

Who should deliver agri-environmental public goods in the UK? New land managers and their future role as public good providers[☆]

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ARTICLE INFO

Keywords:

Multifunctional Rural Transition
Brexit
Agriculture
Public Goods
Agri-Environmental Schemes

ABSTRACT

Agri-environmental policies in the UK stand on the threshold of significant change, with wide acceptance that radical changes are needed to ensure a better delivery of public goods in future. The UK's departure from the EU presents an opportunity to fully realise the "Public Money for Public Goods" principle in the new suite of Environmental Land Management schemes. A likely priority will be the delivery of conservation goals at a landscape scale, which will require the recruitment of a broader range of actors and institutions than at present, including an emerging group of what we call in this paper 'new land managers'. Understanding the changing dynamics of rural land occupancy, and the characteristics and motivations of these new land managers, will be essential in the future for the effective delivery of these public schemes. Data on land market trends is nevertheless patchy and poorly researched. For this paper, we drew on a survey of land agents in England, all of whom were members of the Central Association for Agricultural Valuers (CAAV), in order to gather information and reflections on contemporary land markets. A key finding is that agricultural policy reform and retrenchment is seen by many of these experts as a significant driver of future change. Taken together with other interacting factors such as the overall tax burden on businesses and the economic and personal situation of farmers and their succession status, many of our respondents predicted significant structural change, with more land coming on to the market for resale. At the same time, increasing demand for land from "lifestyle/non-farming landholders" and the growing presence of people entering the market interested in enrolling land for carbon sequestration and natural capital improvements, will mean a shift in the types of individuals and organisations holding land. Those holding and managing land in coming years are likely to comprise an ever more diverse and fragmented community of land owners and occupiers. The task for policymakers then, is to deliver a suite of interventions specifically tailored to the various types of landholders in order to engage them effectively into public goods delivery under ELMs.

1. Introduction

After decades of debate and an uneven record of achievement, it is now widely accepted that the ways in which the UK government delivers public support to farmers and the farming industry need to undergo radical change (Hill, 2017; Bateman and Balmford, 2018; Hill, 2021). Reform of the way policy is delivered in this area needs to be financially sustainable, equitably distributed, and environmentally effective in achieving nature recovery and climate goals for rural spaces (Jambor and Harvey, 2010; Helm, 2017; Bateman and Balmford, 2018; Navarro and López-Bao, 2019; The Royal Society, 2019). The "Public Money for

Public Goods" (PMPG) principle, centred on the idea of paying farmers to deliver environmental benefits on their land, has already been adopted to some extent under the European Union's Common Agricultural Policy (CAP) (Ovenden et al., 1998; Hodge, 2001; Kam et al., 2023). However, the effectiveness of a series of past agri-environment schemes supposedly designed to embody the PMPG principle is now widely judged to have been partial at best (Kleijn et al., 2006; Ansell et al., 2016; Hurley et al., 2022).

The UK's agri-environmental policies now stand on the threshold of significant change, with the country's departure from the EU presenting an opportunity to translate the PMPG principle more fully into practice.

[☆] This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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A new tranche of schemes under the UK Government's Environmental Land Management scheme (ELMs), expressly designed to incentivise landholders to deliver public goods such as capturing carbon, protecting and enhancing wildlife habitats and delivering cleaner air and water are currently being fine-tuned (Department for Environment, Food and Rural Affairs DEFRA, 2021a). A likely priority in delivering these conservation goals is to achieve this on a landscape scale, with the aim of creating better connectivity between habitats and spaces with conservation value (Gottfried et al., 1996; Tschardt et al., 2005); in line with UK's 25 Year Environmental Plan (Her Majesty's Government, 2019). Two of the three tranches of the incoming ELMs (the Countryside Stewardship and Landscape Recovery schemes respectively) to some extent embody this principle (Department for Environment, Food and Rural Affairs DEFRA, 2021b). Key to the success of this will be the ability to recruit a broad range of actors and institutions into public goods delivery, and to do so at the desired landscape scale through collaboration (Hodge, 2001; Prager et al., 2012; Häfner and Pierr, 2021). By implication there is a need to move away from traditional approaches, which until now has been strongly focussed on enrolling individual main occupation farmers as providers of first resort for delivering public goods (Lowe et al. 1992; Kam et al. 2023).

A main reason for this is attributed to the potentially significant changes in the rural land market, with more land being held by individuals and organisations whose primary motivation may not always be agricultural. Rural scholars have long observed a steady diversification of land occupancy and ownership over the past several decades (e.g., Cloke and Goodwin, 1992; Marsden, 1999; Baldock et al., 2001), attributing it to various sets of drivers. This has prompted Holmes (2006) to predict that over time the cumulative effect will usher in a "multifunctional rural transition". Consequently, new types of land occupancy have been emerging, particularly those holding land to pursue non-productivist objectives. However, prior studies have observed a gap in knowledge concerning the characteristics and role of these new land managers in delivering public goods, with an inadequate understanding of their impacts and potential landscape contribution (Bohnet et al., 2003). These new land managers,¹ or the "non-farming cohort of landholders" as described by Curtis and Mendham (2011), have a high likelihood of impacting the way land is used, and managed, in multifunctional landscapes settings (Groth et al., 2017). What this means for future scheme delivery is two-fold: First, the diversification of landholder types suggests a need to recruit a broader set of actors than at present to deliver public goods. Second, given the growing impetus for delivering these public goods on a landscape scale, policy-makers need to better understand how these different actors can be integrated into larger scale collaborations than might have existed until now. To achieve both, policy-makers will need to investigate and grasp the recognised complexities, and address the lack of knowledge, of what drives the participation of new land managers in schemes (Lastra-Bravo et al., 2015; Sorice and Donlan, 2015). This requires policymakers to first understand the changing dynamics of rural land occupancy, how it will continue to change in coming years, and the landholder types emerging as a result of these changes.

Significantly, research into these deep-set drivers of change and their role in reshaping the pattern of land ownership and management has been scarce over the last two decades. Various scholars and researchers in the past (e.g., Cloke and Goodwin, 1992; Munton et al., 1992; Marsden, 1999; Holmes, 2006) have analysed and predicted how UK

rural spaces are likely to change, with discussion typically centred around the growing demand for non-agricultural uses of the countryside and the restructuring of the agriculture industry. Observations about the changing nature of social demographics in the countryside have been noted as far back as the 1990's, with a new breed of landholders being identified with "differing consumption interests" compared to main-occupation farmers (Munton, Low and Marsden, 1992). However, while there was much debate and research around multifunctionality and land occupancy trends during the 1990's and 2000's, interest has waned in recent years. The resulting hiatus in research on the topic thus presents a gap in our understanding of how rural land is currently being occupied and warrants a timely examination of the drivers shaping the UK countryside; especially in the light of Brexit and its wider biodiversity and climate implications. There is a particularly acute need to gain a better understanding of how land occupancy is changing and what this implies for land management and public good provisioning. This is to ensure that policies such as ELMs are able to realise their full potential in recruiting the widest possible spectrum of rural actors and integrating them into landscape scale collaborations.

