for forest regeneration or incorporating more semi-natural areas such as hedgerows or agroforestry (Staddon et al., 2021). Agroforestry is an uncommon

practice in the UK, though it is gaining popularity. It is the incorporation of trees into agriculture, either through grazing lightly wooded pastures or growing trees in between crop rows (Varah et al., 2013). Unlike agroforestry, areas of wooded land within or between agricultural estates is quite common, even with steady declines in the last half century. Hedgerows have also been a prominent way of defining field boundaries in the UK since at least the 1700s (Historic England, 2021). Other field boundaries and ditches as well as ponds can also be important havens for biodiversity within agricultural landscapes (Williams et al., 2004), as can other semi-natural habitats such as managed grasslands (Woodland Trust, no date).

Scope and Research Aims

Farmers are frequently identified as key players in working to shift towards more successful biodiversity conservation in the UK (HM Government, 2021). As landowners or managers, their decisions define biodiversity outcomes. As explored in the literature review below, there is an abundance of research attempting to understand their motivations, decision making processes, and how to practically influence change. However, limited existing literature is specifically focused on Norfolk and Suffolk. According to the National Farmer's Union (NFU), about three quarters of these regions is used for agriculture (NFU, 2016). The average farm size is 118 ha, compared to the national average of 86 ha. On larger farms, environmental damages are likely more significant. There is also more opportunity for landowners to be experimental in maintaining or establishing semi-natural habitats on some parts of their farms.

Considering this, the following research aims to answer the research question:

What are local farmer's motivations for maintaining or increasing woodland and semi-natural habitats on their farms for biodiversity conservation in Norfolk and Suffolk?

The innate value of biodiversity and the necessity of its conservation is assumed. Although discussion of ecosystem services and natural capital is relevant to agriculture and agri-environmental policy, a discussion on justifying nature's value is beyond the research scope. Additionally, although agricultural chemical input is understood as a significant driver of biodiversity loss, it is not explicitly included in the research aims.

This research also seems to be relatively unique in implementing a theoretical framework that combines Michie et al.'s (2014) *COM-B Model* with Kollmuss & Agyeman's (2002) *Model for Pro-Environmental Behaviour*. Although the COM-B Model is presented by Michie et al. as useful in a policy context, this research does not limit itself to policy-based motivations (as much of the existing literature does). Instead, policy and government schemes are approached as being one of many factors, alongside other monetary and non-monetary considerations. It is also important to note that the focus is on farmer *motivations*, rather than farmer decision making. Although the two are unavoidably linked, explicit documentation of decision outcomes were not recorded methodically during data collection. Instead, the intention was for a qualitative approach to uncover reflexive motivations that may or may not initiate a pro-environmental decision outcome.

The following sections begin with a more detailed explanation of the current policy context in England, which is important background information for understanding the farmer's motivational context. This is followed by a literature review explaining the theoretical framework and posing existing literature within a structure derived from this framework. The methodology is then explained followed by the results and discussion.

Contemporary Policy Context

i. Established Policy

The CAP is a piece of EU legislation that has gone through various iterations. Since 2015, it functioned through Basic Payment Schemes (BPS) in the UK. Once a year, active farmers with at least 5 ha of land are permitted to apply for payments of around £163/ha in 2020 (GOV.UK, 2015; GOV.UK, 2022a). To qualify for these payments, farmers must meet 'cross compliance' requirements by maintaining a good agricultural and environmental condition and meeting statutory management requirements. These requirements attempt to put limits on soil erosion, habitat destruction, and water pollution while maintaining soil structure and organic matter. Farmers can also apply for an additional 'greening' rate which requires increased focus on crop diversification and ecological focus. Nevertheless, BPS is not considered to be primarily focused on ensuring agricultural biodiversity (GOV.UK, 2022a).

Environmental Stewardship (ES), which was implemented in 2005 by Natural England on behalf of DEFRA, provides payments that specifically incentivise the maintenance of biodiversity conservation in rural and agricultural areas (GOV.UK, 2012). A variety of different levels are available from Entry Level to Higher Level, lasting up to 10 years. In 2014, this was replaced by Countryside Stewardship (CS), which is similar, but organised into Mid Tier, which is for farmers and landowners, and Higher Tier, which is for more complex environmental management projects (GOV.UK, 2023b).

These schemes followed legislation relevant to EU law and therefore, following Brexit, new legislation will be written. BPS will be phased out gradually between 2021 and 2028 (Rheinbaben, 2022). Payment declines for 2021 were between 5-25%, with higher rates for larger farms (GOV.UK, 2021a).

ii. New Policy Structures; ELMS and Credit Markets

The Environmental Land Management Scheme (ELMS) is set to be the replacement. Unlike BPS, ELMS is not intended to be an income subsidy for farmers, but instead monetary incentives to produce public goods through effective environmental land management. ELMS includes three schemes: Sustainable Farming Initiative (SFI), Local Nature Recovery (LNR), and Landscape Recovery (LR) (GOV.UK 2021b). These schemes claim to be aligned with the *25 Year Environment Plan* (GOV.UK, 2018) for net zero emissions by 2050. Most relevant to this study is the SFI, which is organised into different standards (such as 'hedgerows'), that farmers can choose to subscribe themselves to. Instead of farmers being guaranteed BPS for meeting minimal requirements, the UK government claims that SFI will increase flexibility because each farmer can choose for what standard they wish to comply (GOV.UK, 2023c).

There has been much uncertainty surrounding the implementation of ELMS. It has entered various pilot stages but has not yet been fully implemented. The latest update was published on 26 January 2023, after the data collection of this project. It was confirmed that

ELMS would go ahead and that existing ES agreements would continue to be supported, with the full SFI offers to start in 2025. The standards available under SFI, subject to change, are hedgerows, integrated pest management, nutrient management, arable and horticultural, improved grassland, and low input grassland (NFU, 2023; GOV.UK, 2023c).

This new policy is being implemented in tandem with the developing market for biodiversity and carbon credits (Freedman et al., 2009; Bruggeman et al., 2005). Biodiversity and natural carbon sequestration are non-rival and non-excludable public goods. This causes a market failure because consumers are not incentivised to pay, and producers are not incentivised to maintain ecological wellbeing (Gomez-Baggethun et al., 2010; Alvarado-Quesada et al., 2014). The monetisation of ecosystem services through credit markets is undertaken as a strategy for correcting this. The intention is that to keep in line with regulation, companies will either limit environmental degradation or purchase credits from other actors that are managing biodiversity elsewhere to ‘offset’ damage (Van Hecken et al., 2015; Hausknost et al., 2017). There is a lively debate in the literature surrounding the effectiveness and moral implications of this strategy (see Hausknost et al., 2017; Ola et al., 2019; Ives & Bekessy, 2015; Vidal, 2014).

In the UK, biodiversity net gain (BNG) will be mandatory in November 2023, and it is assumed that this will require an increase in the trading of biodiversity credits (GOV.UK, 2023a). The UK’s carbon trading scheme (UK ETS) has been live since January 2021 (GOV.UK, 2022b), which is included in the UK’s governments 2021 Net Zero Strategy (HM Government, 2021). Though there are criticisms still surrounding these interventions (Simpson et al., 2023), it seems likely that markets for biodiversity and carbon credits will expand in the UK alongside the implementation of ELMS. As landowners, farmers should be able to sell biodiversity and carbon credits if they implement agricultural land management practices that result in a net gain of biodiversity or a net loss in carbon.

Literature Review

Theoretical Context: COM-B Model and Model of Pro-Environmental Behaviour

Michie et al. (2011) developed the COM-B System as a way of conceptualising behaviour change for policy creation. It categorises capability, motivation and opportunity as influencing and being influenced by behaviour.