With this in mind, the main objective of this paper is to gain a fresh understanding of the patterns of rural land occupancy in England and the existing and emerging drivers shaping it. Moreover, to explore the implications of Brexit and the changing agri-environmental policies on the countryside, and the extent to which it will impact future patterns of land occupancy. As such, this paper would be guided by the following aims: (1) to investigate the overall trends and drivers shaping land occupancy over the past decade and in the years to come - especially the extent to which the agricultural policy reforms will have an impact of farmers and on the demographics of the countryside as whole; (2) gain deeper insights into the characteristics and motivations of New Land Managers and their presence in the rural land market. These aims will be achieved, through the use of survey and interviews, by tapping into the deep depository of knowledge that members of the Central Association for Agricultural Valuers (CAAV) possess with regards to the rural land market. Most of these members are land agents, who have long been seen as influential actors in terms of the land market, giving advice to vendors or potential vendors and playing a key role in the process of selling and letting of land. The following sections will discuss the drivers that have shaped the countryside and the implication of Brexit, before presenting findings this research conducted with members of the Central Association for Agricultural Valuers (CAAV). The paper concludes with a discussion of how ELMs might be rebalanced and better targeted in order to bring new land managers into the land management community.

1.1. Drivers of change in the countryside

As was said above, the idea that the rural land market may be changing has already been noted by a range of commentators and scholars, with a gaining sense that an influx of new land managers is in process, each of whom possess land use and management goals that often differ significantly from those of main occupation farmers they replace (Gill et al., 2010). Indeed, many of these scholars have signalled a new type of countryside, explicitly as a place of consumption and conservation rather than of production (Munton et al., 1992; Gill et al., 2010). As one of the key drivers transforming the countryside over the past few decades, the rising demand for other uses of the countryside has led Wilson (2007) to speculate about the growing significance of "non-productivist pathways". On the other hand, the changing countryside and diversification of land use is also driven by the decline and restructuring of agriculture, particularly in the late 1990's and early 2000's, when Total Income from Farming (TIFF) fell by more than 60% from 1995 to 2001 (Lobley and Potter, 2004). Further signs of decline are reflected by the dwindling of holdings, employment and land area of more marginal agricultural businesses (Ward, 2006; Bibby, 2009). This has been driven by several factors, including CAP reforms and cost-price squeeze (Lobley and Potter, 2004), in addition to the ageing

¹ Given the breadth of landholders this paper seeks to encompass into the discussion of public good providers, these groups of landholders will be collectively referred to as "new land managers" in this paper. This will entail any type of landholder possessing main land use values of consumption and/or protection and do not derive their main source of income from agriculture. This paper further explores the distinct landholder groups within this "new land managers" category in the Discussion section.

population of farmers (Morrison et al., 2012). With regards to the latter, a study by Potter and Lobley (1992a) some 30 years ago, for instance, found that in 1987 almost half of the farming community were over 55 years of age – amounting to 40% of total farmed area in England and Wales. By 2019, close to a third of landholders were over 65 years of age (Department for Environment, Food and Rural Affairs DEFRA, 2019).

These pressures have translated into a declining number of farmers relying on agriculture as the main source of income, a subsequent rise in farm diversification, and an increase in part-time, pluriactive and hobby farming, with many in these groupings no longer placing the same emphasis on productivity as their main occupation equivalents (Marsden, 1995; Primdahl, 1999; Busck, 2002; Shucksmith and Herrmann, 2002). Overall, the countryside is in the process of being transformed from being a place of production dominant values to one that consists of a diverse and complex mix of production, consumption and protection goals – a shift termed by some researchers as a “multifunctional rural transition” (Holmes, 2006; Abrams and Bliss, 2013). The result of this transition is changing patterns of occupancy which, facilitated by transfers of land through the land market, has precipitated in an increasingly diverse set of ways to own, manage and/or occupy land. The UK’s departure from the EU is widely expected to accelerate these key trends for a variety of reasons. First, the phasing out of the CAP’s Basic Payment Schemes (BPS) due to Brexit is expected to impact on a majority of farm businesses, particularly marginal businesses currently being underwritten by the direct payments that have traditionally been a core feature of CAP support (DEFRA, 2020a). An anticipated downscaling of direct payments, and their replacement with payments more directly linked to public goods, will have implications for the financial viability of many such businesses if the former does not fully replace the latter, pound for pound (Teany and Norton, 2019; Department for Environment, Food and Rural Affairs DEFRA, 2022). Meanwhile, the option of a “lump sum exit scheme” provides a potential avenue for farmers uncertain of their place in the changing policy landscape to leave the farming industry altogether. The result could be a potentially significant shakeout of farmers who either might struggle to remain viable without the BPS payments or do not wish to continue under the agriculture policy regime, or both. Separately, it is likely that demand for land and holdings from new land managers with non-farming, lifestyle or natural capital investment aspirations will become a key driver in the market (Sudlow, 2020; Teany, 2020; Evans, 2021); which could see them take over land owned or managed by farmers. This could be especially applicable to the portion of ageing farmers without a successor; with prior studies suggesting that decisions concerning the farm are largely dependent on whether there is a successor in place to take over (Potter and Lobley, 1992b).

1.2. Land occupancy: an incomplete picture

Better understanding how these drivers have, and will, precipitate change with regards to land occupancy is likely to be crucial if policy-makers are to have a more accurate sense of the community of public good providers they need to target for funding. However, several hurdles stand in the way of this. Current data on rural land occupancy is far from complete and there are various gaps in coverage. In exploring land ownership patterns in the UK, Home (2009) noted that the consolidation of relevant information regarding land ownership has been lacking, with data having to be assembled from a variety of sources. This was also recognised by Munton (2009, p. 555), who acknowledged that “there is no single source of information on land ownership”, with the voluntary nature of Land Registry registration making for an incomplete picture of rural land ownership and occupancy change in the UK. In an effort to provide some preliminary data describing more recent occupancy changes, this paper examined available rural land market data over the past decade from major land agencies (Savills, Knight Frank and Strutt & Parker), in order to assess rural market trends, with the decision to narrow our focus firstly on England alone. Further justification for

focusing on England is the slight differences in how ELMs will be implemented in each devolved nation in the coming years (UK Parliament, 2023). As such it appears pragmatic to place focus first on the implications of land occupancy change in England before widening the scope to other devolved nations in future research. Ultimately, while this work is unlikely to fill all knowledge gaps, it could provide a better indication of land occupancy trends over the past decade. Furthermore, it would give a better picture of key indicators such as how much land is being traded annually over the past decade, and the types of buyers and sellers.