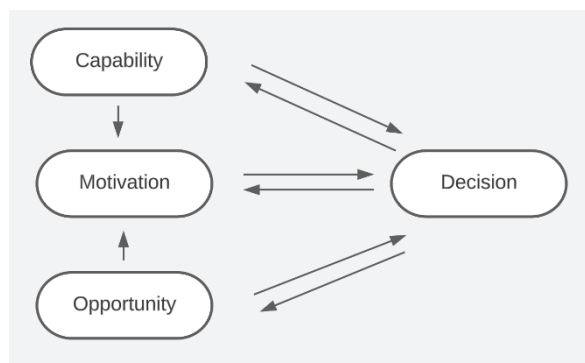


Image 1: COM-B Model reproduced from Michie et al. (2011) in Michie et al.. (2014).

This theory is concerned with conceptualising any behaviour, but here ‘*behaviour*’ will be utilised to connote a ‘*decision*’ made about farm management. As defined by Michie et al.,

the *capability* element is the physical and psychological capacity for someone to carry out an activity. Although physical capability may be relevant to the research context, the data collection is focused more on what Michie et al. calls ‘psychological capability’. This is understood to include perceived capability, or a farmer’s perception of whether a management decision is realistic and/or possible. This is referred to in the literature as ‘self-efficacy’ (see Massfeller et al., 2022). *Opportunity* is the physical, social and institutional context that either prompts behaviour or allows for it to happen. *Motivations*, as defined by Michie et al., can either be reflexive or impulsive/habitual. For this research, the focus is on motivations as reflective, intentional processes.

The utility in this conceptualisation of motivation is that it expresses the dynamic relationship between elements. Each may have varying influence on the outcome, and capability and opportunity may either feed into motivation or influence the decision more directly. Feedback systems are also illustrated by this model because the decision to take pro-environmental action may consequently strengthen value systems or social and cultural opportunities through community involvement. Barriers to pro-environmental decision making may constitute the absence of an elements, or may disrupt the flow of one element in influencing another. It is also important to understand that motivations are not static, but a “process marked by interaction” (Siebert et al., 2006)

To contextualise this framework, it will be used in combination with Kollmuss & Agyeman’s (2002) Model of Pro-Environmental Behaviour. This model attempts to explain the gap between environmental knowledge or awareness and participating in pro-environmental behaviours and decision making. The theory outlines how there is a differentiation between internal and external factors.

Table 1: Summary of internal and external factors reproduced from Kollmuss & Agyeman’s (2002) ‘Model of Pro-Environmental Behaviour’ in Michie et al. (2014).

Internal Factors	External Factors
Personality traits Value system (pro-environmental) <ul style="list-style-type: none"> - Knowledge - Values - Attitudes - Emotional involvement 	Infrastructure Economic situation Political factors Institutions Education Social and cultural factors

The effect that these motivations have is strongest when they work synergistically, but they can also work independently. Internal and external motivations can also influence each other, for example, taking political action would constitute indirect environmental actions influencing external factors.

Although this theoretical model is constructed with general environmental behaviour in mind, it is useful for this context. Here, the ‘pro-environmental behaviour’ would be farm management activity that increases or maintains woodland or semi-natural habitats. Differentiating between internal and external factors is important considering the plethora of relevant economic and political factors.

In combining these two frameworks, Kollmuss & Agyeman's *external factors* can generally be identified as Michie et al.'s *opportunity* element, while *internal factors* are more associated with *capability* and *motivation*. In this way, the framework supports an understanding of motivations for pro-environmental behaviours.

Landscape of Motivation

In line with this conceptualisation of motivational factors as being internal, external, and interrelated, the following sections positions this in the relevant political, social and physical landscape.

i. Monetary Motivation

Conventionally, it tends to be assumed that farmer motivation is dominated by financial and economic factors (Maybery et al., 2005; Russi et al., 2016; Rezaei-Moghaddam et al., 2020; Brown et al., 2021). It is therefore important to understand the framework under which farmers can be financially motivated to make pro-environmental decisions. In the context of the theoretical framework, these are mostly external institutional factors.

a. Agri-Environmental Schemes

The relevant existing literature is dominated by perspectives on agri-environmental schemes and policy writing. One key finding by Wilson & Hart (2002) is that the schemes do little to change a farmer's long-term attitudes, and that this may be because they focus too heavily on landscape maintenance rather than change. Schemes that do focus on landscape change are more likely to attract farmers that are already conservation-oriented, but also have a higher chance of shifting attitudes (Wilson & Hart, 2001). Criticism of how schemes are structured has also looked at results-based schemes versus schemes that require specific management (Massfeller et al., 2022). Traditionally, schemes have prescribed management practices, but this is often not context-specific and may limit the autonomy of farmers in making management decisions. Either way however, Massfeller et al. (2022) found that the most significant barrier for participation was bureaucratic burden. Aside from the added workload of application paperwork, inefficient communication and confusion were also listed as bureaucratic barriers (Coyne et al., 2021).

The imminent changes to agri-environmental scheme policy in the UK makes this motivational factor somewhat obscure, as no literature yet studies ELMS. Non-academic references express general frustration surrounding the lack of clarity in implementation. Since the introduction of ELMS in 2018, there has been much uncertainty surrounding what funding will be available. This was exacerbated by frequent Prime Minister changes throughout 2022. Media outlets discussed uncertainty for farmers surrounding ELMS (Harvey & Horton, 2022; Herrick, 2023; Bright Seeds, 2022; NFU, 2023), with rumours even hinting that Liz Truss would put the whole plan 'under review' and perhaps abandon it (Harvey & Horton, 2022). At the time of the data collection for this study, the state of ELMS under the UK government had not been clarified.

b. Private Funding; Biodiversity and Carbon Credits

The existing literature surrounding how farmers may interact with biodiversity and carbon credits is limited. Lokuge & Anders (2022) claim that the uncertainty of agricultural carbon credits mean that their benefits cannot be guaranteed. There seems yet to be any research

on how these markets may act as a motivation for pro-environmental decision making. Outside of academic literature, there is growing discussion within farming communities about the possibility of future markets. For example, the April 2022 issue of *Farmers Weekly* mentions it in terms of potential benefits for increasing woodland on farms (Meredith, 2022, pp. 35).

c. Risk Aversion

Research surrounding the influence of risk aversion in agriculture often suggests major influence (Ghadim et al., 2005). Agriculture is burdened with high levels of economic and environmental uncertainty, which makes farmers less willing to take risks (Chavas, 2018). Uptake of new technologies and practices is slow because traditional practices are associated with the most certainty (Nowak, 1987). This is primarily a financial consideration; uncertainty is avoided because a negative outcome could damage the financial viability of the farm.

There is also some literature on the relationship between risk and the uptake of agri-environmental schemes, but not so much on the implementation of pro-environmental behaviour in general. Giovanopoulou et al. (2011) claims that risk associated with adopting the European Union's Nitrate Reduction Programme (NRP) lowered uptake by 18%. Additionally, Massfeller et al. (2022) argues that risk aversion is particularly influential for results-based schemes, rather than prescribed management schemes, due to fear of not being able to deliver outcomes. However, Cullen et al. (2020) argues that it is not so straightforward. Their research categorises farmers in association with their personal identity as being productivist, conservative, forward looking, or optimistic caretakers. Those with a conservative self-identity were more likely to discuss risk as a barrier for participating in the scheme. As such, it seems that risk aversion may be a barrier to adoption of pro-environmental behaviour, but not unquestionably. In the context of the theoretical framework, risk can be considered as a hinderance to a farmer's self-efficacy. Lacking self-confidence in their ability to handle possible negative outcomes hinders motivation to change behaviour.

ii. Non-Monetary Motivation

There is a growing conversation on non-economic factors that influence farmer behaviour. Policy implementation and conventional narratives often assume that farmers are financially motivated without understanding their context (Howley et al., 2015). According to Siebert et al. (2006), willingness to cooperate with agricultural policy cannot be reduced to any one factor alone, whether it be economic, social, or value-based. Considering this, some relevant non-monetary motivations are introduced below, mostly from the perspective of policy improvement. The first two factors fit under the internal categorisation of the theoretical framework while the last is more external.

a. Relationships with Nature and Environmental Values

Environmental values are defined here as beliefs about the importance of the natural world and how it should be treated (Reser & Bentrupperbäumer, 2005). These values have been explored as an explanation for pro-environmental behaviour (65). Strong conservation motivation often translates into behavioural change and pro-environmental decision making (Beedell & Rehman 2000; Greiner et al., 2009).

King & Ilbery (2012), who compared attitudes of conventional and organic farmers in England, found that environmental attitudes were not necessarily strictly defined by fully pro-environmental management styles. Conventional farmers were more likely to express a

business-like attitude to managing their farm, and organic farmers tended to be more motivated by their environmental attitudes. However, conventional farmers also expressed pride, respect and sensitivity to the environment that may or may not have translated into pro-environmental decision making. The findings of King & Ilbery (2012) are not directly comparable to the context of this study because of the focus on organic practices rather than increased woodland and semi-natural habitat as ‘pro-environmental behaviour’. Nevertheless, it indicates that it cannot be assumed that pro-environmental attitudes only exist within contexts where pro-environmental decisions are made.

In addition to internally determined environmental factors, there is also a body of literature exploring beneficial ecosystem services provided by biodiversity. This is largely concerned with regenerative farming practices like agroforestry, and how it can provide benefits such as improved nutrient cycling and fixation, reduced soil erosion, wind shelter, the creation of a stable micro-climate (Tsonkova, 2018; Varah, 2013).

b. Responsibility and Moral Framing

Razaei-Moghaddam et al. (2020) argue that moral norms can be a significant motivator in influencing pro-environmental decision making. In some cases, environmental morals may be what motivates farmers to maintain or expands biodiverse areas. At the same time, however, feelings of moral responsibility may be associated with food production itself. For example, King and Ilbery (2012) found that conventional farmers often cited concerns around feeding growing world populations (Kings & Ilbery, 2012). They may therefore see it as their responsibility to continue with intensive practices in order to meet demand. Howley et al. (2015) also found that ‘productivist attitudes’ in farmers sometimes prevented them from increasing woodland cover even when it was economically beneficial to do so. The farmers had positive associations with traditional farm work and were not inclined to give it up for farm diversification.

c. Social Influence

According to Razaei-Moghaddam et al. (2020), social norms can motivate farmers to make pro-environmental decisions. This study was done in the context of clean technologies and found that encouragement or opposition from other farmers or prestigious people influenced adoption (Razaei-Moghaddam et al., 2020). Cultural norms around ‘good farming’ may also influence how farmers manage their land (Westerink et al., 2021). Social interaction and community intervention have been found to be effective in promoting motivation and capability through conflict resolution, mutual learning and trust (Prager, 2015; De Vries et al., 2019). According to Burton & Paragahawewa (2011), promoting pro-environmental behaviour is more sustainable if it becomes a culturally embedded social norm. Innovation, monitoring, regulation and enforcement activities carried out by peer groups may become more embedded into farmer practices. In this case, there is an intrinsic reward of social and cultural capital for pro-environmental behaviour.

This finding has been applied in the Netherlands where farmers join agricultural collectives that independently distribute funding for agri-environmental management (Barghusen et al., 2021). The implementation of this is very recent, and therefore its effectiveness in improving outcomes for biodiversity is not yet understood. Relevant to its success and implementation, however, is the prospect of local self-governance for effective

natural resource management. According to Termeer et al.'s (2013) study on a Dutch Farmer's cooperative established before the agricultural-collectives policy, success depends on how the cooperative is internally arranged, and whether it can successfully communicate with relevant authorities.

Methodology

The methodology is structured following the Standards for Reporting Qualitative Research (SRQR) defined by O'Brien et al. (2014).

i. Approach and Research Paradigm

This research used a qualitative approach to explore the subjective motivations of farmers. Rather than having an objective ontology, which assumes that reality can be empirically measured, the approach used here is constructivist. Constructivism argues that our reality is socially constructed and established by various social factors and interactions (Clark et al., 2021). Constructivism is aligned most closely with an interpretivist ideology in which the researcher attempts to "...grasp the subjective experience of social action" (Clark et al., 2021, pp. 25), or understand social interaction within a specific context (Dearnley, 2005). A deeper understanding of the complexities that play a role in farmer motivations cannot be uncovered through questionnaire answers or any kind of quantitative data collection. Instead, semi-structured interviews were chosen, for which a series of preliminary questions were prepared. Carrying out semi-structured interviews requires that the researcher be actively reflective during and after the event. As recounted by Dearnley (2005), reacting to any verbal and non-verbal cues and picking up on mentions of relevant themes for further gentle probing is necessary. The intention is for the participant to feel comfortable expressing their personal opinions and perspectives without expectation. This approach does not intend to be generalisable but allows for a much deeper understanding of the complexities of social interactions and individual perceptions (Clark et al., 2005).

ii. Researcher Characteristics

This study was carried out by an undergraduate student with no previous association with agricultural communities in Norfolk. The researcher had no personal relationship with participants and acted as an outsider that participants would likely have found unrelatable.

iii. Sampling Strategy

Initial participants were contacted through the researcher's social circles and the project supervisor. This was followed by snowball sampling, which is a form of network sampling in which participants are asked for contacts (Bernard et al., 2016). Most participants farmed conventionally, meaning that they utilise chemical inputs and other technologies to maximise yield. Two were specifically sought out because of their agroforestry methods. The intention was to find participants that implemented varied farming practices, but in the end the sample group was somewhat dictated by convenience and feasibility. As a student project, there was limited resource access and time frame.

Because this is not a form of representative sampling, statistical or generalised conclusions cannot be drawn. Therefore, the participants are more like individual case studies that reveal depth in knowledge of their own experience rather than breadth in knowledge of generalised experience. Two key informants were also interviewed, both of whom were

agricultural advisors and professionally interacted with various farmers around Norfolk and Suffolk. These advisors provide broader insight but did not manage their own farms and therefore do not represent the positionality of the research context.

iv. Ethical Issues

Ethical guidelines outlined by the University were strictly adhered to. The Research and Ethics Committee reviewed and accepted the proposal. Each participant was provided with a Participant Information Sheet (Appendix I) prior to the interview, and were required to sign the Consent Form (Appendix II).

v. Data Collection and Processing

Eleven interviews were carried out which lasted between thirty and fifty minutes as determined by the participant. Of these, nine were farmers and two were agricultural advisors, or key informants. Interviews were carried out from September to December 2022. Most of these were in person on the farm site. One was held at the UEA campus, and one was conducted online via Zoom. Prospective participants were initially contacted by phone and offered in person or virtual interviews. Online interviews were found to be largely unsuccessful in terms of participation reliability, so efforts were made to travel to farm sites.

Interviews were recorded on a personal device and then transcribed. Transcription was done initially by Microsoft dictate, followed by thorough manual checks for accuracy. Transcribed interviews were then inputted to NVIVO. Thematic coding was then carried out following the guidance of Ryan & Bernard (2003). The text was read line by line and each quote or relevant phrase was selected and sorted into themes. Many of these themes were identified inductively through pattern recognition in the data (e.g. 'perceptions of nature'). Some themes were predetermined for their relevance to the research question (e.g. 'env. motivation' and 'farm priorities'). Inductive sub-themes were also sometimes created when code frequency became larger than manageable (e.g. 'bureaucratic/unclear' within 'negative' within 'opinions on agri-env schemes'). In NVIVO, attributes (see Table 2) were assigned to each interview. This allowed for Matrix Queries to be used to identify appropriate quotes during the writing process. This also allowed for NVIVO to produce various graphics to help illustrate arguments. Results are discussed within the structure derived from the theoretical framework, somewhat mirroring the literature review. The theoretical framework was chosen post-data collection because it was found to effectively synthesise findings.

vi. Techniques to Enhance Trustworthiness

Thematic coding can be done collaboratively in order to increase reliability, but this was not an option here. Trustworthiness was enhanced using NVIVO tools to determine quotes adhering to certain characteristics rather than relying on memory or inferences. Additionally, methodology literature was referenced in order to implement reliable techniques for qualitative data analysis.

Results

Throughout the Results section, which is structured by the theoretical framework, the eleven participants will be referred to anonymously. The following tables introduce and describe each participant.

Table 1: Description of the attributes assigned to each participant.