However, this investigation revealed further limitations. While reports from land agencies offer an overview of the rural land market for that respective year – reporting on trends on demand and supply in the rural land market, land values, along with the forecast and outlook on the future – more detailed and consistent information year on year, along with a consolidation of this information, was not available. For instance, Savills publishes an annual land market survey (variously entitled “The Market Survey UK Agricultural Land” or “The Farmland Market”), but information concerning key indicators is often not consistently presented each year. This means that data from a particular year cannot easily and consistently be compared to previous years, especially when it comes to profiling buyers and sellers, and the trends and drivers of these in specific locations. More significantly, much of the available information concerning the specific characteristics of new land managers was lacking, making it difficult to reliably assess the significance of these new land managers as occupiers or managers of rural land. Furthermore, the scope of the research conducted for this paper meant that recent land occupancy patterns was not the only key aspect, with information relevant to understanding the broad spectrum of existing and emerging landholders crucial as well. Therefore, more information was needed in order to better characterise the land occupancy community as a whole. The need is acute given that rural land market reports in the public domain show that landholders not engaged in agriculture are typically categorised as “non-farmers”, without further distinction of the different types of “non-farmers” this paper seeks to further establish.

To address this gap, several key-informant interviews were conducted, first with a member of the Royal Institution for Chartered Surveyors (RCIS) and academic specialising in agriculture law and valuations and then with a second academic expert on land market trends. A decision was made, upon the suggestion of these key informants, to seek the expert opinions from members of the Central Association for Agricultural Valuers (CAAV) to augment our understanding of current land occupancy patterns and the various existing and emerging landholders in England. Hence, an online survey and semi-structured interviews were undertaken to achieve this paper’s objectives. The following section details the methodology used for the study on which this paper draws.

2. Methodology

2.1. Survey data collection

An online survey was conducted with members of the CAAV. This organisation comprised of 3000 members located around the UK, all of whom are land agents and/or Chartered Surveyors with knowledge of, and insights into, the rural land market due to their close dealings with market activity and transactions. With the approval of the then secretariat of the CAAV, the advertisement for the survey was included in the organisation’s weekly briefing, which was distributed to every CAAV member, at the beginning of March 2021. Due to the low initial response rate, the study was granted permission by the secretariat to contact members directly via email from the information available on the CAAV online directory. An initial response rate of 93 was targeted. This was based off the 2737 CAAV members that the study contacted (members outside England were excluded), which equated to a 95% confidence

rate and 10% error of margin (Rashi, Alnaser and Ghani, 2019). Justification for this target sample size was based on: 1) guidelines from past research (e.g., Roscoe et al., 1975); 2) past experiences of the secretariat and our key informants in surveying the CAAV, who had found response rates to be generally low; 3) resource and time constraints this study possessed which were further exacerbated by the Covid pandemic (Lakens, 2022). Moreover, the study also observed increasing data saturation as the number of responses was approaching 100 participants. The survey was closed at the end of March once there were no longer any new survey responses. The survey completed with 101 responses.

With regards to the design of the survey questions, we - together with the help and advice of the key informants and CAAV secretariat - established the following set of research questions to guide the construction of our survey:

- 1) What are the overall trends and drivers shaping land occupancy over the past decade and in the years to come?
- 2) To what extent will the transition from the CAP to ELMs have an impact of main occupation farmers and on the demographics of the countryside as whole?
- 3) Who are these new rural land managers? How significant is their presence in the land market? What are their backgrounds and motivations and how far do they differ from traditional main occupation farmers?

The survey was kept to 10 questions (survey questions can be found in [Supplementary Table 1](#)). This was based on the experience of our key informants, whom suggested that members of the CAAV would be more receptive towards completing the survey it could be completed in a short span of time. Hence, we decided to keep the survey concise; focusing more on quantitative questions that could be answered within the allotted time, with more detailed explanation and discussion around the topic left for the post-survey interviews.

2.2. Survey data analysis

The survey collected 101 responses. One of these was discounted for technical reasons. Some questions were also not completed by some respondents and therefore not all questions recorded 100 responses. Of the remaining 100 respondents, 11 responded that they dealt with properties “nationally” (question 1 of survey), while the rest selected specific counties of England (question 2 of survey). These respondents were grouped into regions of England that the counties they selected were located in ([Supplementary Table 3](#)). Where respondents selected multiple counties that fell into different regions, they were grouped into the region where majority of the counties they selected fell into. For instance, if two of the three counties a specific respondent chosen was in the “South West” region and the remaining one was in the “West Midlands”, they will be counted in the “South West” region and not included in the “West Midlands” group – in affords to avoid double-counting. The grouping of respondents according to region was done to analyse any noteworthy area-specific trends, particularly the significance of non-farming/lifestyle landholders in various parts of England (as detailed below in discussing the data used for [Fig. 5](#)). Information on the regions of England which respondents dealt with in their work can be found in [Supplementary Table 2](#).

A preliminary analysis of survey data was conducted using Microsoft Excel. Weighted means were calculated for questions which sought to attain the significance of each category (i.e., data presented in [Figs. 1, 2 and 5](#)). This was calculated by first taking the significance of each category in the question (1 being least significant and 6 being the most) and multiplying it by the number of respondents who had placed that significance on that category. This was then added up and divided by the number of responses to that question. For instance, in [Fig. 1](#) when asked to rank the significance of various types of purchasers, one respondent

had ranked individual farmers as 1 (least significant), five respondents had ranked it as 2, four had ranked it as 3, nine had ranked it as 4, 20 had ranked it as 5, while 59 had ranked it as 6 (most significant). Hence, each level of significance was multiplied up with the number of responses, this was then added up together and divided by the total number of responses for that question – which in this case was 98. Thus, the weighted mean significance was calculated as follows:

$$(1 \times 1) + (5 \times 2) + (4 \times 3) + (9 \times 4) + (20 \times 5) + (59 \times 6) / 98 \\ = 513 / 98 \\ = 5.23$$

Concerning data from [Fig. 3](#), this was generated from a series of questions relating to the percentage of purchasers who derived their principal source of income from agriculture and the percentage derived from other activities – both categories adding up to 100% for each individual response. The average for each category was then calculated separately – i.e. respondents’ response for the category of percentage of purchasers derived their principle source of income from agriculture were all added up, and then divided by the total number of responses. This was similarly done for the other category.