Label	Description
Agri-env income	Farm receives income from an agri-environmental scheme including ES, CS, and SFI
Woodland	Farm contains area that is exclusively woodland (any size)
Conventional	Use of conventional farming intensity. Varied environmental measures, but with the input of chemical pesticides and fertilizers. High-yield mindset.
Agroforestry	Inclusion of trees in crop rows and focus on high biodiversity. Radical and unconventional regenerative practices, less focus on yield.
Env. Activity	When prompted, participant can discuss actions and decision making that implemented environmental protection or considered ecological wellbeing.
Env. Priority	Farm management sacrifices opportunity for profit to prioritise environmental wellbeing and biodiversity.
Consultant/Advisor	Gives advice to multiple farmers and farms
Landowner	Owner of land, does not answer to anybody else, personal income directly determined by farm output.
Manager	Earns salary for managing a farm for the landowner. May be rewarded for high yield, but personal income is not directly determined by it.
Tenant	Rents land to farm on from a landowner or farm business. May no have long-term autonomy for decision making.
Single Farm	Based on one farm.
Multiple Farms	Has access to or is advisor to multiple different farms.
Small Scale	<150 ha
Medium	150 ha-500 ha
Large Scale	>500 ha

Table 2: Interview participants and their relevant attributes.

		Participant Number										
	Label	1	2	3	4	5	6	7	8	9	10	11
1.	Agri-env. scheme	X	X	X	X		X	X	-		X	-
2.	Woodland		X	X	X	X	X	X	-	X	X	-
3.	Conventional	X	X	X	X	X	X	X	X			X
	Agroforestry									X	X	
4.	Env. Activity	X	X	X	X	X	X	X	-	X	X	-
5.	Env. Priority						X		-	X	X	-
6.	Consultant/ Advisor								X			X
	Landowner		X		X	X		X		X	X	
	Manager	X		X			X					
7.	Single Farm	X	X		X	X	X	X		X	X	
	Multiple Farms			X					X			X
8.	Small Scale					X		X	-	X	X	
	Medium Scale		X	X	X				-			
	Large Scale	X					X		-			X

Note that participants 8 and 11 were advisors rather than farmers, making them key informants. They both work with conventional farms, but Participant 11 is associated with fewer farms than participant 8, with one ‘home farm’ which is large scale. All participants except 9 and 10 used conventional farming techniques. Of the relevant participants, only two (5 and 9) did not participate in an agri-environmental scheme. Most participants were landowners, but managers and consultant/advisors were also interviewed.

Monetary Motivation

The data show that financial stability is a frequently mentioned priority for these farmers. The diagram below was produced using NVIVO code frequencies for the predetermined theme of 'Farm Priority', for which the sub-themes in Image 1 were deductively determined.

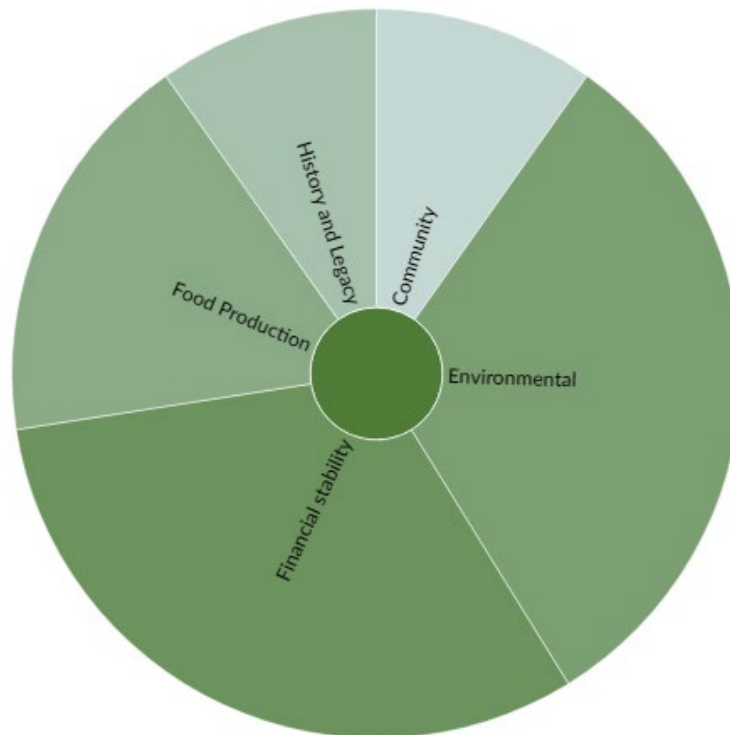


Image 1: Code frequencies of stated farm priorities

The diagram illustrates that the most frequently stated farm priorities were 'Financial stability' and 'Environmental' with equal prevalence. This is an imperfect rendition of the data because farmers actually prioritised financial stability over all other concerns.

“The initial thing has to be... we're led by money. Yeah, so we've, we've got to see a financial benefit, over and above the environmental benefit” (Participant 7).

Although environmental priorities were discussed as frequently, they were always secondary. Nevertheless, Image 1 is useful in illustrating that participants expressed financial stability as an important motivation for deciding how a farm is to be managed, while environmental factors were also at forefront.

This finding introduces the perceived convoluted relationship between economic and biodiversity outcomes. The decision tree below (Image 2) attempts to visualise this relationship by showing how the initial decisions (in black) and the following management strategies (in white) influence profit and biodiversity (in green). In situations where biodiversity increases (left), there is often perceived to be a trade off in profit. In the instance of converting semi-natural areas to arable, there is almost certainly short-term profit and a decreased biodiversity. However, different management decisions to maintain or create more biodiverse areas may result in both biodiversity and some profit.