2.3. Post-survey interview and analysis

Survey respondents were asked at the end of the questionnaire to provide their contact details if they were interested in participating further in a follow-up interview. The 25 respondents who expressed interest in participating further in these interviews were contacted, with 14 agreeing to being interviewed. Due to the Covid-19 pandemic, all interviews were conducted on Microsoft Teams or over the phone, with the interviews typically lasting approximately 40 min on average. For confidentiality reasons, the interviewees were identified by a code (e.g., “A1”, “B2”, etc.) – given that there were 14 interview participants, codes for the participant begins from A1 and ends at N14.

Semi-structured interviews were subsequently conducted with these 14 participants. This semi-structured interview format was used as:

- 1) it provided a structure to the interviews, enabling the research to ask a uniform set of questions that further explored key findings from the survey, along with the thesis research question of: “To what extent will the transition from the CAP to ELMs have an impact of main occupation farmers and on the demographics of the countryside as whole?”
- 2) conversely it also allowed for interviewees room to discuss any key observations that this research had not anticipated for, or any topics that previous interview participants had raised and was worth exploring.

Semi-structured interviewing gave us the flexibility to explore emerging and unique viewpoints throughout the interviews, but also enabled a systematic method of comparing the views between participants (Tracy, 2013; Bryman, 2016). The interview questions served to build on the key themes of the survey, and stimulate further deeper discussions on the topic of current and future trends and drivers in the rural land market, the impacts and implications of ELMs, and deeper insights into non-farming/lifestyle landholders. The complete set of interview questions can be found in [Supplementary Table 4](#).

Upon the completion of the interviews, the interviews were subsequently transcribed using the Trint transcription software. Process of transcription included using the Trint software to automatically transcribe the interviews. Transcripts were proofread while listening to the recording, to ensure responses were transcribed verbatim and without error.

Following the transcription of these interviews, thematic analysis was conducted using ATLAS.ti. Thematic analysis, as described by [Braun](#)

and Clarke (2006, p.79) is “a method for identifying, analysing and reporting patterns (themes) within data”. The first step of thematic coding was “open coding” stage, in which an exploratory process of identifying phrases and concepts in the data. This was accomplished by reading each interview transcript line by line in the ATLAS.ti software, and assigning sentences to nodes related to specific themes. Majority of these themes have been established beforehand in accordance with the research objectives, while the rest were identified during the process of coding – what is known as “emergent themes” (Creswell, 2007). In order to ensure the coding process can be reliably concluded, and that all the relevant themes had been identified, all interview transcripts were read at least three times. Data from both the survey and interviews was stored and managed in accordance with the researchers’ institution’s Data Management Policy and approved by the Research Ethics Committee (SETREC). Data collected was only accessible to members of the study’s research team and identities of participants were kept confidential.

In the following sections, farmers are defined as landholders whose main land use is production and derive their main source of income from agriculture. New land managers, by comparison, are landholders whose main land use is either protection or consumption (such as the non-farming/lifestyle landholders examined in the study below, which are a subset of the New Land Manager category) and do not derive their main source of income from agriculture.

3. Results

3.1. Overall market trend - purchases

In terms of land purchases, main occupation farmers remain the dominant presence in the rural land market over the survey period (Fig. 1). In ranking the significance of various purchasers over the past decade on a scale of 1 (least significant) to 6 (most significant), farmers had the highest score, with a weighted mean of 5.23. Non-farmers/lifestyle purchasers were the second most significant, with a weighted mean of 4.04. At the other end of the spectrum, developers were seen as least significant, with a weighted mean of 2.76. Latest figures from Savills seem to support this, with their 2021 figures showing farmers contributing to 46% of land purchases in that year and non-farming buyers constituting 38% (Norton et al., 2022).

Results from Fig. 2 are congruent with Fig. 1, with expansion by main occupation farmers emerging as the most significant reason for land purchase over the past decade (weighted mean of 6.33); a finding which is in line with Savill’s 2020 data that observed 45% of all purchases being motivated by farm expansion (Norton and Teanby, 2021).

Purchasing land for investment, along with non-farming/lifestyle reasons, are the second and third most significant reasons respectively, closely mirroring Fig. 1. In contrast, purchases by sitting tenants or buying land for development are the two least significant reasons for purchasing.

The continued strong presence of main occupation farmers in the land market is also reflected in respondents’ observation of the average proportion of purchasers who derive their principal source of income from agriculture, with this figure over 55% (Fig. 3). Purchases by landholders who derive their principal source of income from other activities is also not far behind, with respondents stating on average that this constitutes close to 45%.

3.2. Non-farming/lifestyle landholders

Focusing on non-farming/lifestyle purchases, Fig. 1 and Fig. 2 suggest that non-farming/lifestyle buyers are an increasingly significant presence in the rural land market - albeit still less than main occupation farmers. This is further reflected in Fig. 4 below, which shows that, overall, close to 70% of all respondents have deemed non-farming/lifestyle purchases to be significant or very significant in their area over the past decade.

When data from Fig. 4 is broken down into different regions of England (Fig. 5), we see that a majority (or at least half of respondents in the case of the Northeast) of respondents from each region have indicated the presences of non-farming/lifestyle landholders purchases to be significant or very significant. Additionally, the south regions of England – South West, Greater London and South East – constituted the largest proportions of respondents who observed non-farming/lifestyle purchases to be significant in their area over the past decade. Although it should be noted that there was only 1 response was provided for the Greater London region.

This concurs with findings from the interviews, with locations such as the Cotswolds and Oxfordshire (in South West and South East regions respectively) observed to have the most significant presence of lifestyle/non-farming landholders. This trend was also observed in Strutt and Parker’s 2019 Winter Farmland Market Review (Sudlow, 2019), which highlights the sustained demand for “non-farmer buyers” in the regions of Hampshire, Berkshire, Gloucestershire and Oxfordshire – known as the “hotspot crescent”.

I think certain parts of the country, in particularly, where I am now in the Cotswolds and Oxfordshire, you have got a high percentage of lifestyle buyers who also driving the market. H8

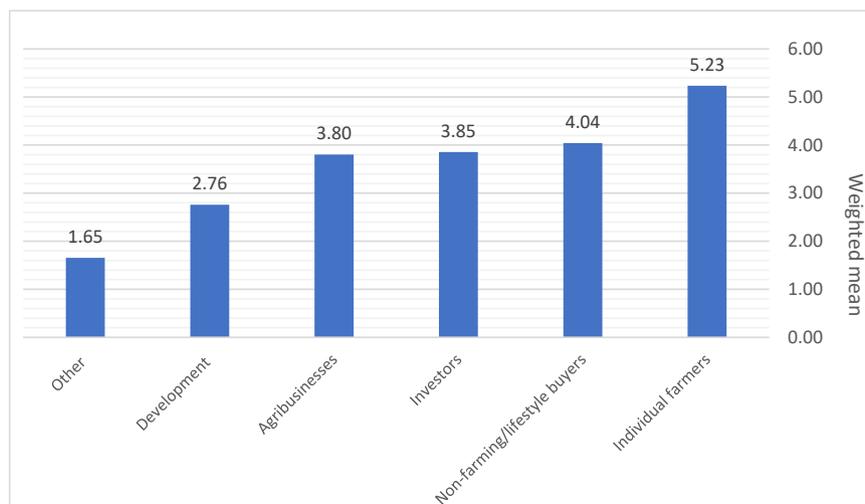


Fig. 1. Most significant land purchasers over the past decade by category (2011 – 2020) (n = 98).

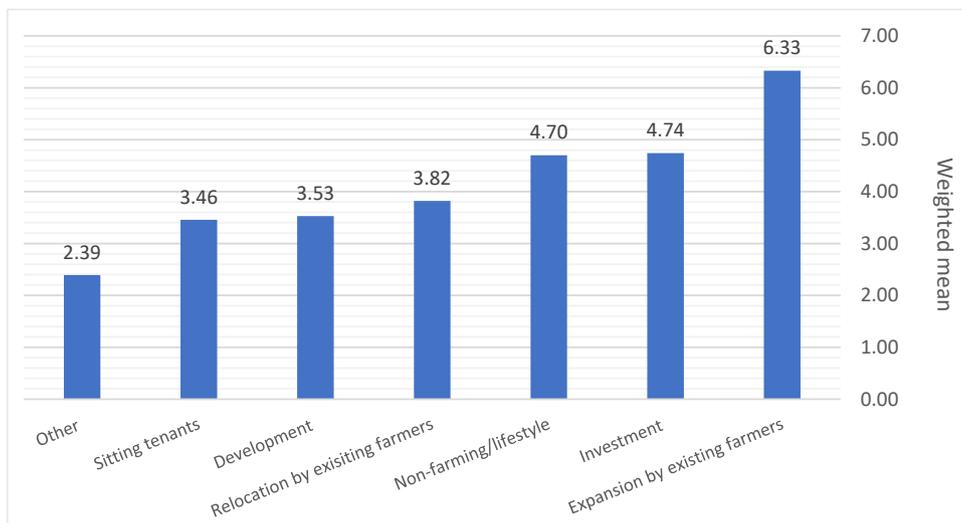


Fig. 2. Most significant reasons for purchase over the past decade (2011 – 2020) (n = 97).

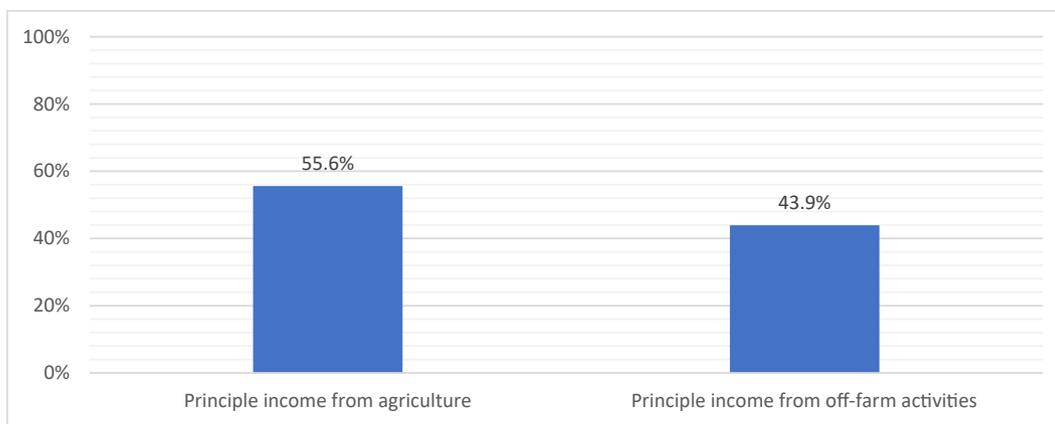


Fig. 3. Proportion of purchasers whose principle source of income is derived from agriculture vs. purchasers whose principle source of income is derived from other activities (n = 79).

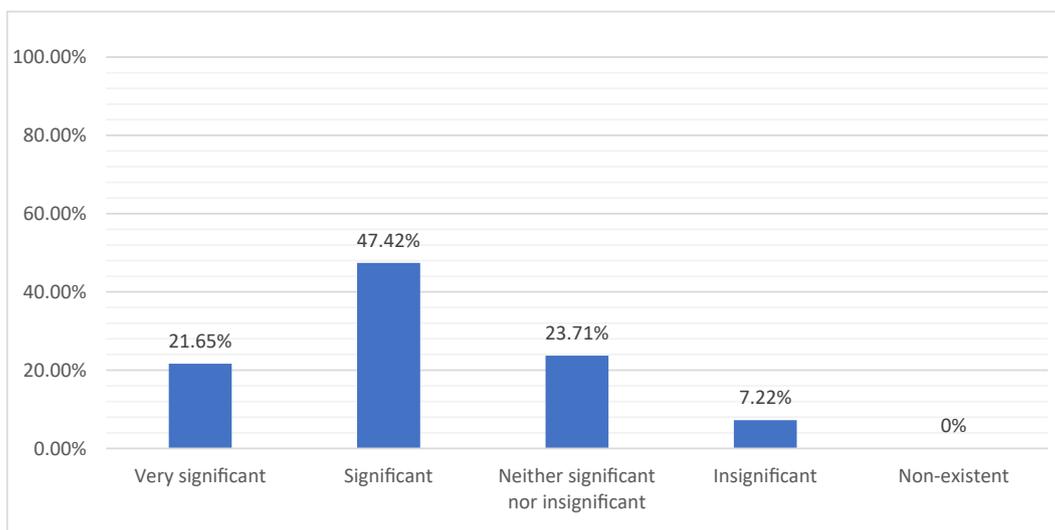


Fig. 4. Significance of non-farming/lifestyle purchases over the past decade (2011 –2020) (n = 97).