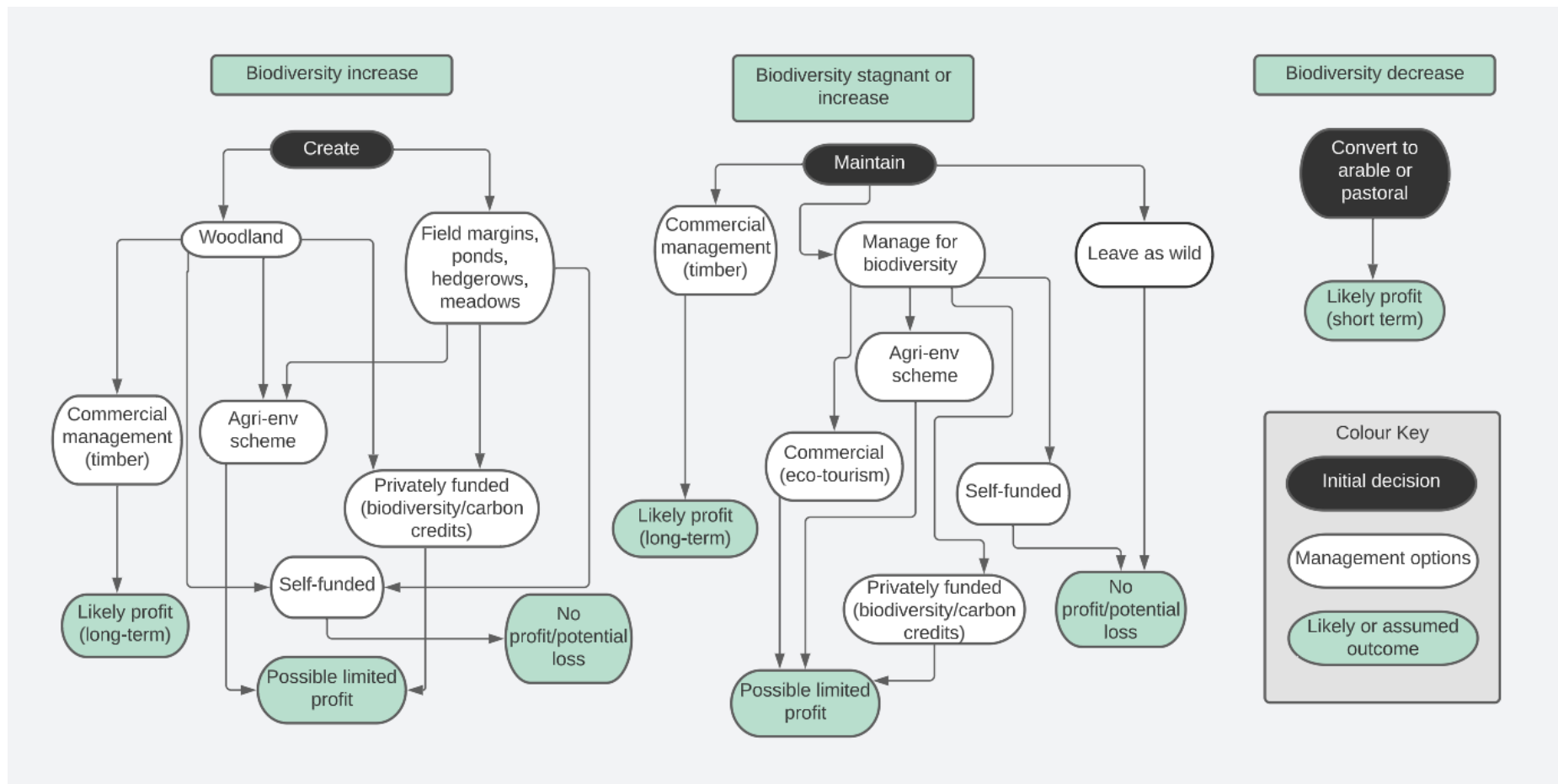


Image 2: Likely or assumed financial and biodiversity outcomes for three main option categories

Image 2 was constructed by synthesising a combination of descriptive anecdotes and specific explanations. It is not a point from which conclusions about the data can be drawn, but instead an introduction to the convoluted relationship between economic and biodiversity factors perceived by participants, and a simplified explanation of some of the management options available to them.

i. Agri-Environmental Schemes

Agri-environmental schemes are a way in which these farmers can potentially receive income, or cover costs, for maintaining or creating woodland and semi-natural habitats. Most farmers said that they were subscribed to an agri-environmental scheme. Their opinions of schemes can be initially categorised as having positive or negative associations.

Table 3: Thematic code frequency of negative and positive opinions on government agri-environmental schemes

	Cases Frequency	Total References
Positive Opinions	8	16
Negative Opinions	10	48

Table 3 indicates that negative opinions were dominant. These comments were made in reference to experience, either with schemes they participate in or had investigated. This is mostly CS and ES, and some SFI pilot schemes.

Positive Opinions

Positive opinions were not as common and tended to be less emphasised.

Table 4: Summary of Positive Opinions about Agri-Environmental Schemes.

Summary	Representative Quotes
Brief compliments with little depth.	“The schemes are...I think sometimes well-intentioned” (Participant 4).
	“[farmers]...think more positively about their woodlands, because they can get some payment for it” (Participant 8).
Environmental management already implemented.	“Well for the soil standard, I haven’t really got to do much different to what I’m already doing. Which is why I went to the advanced” (Participant 7).
Theoretical, rather than anecdotal positive experience.	“...and they’re stable, they’re known incomes, which is, you know, we’re a pretty volatile market” (Participant 11).
Improvements from previous schemes.	“And there’s more flexibility and it more what I would call user friendly” (Interview 8).
	“I think... it’s easier and easier. You look at this SFI, they’ve made it pretty easy” (Participant 11).

Negative Opinions

Participants were generally quite critical about the schemes, with participants 9 and 5 refusing to subscribe to them. There was variation in how opinionated each participant was. The negative comments were deductively coded into three main categories, summarised in Tables 5-7.

a. Bureaucratic, unclear or inconsistent

This was a frequent complaint and sometimes led to extensive and passionate monologues. Negative perceptions of the government as an institution was expressed in reference to this. Note that this was most frequently by participants who were subscribed to a scheme, and it normally did not necessitate unsubscribing.

Table 5: Summary of comments on problems with bureaucracy and uncertainty.

Summary of Complaints	Representative Quotes
Paperwork, delays, perceived inaccuracies of payment amounts.	“...one will be the sheer hassle of it with the government and all the paperwork, and I mean the government are their own worst enemy” (Participant 2).
Technological obstacles and inflexibility with plan adaptations.	“It’s a nightmare...initially it was getting my maps sorted out. Although my maps were right, they kept coming up with anomalies” (Participant 7).
	“...I click about and it says ‘unavailable’. And I eventually go through to see why its unavailable, and it’s because it’s in a mid-tier cover crop, but actually it's not now because that field is actually in wheat... their system didn't predict or can’t cope easily, with that change” (Participant 3).
Political inconsistency leading to lack of clarity and uncertainty.	“There’s quite a lot of political instability... it's like overnight, we're not doing that anymore” (Participant 8).
	“I mean when Liz Truss was prime minister, they were going to completely ditch it and now they're just saying it's ‘under review’” (Participant 9).

b. Bad Policy

This was a common complaint particularly by those who refused to subscribe to a scheme (Participants 5 and 9). Comments were often associated with participants lacking respect in government knowledge and capability.

Table 6: Summary of criticism about the content or management guidelines of the schemes.

Summary of Complaints	Representative Quote(s)
Policy writers unfamiliar with context.	“...written by people who have perhaps only sat in an office and don’t actually know what they’re talking about” (Participant 4).
Assigning seemingly arbitrary dates for management activities.	“And it was weird. You have to mow them after the 15 th of July. And right now, if you want to manage a meadow for wildflowers, you don’t mow it in July, you mow it in May” (Participant 9).
Inflexibility.	“It’s like they’re trying to do, you know, one policy for everyone. You know, ‘don’t plough anything, put organic matter on so much of the farm’, but that’s not always the right thing to do” (Participant 4).

c. Insufficient Payments

This complaint was less frequently discussed and less inspiring of extensive discussion. However, it still proved to be a reason for less or limited engagement with schemes.

Table 7: Representative quotes for complaints about insufficient payment.

Representative Quote(s)
“The process is difficult for a relatively small reward. So it just turns you off a bit really” (Participant 3).
“...makes it very difficult to take land out of production, or whether you just think we’ll maximise...and keep growing the best crops we can do. Yeah, and just carry on as we are with that income” (Participant 5).

Some farmers would also carry out environmental management without applying for payment because they did not consider the money to be worth the bureaucratic hassle.

“I suppose like this SFI, woodland money, there isn’t enough in it to warrant doing it. I’d rather not have the money and just let the wood do its own thing” (Participant 7).

ii. Private Funding

Private funding, such as through biodiversity and carbon credits or through specific grants, sparked varied conversation throughout data collection. Biodiversity and carbon credit markets were asked about together, but discussion usually fixated around carbon credits.

Table 8: Summary of reactions to carbon credit markets.

Summary of Points	Representative Quote(s)
Uncertainty about measuring carbon and concerns about managing farm's own carbon emissions.	"So, I think we need to be sincere about it. We need to fully understand it because some and some of the ones get quite restrictive...one is about depth of cultivation of arable soil, for example. And you wouldn't want to commit to something so long term that prevented something that you may need to do" (Participant 3)
	"And I'm not... carbon capture, very unsure of at the moment. How to measure it essentially" (Participant 7)
Theoretical aversion (expressed by both conventional and agroforestry participants).	"I think that's disgusting... we can sell our carbon credits to yeah factory in Norwich that's pumping out pollution, and that then gives them a clean bill health how can that be ethically right?" (Participant 5).
	"Carbon, I get a little frustrated with carbon that you know, one we're not going to solve climate crisis just by offsetting carbon" (Participant 6)
Willingness to hypothetically participate in market when deemed worthwhile.	"...in the end farmers will use carbon credits if and when they become, you know, valuable, I would have thought" (Participant 2).

Reactions to biodiversity credits were more vague and more positive. There was still uncertainty around the logistics of it and weariness about the risks of getting involved. However, it was perceived as being more compatible with farming practices, and there was less scepticism about measurement strategies or risk of overcommitment.