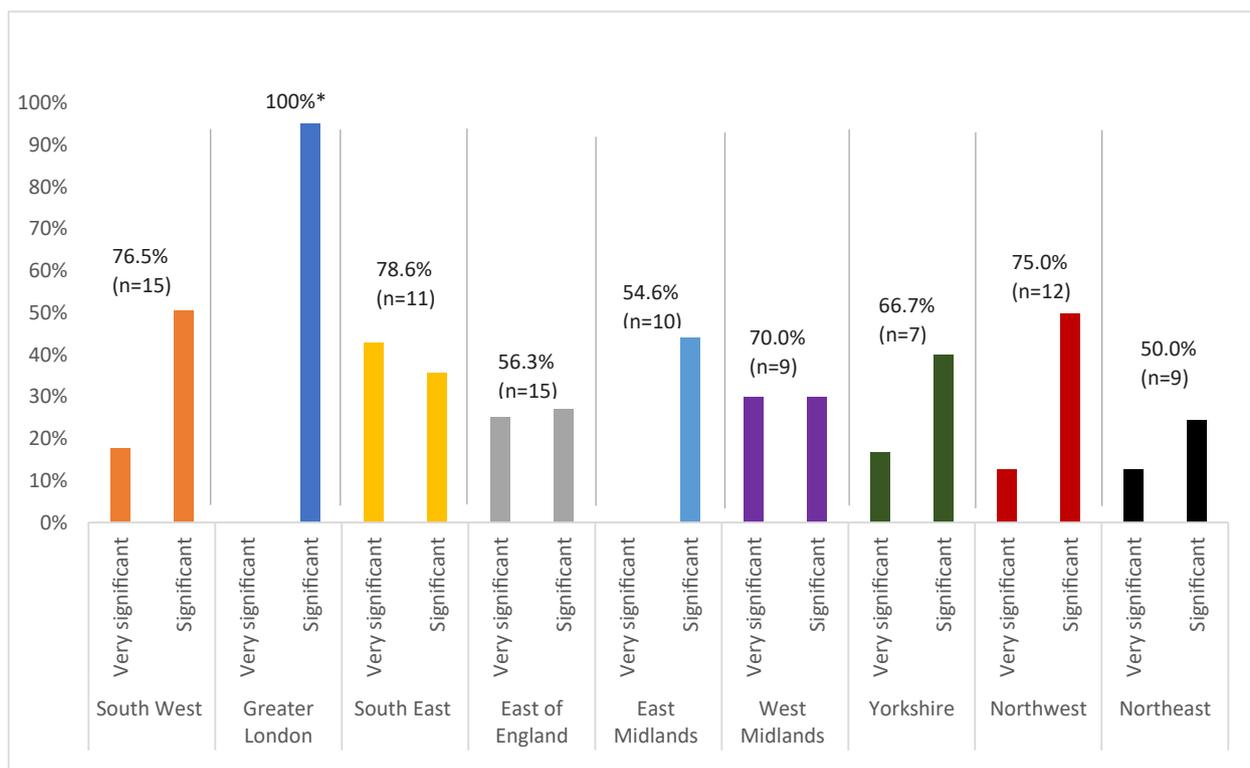


Fig. 5. Respondents who observe non-farming/lifestyle purchases to be “significant” or “very significant” over the past decade, by regions of England. The percentage above the graph represents the combined proportion of respondents, according to region, that answered “significant” or “very significant”. The response rate given in graph represents all respondents in that particular region. *It is important to note that there was only one respondent for the Greater London region.

In terms of the background and motivations of these lifestyle buyers, we observe certain common characteristics emerging. Analysis of interviews finds this type of purchasers to be urban dwellers acquiring land in the countryside for nature and recreation – re-affirming earlier discussions that notes these new land managers to hold values more aligned with consumption and/or conservation values:

we have seen historically money coming out of, investment bankers, investors in London having you know large bonuses, buying property. One in particular who bought very nice property in the sort of Cotswolds area. But it was bought more for two reasons: One, [it has] got very nice residential element. Two, his wife was heavily involved in horses and they adapted the farm buildings to suit an equestrian business and now she breeds championship race horses. A1

Due to their motivations for recreation, these lifestyle buyers generally look for properties that suit their aspirations together with the aesthetics of the landscape. As such, consensus amongst interviewees is that location, appropriate amenities are strong driving factors for purchase.

A lot of the lifestyle buyers are into their country sports, be it shooting, be it hunting, or be it horses. And that tends to sort of lead the way on, you know, what kind of facilities they have got for it...the bit I forgot about is, you know, prettiness of landscape is also important; you get a higher price, the prettier landscape. The really super rich will change the landscape... they farm it like a garden to change the landscape. C3

In addition to this, echoing the interview quote from A1 above, lifestyle buyers appear to possess more financial capital to manage their land in accordance with their recreation and amenity aspirations, as opposed to main occupation farmers who have to run it as a business:

with the lifestyle buyers, they've also probably got more cash behind them than say farmer, and so they're probably willing to invest in and they can see that investment. Also, probably the profile point of view, maybe

they're a little naïve and this is more of a dream they're going forward with. Whereas a farmer, it's much more of a business. You know, it's a business investment that they're looking after. N14

This further corroborates earlier discussions which finds farmers to derive their main source of income from agriculture/on-farm activities. Which stands to reason that they would manage it more like a business and very differently to the way lifestyle purchasers would. Moreover, another key difference between these two landholder types seem to be size of land, with “the vast majority of lifestyle buyers, I would say are under 40 acres and a majority are probably under 10” C3. .

Future drivers and trends in the land market

With regards to future main trends and drivers in the rural land market, our interviewees agree that “it would only be reasonable to think that there will be more land coming onto the market” L12, reversing a trend established since 2018 of falling supply of marketed land (Norton et al., 2022). Reasons for this structural change point to several drivers. For one the longstanding pressures of the cost-price squeeze, as noted previously by Lobley and Potter (2004) and Ogaji (2005), could serve to drive the shakeout of land and farmers. In the study by Lobley and Potter (2004), the authors observe a restructuring of farm businesses in the early 2000 s, which has seen a transition away from agriculture centrality rather than a complete shakeout. However, the cost-price squeeze seems likely to intensify, as evident in the latest agriculture price indices released by DEFRA in December of 2022 (DEFRA, 2022b). Adding to this is weight of direct payments being phased out. As findings from our interview suggest, this could provide the catalyst for a shakeout of a portion of farmers in the coming years. In particular, smaller or marginal farms seem likely to be impacted the hardest by the reform in payment support, and are suggested to be the ones most likely to come onto the market in the coming years as direct payment gets progressively phased out:

the upper 25% of farmers are already making money and are very successful. You've got then the middle 50% which are the ones that need to up their game or they will lose out. And then there's the bottom 25% which have always been rubbish, and have only been making money from the subsidy [Basic Payment Schemes]. Those will be the farms that will be coming on to the market that never have needed to. L12

This is exacerbated by the overall reduced level of public subsidy provided by the incoming ELMs and the shifting emphasis towards public goods delivery; possibly combined at the margins by the effects of the lump sum exit payment now available to farmers who are considering leaving the industry. With regards to the last point, Norton et al. (2022) note that the lump sum payment scheme would play only a minor role given the complexity and issues around eligibility plaquing the schemes – meaning the pay-out would likely only be taken up by farmers who were planning to exit the industry regardless.

While a shakeout remains a possibility for a portion of farmers in the years to come, analysis of the interviews further suggests that the impact of the transition to ELMs will be nuanced, with factors including the availability of a successor, which prior studies have noted to play a role in the decision of the farm (Potter and Lobley, 1992b):

I think that...what's likely to happen is this as the BPS area subsidies are withdrawn, a lot of farms are going to face some very difficult choices. The average age of farmers is in the 60s, and in many instances the farmer's children are being well educated and they got off to go in there now living elsewhere...Now, I think there is a what I describe as potentially a sort of succession crisis that's got to be faced within the next 10 years. K11

Along with the question of succession is the willingness of farmers to participate in the upcoming ELMs, which would potentially entail a change in the way their farm is managed. This could be particularly influential to older farmers who might be less keen on the implications the change in scheme would bring:

I think there will be a number of older farmers...who just go "This is too much like hard work" and will either take one of two actions. They will either sell land or they will then look at managing it in a different way... Because they don't want that hassle factor that the change of subsidy will bring because it will mean that a significant number of farming enterprises have to change their approach to farming...A1

Land value in the current market and agricultural relief tax also appears to play a role in this decision. The latter points to another key finding: analysis of the interviews together with findings from published reports such as that by Teanby and Norton (2021) suggests that tax, in the form of agricultural relief tax, capital gains tax and/or inheritance tax, will be a significant driver in a landholder's decision to sell or keep the land; especially in the midst of the agricultural policy reform:

So much is driven by tax. And I wouldn't say all, but I would say the majority of farmers are actually driven by not paying tax... With the upcoming ELM schemes, these farmers might not be willing to participate or as the BPS payment's being phased out as well, they might want to look to exit. And now with the news that these lump sum exit payments might give them more push to sell - do you see that being a reality? It'll give more push to possibly get out. Whether they sell or not, will come back to tax. B2

Ultimately, these factors might not always culminate in the sale of the land, but could hasten plans of succession, leasing the land out, or especially for smaller or marginal farmers, to transition to part-time farming:

I think these smaller farms, which are probably most vulnerable, will probably you know they were going to become part-time farms, so they will still exist, but they become part-time farms. I actually think the biggest pressure will be on the 700 to 1000 acre farm, because the 3000 acre farm can survive. C3

Nonetheless, our findings indicate that this could result in the fragmentation of land occupancy patterns, with the growing appetite for other uses of land, away from agriculture, becoming more apparent.

Land occupancy will become fragmented...I can see lots of clusters of small pockets of land being owned by numbers of people. I can see large swathes of land being owned by institutional clients...new investors in agricultural land... A1

I think the market may slightly start to fragment... There's less out and out kind of traditional agriculture and forestry; more kind of diversification, which adds value, more lifestyle buyers. And then there's also the movement for planning and development; offsetting carbon and environmental damage onto land. E5

Respondent E5's comments above raises another key finding. There is a consensus amongst interviewees that investment in natural capital will become an increasingly important reason for land purchase especially from natural capital investors and lifestyle buyers. This could drive, from the demand side, the growing fragmentation of land occupancy in the years to come:

I think there will be a lot more focus on the greener side of farming; natural capital as a terminology is gaining momentum in farming circles... I can see natural capital and the use of fringe lands becoming prime environmental benefits obtaining great chunks, and there will be less emphasis on big areas of crop able farmland... A1

This is similarly forecast by Savills rural research team as well (Norton, 2020), which foresees a stronger competition for land use from this source in the coming years, especially given "the increasing role for environmental service delivery". These analysts add that the increasing opportunity for investment in environment markets through land use may help spur this shift. This could pave the way for natural capital investors and conservation trusts to have an increased presence in the land market over the next several years. In addition to these points, there is also a sense amongst interviewees that various types of landholders will perceive the opportunities that ELMs will present differently:

I think a lifestyle buyer will see that as an opportunity to generate income from a holding- as an additional benefit. Whereas a farmer will see it as "I've lost income and I need to replace income 'cause I'm deriving a living from that" so subtly different, but have quite significant alternative permutations to how you view those really. A1

4. Discussion

Findings from the survey and interviews reported above provide further support to the contention set out in the beginning of the paper that structural changes driven by long standing pressures such as cost-price squeezes bearing down on individual farm businesses, will in future be compounded by new drivers and influences. One of these is agricultural policy reform (and possible retrenchment), a key driver identified by a majority of our respondents. According to respondents, the phasing out of direct payments in particular is likely to impact most on smaller, economically more marginal farmers who are currently most reliant on BPS. These direct payments have long been a major source of income for farmers, as noted by Franks (2016, p. 6) who point out further that close to "20% of farms in England failed to achieve a positive Farm Business Income" even with BPS payments included. In time such shifts un funding, if not offset by other payment and revenue sources, will likely result in a shakeout of land and farmers in coming years. However, interview respondents suggest that the eventuality of these farms is rather nuanced, with other key influencing factors included tax liability, the age and family situation of the farmer along with its succession status also determining the future trajectory of land sales.