"...the habitats we create the edges of our fields...if the big corporate wants to sponsor a countryside stewardship, to me that is a, you know, that is a sound way of going" (Participant 6).

iii. Risk Aversion

Risk aversion was a theme that materialised as a barrier for pro-environmental behaviour. In addition to being prevalent in conversation about the possibility of private funding (as discussed above), uncertainty seemed to underlie many considerations. The agroforestry farmers did not discuss economic risk as much of an influencing factor, likely due to the business structure of both of their farms being less intertwined with the market. Profits were already not high and diversified with other income streams.

Table 9: Summary of discussion about uncertainty and expressions of risk aversion.

Summary	Representative Quotes
Uncertainty leading to unwillingness to change practices.	“...you have avian flu which is wiped out half, masses of flocks of domestic fowl, turkeys geese, ducks, chickens, in Norfolk. What do they eat? A lot of wheat. Suddenly who do you sell the wheat to?” (Participant 8).
	“When you enter trees and I think as well, there's this suspicion that they could be quite lucrative somewhere... but there's a fear that we will jump too soon and plant trees when we missed the best opportunities to make more income” (Participant 3).
Uncertainty in regularity of funding for pro-environmental behaviour, see also Table 9 for private funding.	“...there might be a payment say for the first five six years, who will there be payments in 30 years' time” (Participant 7).

Non-Monetary Motivation

During the interview process it became clear that only considering monetary motivation would not give a wholistic understanding of these farmer’s motivations for habitat conservation. Participants often recounted situations in which they decided to maintain or create semi-natural areas but not bother applying for available funding. As illustrated by Image 1, financial stability was not the only priority that was discussed. In any case, a financially profitable farm could be with or without woodland; what is it that motivates maintaining the woodland?

i. Environmental Factors

Various environmental factors were recounted as being important. Some were situational, externally determined factors, and some were associated with internal environmental value systems. Sometimes, for example, already-established woodland would be left simply because it had always been there. While there was no motivation to convert it to arable and decrease biodiversity, there was also no motivation to expand it.

Table 10: Externally determined environmental motivation factors.

Summary	Representative Quotes
Convenience; evening out field shapes.	“Yeah, to you know, square some of our fields up so that we are more efficient in our food production” (Participant 6).
	“Yea because the machinery has got bigger so some of the parts are awkward to get to” (Participant 5)
Geography not aligning with crop requirements.	“...because it's very rubbish fields, very sandy soils and they're probably very low productive parts of the farm anyway, so it makes sense just to put it into wildflowers” (Participant 1).
Ecosystem services provided by wildlife (discussed by agroforestry participants).	“Crop diseases are airborne spores and so they are literally they don't travel through trees. Yeah. And so I think there's a lot of there's a lot of learning on agroforestry and organic agriculture on how the trees are benevolent to the crops” (Participant 9).
	“...it seems to be that the beetles that predate on the slugs were living around the edge of the field.” (Participant 10).

In addition to environmental considerations that were externally defined, internal environmental value systems and positive associations with wildlife were discussed to some extent by all participants. This was both in response to being asked why farmers took pro-environmental action and revealed unprompted in conversation.

Table 11: Internally determined environmental motivation factors.

Summary	Representative Quotes
Personal connection to wildlife.	“And that one is a very ancient wood, that’s a very special one that one” (Participant 2).
	“Yes, I suppose I've always known that wood, I used to play on it as a child and yeah, and I like to do what I can for them environment and so on” (participant 7).
	“So there's so and people historically would often put small woods in when a child was born and call it Rose’s Wood or whatever” (Participant 8).
Farm business relying on general environmental stability (inconsistent prevalence).	“We’re on the treadmill of delivering rather cheap food and that has, you know, no we hold our hands up that, you know, you can't hide the fact that farmland bird index the, you know, invertebrates, were all on the decline at the end of the last century” (participant 6).

ii. Food Security

There were also comments made, with more prevalence in conventional farmers, about perceived conflicts between biodiversity restoration and food security. This seemed to be an internal motivation and was a more general expression of world view than grounded in experience.

Table 12: Expression of concerns about food security and a responsibility to grow crops.

Summary	Representative Quotes
Personal Responsibility to farming.	“The whole thing about production agriculture, feed the world, all that sort of thing, conflicts a bit with trees. I think farmers are quite happy, we know what its like doing farming. To make that big step is quite difficult” (Participant 3).
	“So you know, I probably have got an issue with taking very productive arable land out of production and planting trees on there for the sake of carbon offsetting” (Participant 6).
Broader, national concerns about food imports.	“the government seems to think they can bring everything in from abroad, ultimately, they'll realize that isn't, you know, it's gonna be a problem” (Participant 2).
	“...because I care about the environment. And not just here. I think we should care about it. Worldwide, shouldn't we? Yeah. So that couldn't mean, if we take our land of production, they're gonna come more rainforest down to grow more food over there” (Participant 5).

iii. Control and Autonomy

There were also issues of autonomy brought up mostly in relation to land ownership. If the person managing the land didn't own it then they may not have the ability to make management decisions that have long term implications. Depending on the wishes of the landowner, this could be a motivator or a barrier to pro-environmental behaviour.

Table 13: Explanations of how lack of control may influence farm management decisions.

Summary	Representative Quotes
Pro-environmental behaviour limited due to lack of ownership.	“And I know a manager very well and he's interested in doing things. But it's the landowner who he's doing it for. And so he's trying to do stuff without them knowing, because he believes it's the right thing to do” (Participant 1).
	“Now he's a tenant farmer so he doesn't own the farm so he couldn't do anything that's too long term, okay? And he wanted a return financial return on the trees quite quickly, so he planted apple trees” (Participant 9).
Pro-environmental behaviour motivated by landowner.	“What we're doing with the, with the woodlands. Even though we're not currently in an agreement, we're carrying on because this is what the landowners want” (Participant 3).

iv. Social Influence

This motivational factor cannot be fully explored as it was not sufficiently prompted by the interview questions. Comments made throughout did express the existence of a social network of regional farmers and peer-judgement regarding environmental behaviour.

“Yeah but again, you know some farming practices that will tick the box that they got countryside and take the money but we won't necessarily deliver the results” (Participant 6).

The deductive coding of this theme was prompted by the discussion of ‘cluster groups’ by two farmers with very different attributes. Participant 10, the owner of a small agroforestry farm, explained

“...a cluster is based on the bio-region and it's farmers within, or landowners, within that region coming together...to effectively be a larger organisation” (Participant 10).

The benefits of this were to collaborate in management, knowledge exchange, sharing of resources and to be able to collectively apply for larger funding schemes. Participant 6, who is a manager of a very large conventional farm also spoke about cluster groups very positively.

“So yeah, even though we're at that scale, you know, our biodiversity doesn't stop there...you know, knowledge, exchanges vitally important...I've not yet met a farmer who doesn't want to join one” (Participant 6).

Discussion and Conclusion

The theoretical framework based on Michie et al. (2011) and Kollmuss & Agyeman (2002) can be used to illustrate the diverse factors that interact with motivations for woodland and semi-natural habitat inclusion in this context. For clarity, Image 3 below (p. 28) is a non-exhaustive visualisation of these findings.

A significant factor was the potential for monetary income, such as through government agri-environmental schemes. As an external influencing factor falling under Kollmuss & Agyeman's 'institutions' (see Table 1), agri-environmental schemes are something that all these farmers interacted with, either by participating in them or considering doing so. However, their discussion of them was largely negative and driven by feelings of disrespect and annoyance towards government institutions. Bureaucratic burden as a barrier for scheme participation was a finding present in the literature (Massfeller et al., 2022), but there was little found that discussed farmer's perception of the government itself and how that may influence their willingness to cooperate with schemes. Non-academic sources were more in touch with this dynamic (Harvey & Horton, 2022; Herrick, 2023; NFU, 2023). Findings from this study may have been influenced by the politically uncertain context of the UK during the time of data collection. In particular, the frequent changes in Prime Minister during 2022 resulted in instability and uncertainty. Additionally, such complaints did not seem to frequently result in refusal to subscribe. Nevertheless, there is still an indication that perceptions of the government may influence a farmer's willingness to collaborate with schemes. Complaints about 'bad policy' and insufficient payments, especially for smaller farms, may also have direct implications, but further research, especially on farmer perceptions of government, is necessary for conclusive claims.

Risk aversion, which is internally determined, seemed to be a barrier in the influence of external monetary incentives. This is most related to the *capacity* element of Michie et al.'s (2011) framework. Psychological capacity was most relevant here, including self-efficacy. For example, even if there was opportunity and motivation to make a pro-environmental decision, risk aversion could hinder a farmer's perception of the possibility of successfully managing their farm in that context. This was particularly evident in interactions private funding markets as well as agri-environmental schemes. Although it was implied that financial viability could hypothetically sufficiently incentivise involvement in carbon and biodiversity credit markets, wariness at getting involved was clearly expressed, as is similar to Lokuge & Anders' (2022) findings. The influence of personal identity on risk aversion (see Cullen et al., 2022) was not properly explored, although the fact that the two agroforestry farmers were not as influenced by it does align with Cullen et al.'s (2022) findings that more conservative farmers are more risk averse.

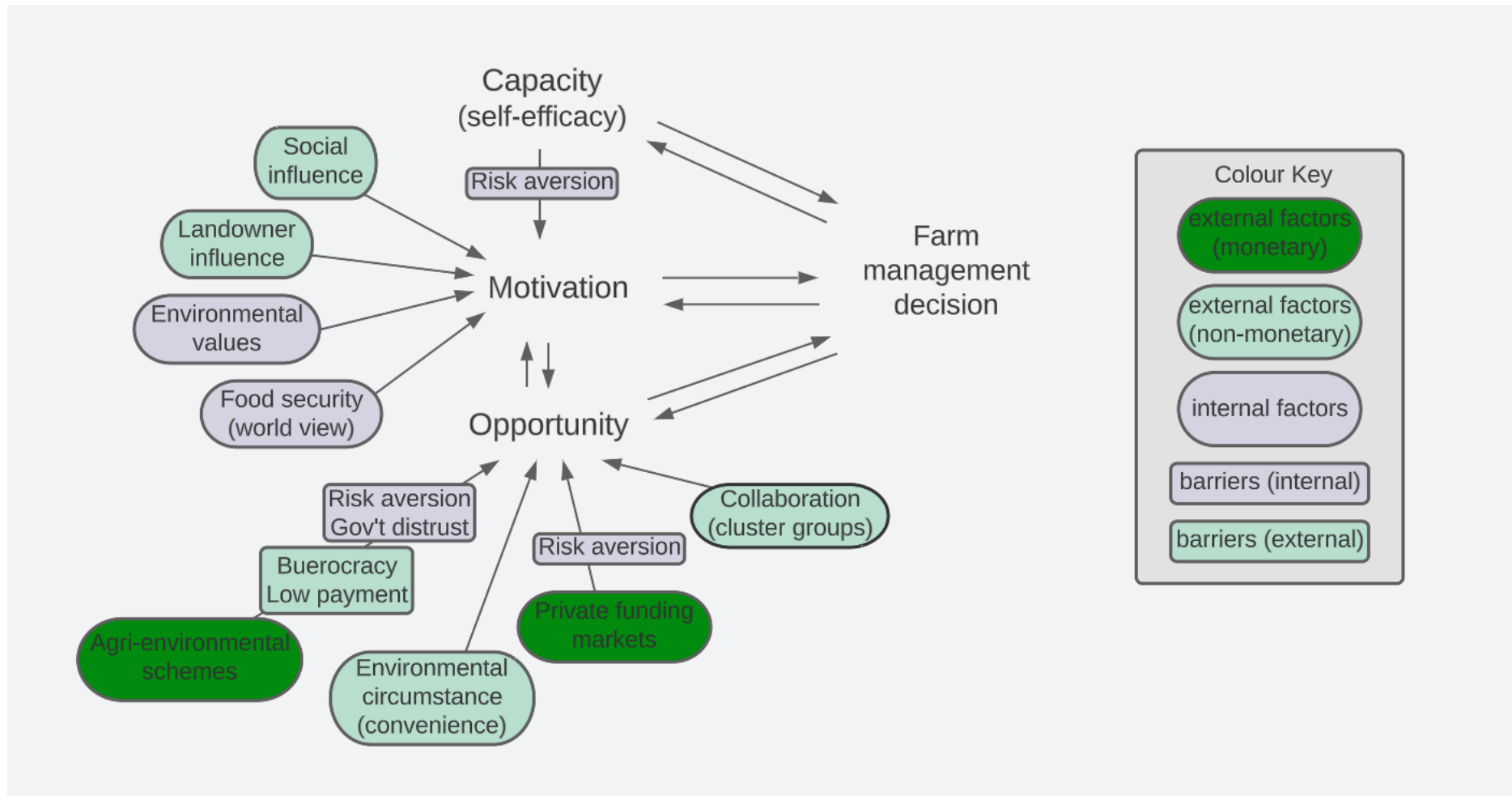


Image 3: Possible iteration of Michie et al.'s (2011) COM-B Model in the context of the research findings.

Here, the theoretical framework reveals that rather than being a direct motivator for pro-environmental decisions, monetary factors more accurately fall under the *opportunity* element (see Michie et al., 2011). As such, they prompt the behaviour change or allow it to happen, but are unlikely to be the source of motivation. This is not to say that financial viability is not of significant importance to most of these farmers. But it does seem that other motivations and capabilities are likely necessary for successful utilisation of monetary opportunities.

As such, the consideration of non-monetary motivation is important. Environmental factors, both internally value-driven and externally defined by landscape features, were discussed by farmers quite extensively. As is consistent with the literature, environmental values were overtly expressed both by agroforestry and conventional farmers (see King & Ibery, 2012). But these did not necessarily instigate pro-environmental behaviour in conventional farmers beyond maintaining or managing existing woodland. Externally determined environmental factors did seem to be influential, but because most of these were related to convenience of field shape and geographical areas, the amount of converted woodland or semi-natural habitats would be limited. This influence is not discussed in the literature, likely because it is not an implementable finding that could be used to influence further pro-environmental behaviour. Ecosystem services, such as pollination and pest reduction (see Tsonkova, 2018; Varah, 2013), were discussed only significantly by agroforestry farmers. This may be because such beneficial effects are only experienced with a drastic wildlife farm presence that conventional farmers would not have been exposed to. Many of these services are provided to them through chemical inputs, the complexities of which is beyond the scope of this research.

Moral framing was expressed by these farmers in relation to their world views on food security and responsibility or desire to continue growing crops. The personal responsibility they expressed for farming is comparable to Howley et al.'s (2015) 'productivist attitudes'. In combination with world views about food imports and high demand, this internal factor could be a motivation against increased woodland or semi-natural habitat. Control and autonomy was not something very present in the literature. It is important to note that not all farmers necessarily own their land or have total control over long-term decision making. This is an external influence that could either initiate pro-environmental behaviour or be a barrier to it.

Social factors were most interesting in reference to the cluster groups that were discussed by two participants with quite different agricultural contexts. The utility of the theoretical framework used for this research (see Image 3) is that it illustrates how interrelated each factor is and how they can feedback to and influence each other. As a hypothetical example, social influence as an external factor may motivate a farmer to join a cluster group which may consequently adjust environmental values and lead to further opportunities to apply to agri-environmental schemes, thus influencing farm management decisions. In combination with recent literature in the Dutch context (Termeer et al., 2013), this finding reveals an exciting avenue for further research and a potential grassroots alternative to monetary incentives as primary institutional factors. The importance of this is supported more generally by these findings, which contribute a conceptualisation of farmer motivations that is not bound to policy considerations. In a context, such as this, where associations with policy were largely negative, it may be useful to consider how other opportunities can facilitate or incentivise pro-environmental behaviour. Although the nature of this study does not allow for generalisability,

the findings can still question assumptions in the literature and reveal new areas for investigation.

Overall, it was found that financial motivation was not the only significant factor influencing farmer motivations for pro-environmental decision making. Risk aversion, moral framing, and social factors were also significant in framing behaviours. This should be taken into account in future research, policy design and other interventions.

Strengths

In terms of data collection, semi-structured interviews allowed participants to freely express what was important to them without the boundaries of survey questions. Additionally, the effort made to conduct all but one of the interviews in person allowed the researcher to contextualize findings, verify some of the information provided, and create a more open and comfortable experience for participants. Additionally, the inclusion of key consultants provided broader information on the topic.

Limitations

A number of limitations to this research should be properly acknowledged. Most significant were limitations in the sampling strategy. Although the methodology explains the small number of interview participants, it would have been preferable to interview a wider variety of farmers. Although the focus was on conventional farmers, the two agroforestry farmers interviewed was not enough to properly understand that context in comparison to the conventional one. Additionally, because participants were found through the researcher's social circles and the snowball method, it was unlikely for there to be much variation in what they were saying. As a time-limited student project with only one researcher, these limitations were difficult to avoid. Additionally, because the research took a qualitative, in-depth approach, it may have benefited from more varied methods. Participant observation or attempts to be more actively involved in the research topic would likely have provided further insight into how the factors discussed influence farmer decisions, rather than the more theoretical narrative that is constructed here. Reliability of findings is also limited by the fact that there was only one researcher interpreting the data.

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Appendix I



Farmer perceptions on foresting agriculture

PARTICIPANT INFORMATION SHEET

1. What is this study about?

You are invited to take part in an undergraduate research project about opinions of farmers and agricultural workers on the inclusion of woodland into farms. You have been invited to participate in this study because you are a farmer or have some association to agricultural work. This Participant Information Sheet tells you about the research project. Knowing what is involved will help you decide if you want to take part in the study. Please read this sheet carefully and ask questions about anything that you don't understand or want to know more about.

Participation in this research study is entirely voluntary.

2. Who is running the study?

The study is being carried out by the following researchers:

Anna Wyeth (undergraduate student), supervised by Professor Andrew Lovett (a.lovett@uea.ac.uk) in the School of Environmental Science at the University of East Anglia.

There are no conflicts of interest for researchers and/or institutions involved in this project.

3. What will the study involve for me?

You are being asked to participate in a 30-minute interview carried out by the researcher listed above. This interview can take place in any location convenient to you. This may include your farm, place of work, or any public place previously agreed upon. If an in-person arrangement cannot be made, the interview may take place online via Microsoft Teams, Skype, Zoom, over the phone, or any other calling platform.

The questions in the interview are designed to uncover your feelings and perceptions about the inclusion of wooded or forested areas into farms. You are not expected to have any background knowledge on specific methods of woodland incorporation. Instead, the focus will be on your personal experience with the farm you work on or are associated with. Your personal opinions on the benefits and drawback of agri-environmental practices are what this study aims to uncover.

In order to ensure accuracy of interpretation, the audio of this interview will be recorded and transcribed into text. You will not be asked to provide any personal information or data, and the information you provide will not be identifiable in the resulting dissertation. Nobody except the researcher and supervisor identified above will have access to the full recordings of the interview. The interview will be used to carry out research for an undergraduate dissertation project, and thus is for educational purposes.

4. How much of my time will it take?

The total time commitment for participating in the study is 30-minutes.

5. Do I have to be in the study? Can I withdraw from the study once I've started?

Being in this study is completely voluntary and you do not have to take part. Your decision whether to participate will not affect your current or future relationship with the researchers or anyone else at the University of East Anglia.

If you decide to take part in the study and then change your mind later, you are free to withdraw at any time before 16 March 2023, one week before the submission of my dissertation. You can do this by contacting a.wyeth@uea.ac.uk with a request for participant withdrawal.

You are free to stop the interview at any time. Unless you say that you want us to keep them, any recordings will be erased and the information you have provided will not be included in the study results. You may also refuse to answer any questions that you do not wish to answer during the interview. If you decide at a later time to withdraw from the study your information will be removed from our records and will not be included in any results, up to the point I have completed my dissertation.

6. Are there any risks or costs associated with being in the study?

Aside from giving up your time, we do not expect that there will be any risks or costs associated with taking part in this study.

7. Are there any benefits associated with being in the study?

There are likely to be no personal financial or non-financial benefits associated with this study.

However, participating in this research will contribute to a better understanding of farmer's opinions and perspectives on the benefits and challenges of including woodland in their farms. As key stakeholders in environmental and agricultural issues, it is of vital importance for the voices of farmers and agricultural workers to be heard and understood.

8. What will happen to information about me that is collected during the study?

There will be little to no personal information about you recorded for the purposes of this interview. The interview will be recorded and transcribed for the purpose of the data analysis and the following dissertation submitting for marking as an undergraduate dissertation. The transcription of the audio recording will be done by hand, with the help of Microsoft Dictate for efficiency. No third parties will have direct access to the interview information aside from the final dissertation.

Following the interview, you can request access to the recording to listen over, and withdraw any information you gave up until the time of the final publishing of the dissertation. If you reveal any illicit or illegal activities, the personal details of this (included participant names or more detailed descriptions) will not be asked about or included in the research.

There are no plans for the research carried out here to be published or widely accessible, though this cannot be guaranteed. It will likely be circulated within the University. The interview recordings will be held on the personal devices of the researcher, and only the researcher and the supervisor will have access to it. You can request for the deletion of the recording at any time, but if this is done after the 16th of March 2023, the information will still be used in the dissertation. If the recordings are to be used for future research, you will be contacted and asked for consent.

By providing your consent, you are agreeing to us collecting personal information about you for the purposes of this research study. Your information will only be used for the purposes outlined in this Participant Information Statement, unless you consent otherwise. Data management will follow the UK General Data Protection Regulation Act 2020 and the University of East Anglia Research Data Management Policy 2015.

Your information will be stored securely, and your identity/information will be kept strictly confidential, except as required by law. Although every effort will be made to protect your identity, there is a risk that you might be identifiable due to the nature of the study and/or results. In this instance, data will be stored for a period of 10 years and then destroyed

9. What if I would like further information about the study?

When you have read this information, Anna Wyeth will be available to discuss it with you further and answer any questions you may have. If you would like to know more at any stage during the study, please feel free to contact Anna Wyeth, student, (a.wyeth@uea.ac.uk) or Andrew Lovett, Professor, (a.lovett@uea.ac.uk).

10. Will I be told the results of the study?

You have a right to receive feedback about the overall results of this study. If you wish to receive a copy of the final dissertation, please contact the researcher or supervisor for a copy. You can receive this dissertation after the time of completion on the 23rd of March 2023.

11. What if I have a complaint or any concerns about the study?

The ethical aspects of this study have been approved under the regulations of the University of East Anglia's Science Faculty Research Ethics Committee.

If there is a problem, please let me know. You can contact me via the University at the following address:

Anna Wyeth

School of Environmental Sciences

University of East Anglia

NORWICH NR4 7TJ

a.wyeth@gmail.com

If you would like to speak to someone else you can contact my supervisor:

Andrew Lovett, a.lovett@uea.ac.uk

If you are concerned about the way this study is being conducted or you wish to make a complaint to someone independent from the study, please contact the Head of the School of Environmental Sciences, Professor Ian Renfrew (i.renfrew@uea.ac.uk), or the Ethics Officer for the School of Environmental Sciences, Dr Helen Pallett (H.Pallett@uea.ac.uk).

12. OK, I want to take part – what do I do next?

You need to fill in the consent form and return it to Anna Wyeth. This can be in paper form or to the email address provided above. Please keep the information sheet.

This information sheet is for you to keep

Appendix II



CONSENT FORM

Title of Project:

Name of Researcher(s):

Please initial / tick box

1. I confirm that I have read and understood the Information Sheet provided to me for the above study/project, I have had the opportunity to ask questions and I am happy with the answers.
2. I understand the purpose of the study, what I will be asked to do, and any risks/benefits involved.
3. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason, until the 16th of March 2023.
4. I understand that personal information about me that is collected over the course of this project will be stored securely and will only be used for purposes that I have agreed to. I understand that information about me will only be told to others with my permission, except as required by law.
5. I understand that any quotes used in this study will be anonymised
6. I agree to take part in this study

Name of Participant

Date

Signature