The strong implication, and one explored by some of our respondents, is a continuing, even accelerating, move away from main

occupation farming in favour of a much more heterogenous land owning and managing community that will include a diversity of new land managers. In revisiting key discussions in the introduction, there has long been a recognition that a shift away from main occupation farming in rural communities will have a range of social and environmental implications (Munton et al., 1992). In Lobley and Potter (2004)'s study, the authors had already noted in the early 2000's the growing complexity and diversity of how land was at that time being occupied and managed. This observation was made in the context of a shifting economic and policy environment during the 1990 s and early 2000 s, leading the authors to observe that a rising number of farmers will be further removed from mainstream agriculture – with increasing on and off-farm diversification, or replacement of farmers with lifestyle landholders, being several pathways moving forward. For these reasons, the definition of what it means to be a farmer in the coming years has broadened.

In the present day, the growing presence of lifestyle/non-farming landholders – ‘new land managers’ in our terms - is significant and will have further land management implications as traditional farmers are replaced by people who may have no farming background or direct experience. Wilson's (2007) contention that “non-productivist pathways” will become steadily more significant over time appears corroborated by the land agents we spoke. A growing appetite for land to be used for non-production purposes, along with the growing focus on environmental protection of the countryside – emphasised by the PMPG principle forming the basis of ELMs and the growing market for natural capital investment - means that the ways ub which how land is occupied and managed will almost certainly change in coming years.

4.1. Typology

In an attempt to encapsulate this growing diversity of landholders, we propose a new typology of land occupancy in the UK (Fig. 6 below). Sourced from literature review of prior studies (e.g., Shucksmith and Herrmann, 2002; Holmes, 2006; Pannell et al., 2006; Gill et al., 2010; Urquhart and Courtney, 2011; Curtis and Mendham, 2011; Groth et al.,

2017) and findings from this study, this typology utilises two main criteria to categorise the various landholder types: (1) principle source of income – in which landholders are grouped according to the proportion of their income that is derived from activities on their farm; (2) land use values. The decision to use principle source of income as the first criteria was informed by findings from prior studies (e.g., Gill et al. 2010), which observed that new land managers typically derive little to no income from agriculture. Moreover, we also note that principal source of income also often dictates the various natural resource management practices that a landholder might be willing and interested to undertake (Gosnell et al., 2007; Mendham and Curtis, 2010 in Groth et al., 2017). The second criterion also draws heavily on past literature, particularly Holmes (2006) and that study's method of categorising different landholders. Holmes proposes categorising the generic modes of landholder occupancy according to production, consumption and protection values. The remainder of this section describes several of the landholder types that constitute the Farmer and New Land Managers category.

4.1.1. Farmers

Farmers (main occupation and pluri-active) possess a predominantly productivist mind-set, owning land mainly for agriculture/commodities production. Most have come from a farming background, with farm size and dependence on agriculture income being differentiating factors. With regards to the former, main occupation farmers are found to own the largest sizes of land amongst all farmer types (Groth et al., 2017), while pluri-active farmers own smaller sized farms (Shucksmith and Herrmann, 2002). As for dependence on agricultural income, because farmers encompass several distinct groupings themselves, their dependence on agriculture as their main source of income varies to different extents; with main occupation farmers and part-time farmers having the greatest dependence as a group on agricultural enterprises and drive for profit, while pluri-active farmers deriving a lower portion of income from agriculture as almost all have off-farm jobs (Shucksmith and Herrmann, 2002; Pannell et al., 2006). It is also because of this that Holmes (2006) notes that main occupation farmers have less flexibility

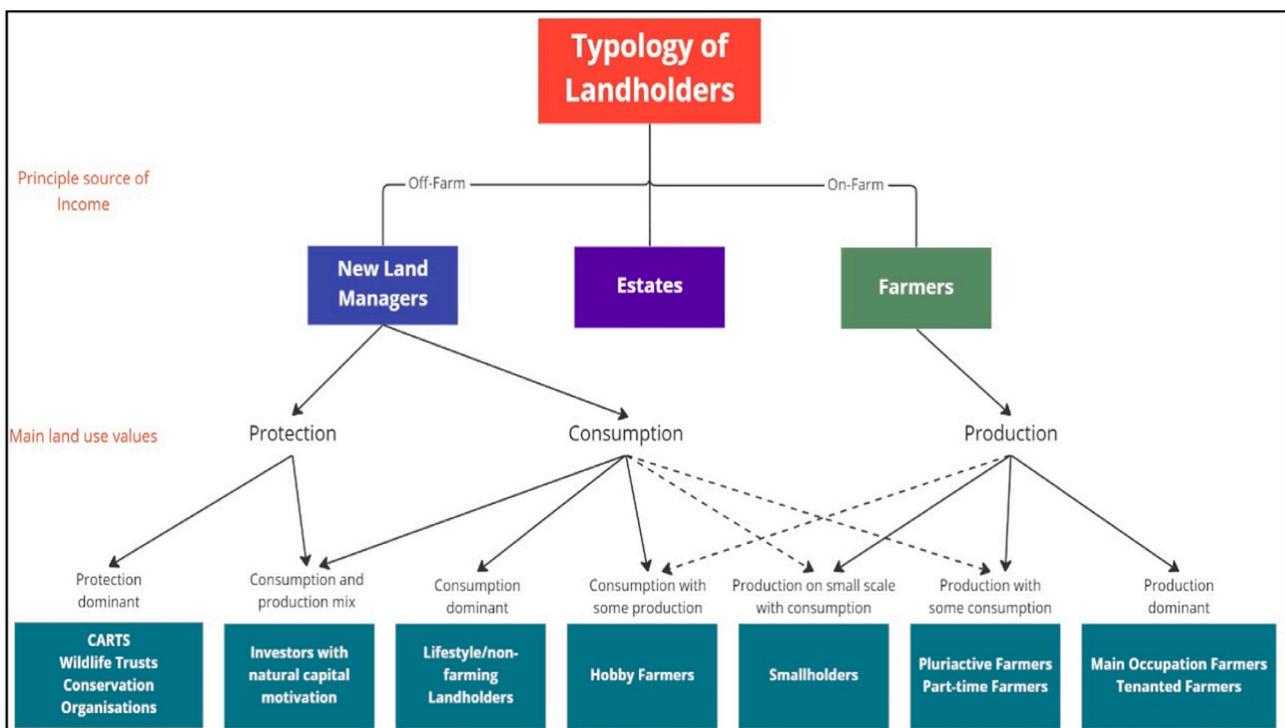


Fig. 6. - Typology of landholders in the UK.

in diversifying their farm business, given that agriculture production is a significant attribute to the value of the land. Ultimately, farmer's adaptability of their business to the agricultural policy reforms will depend largely on their age, availability of a successor and willingness to adapt to schemes focused on payment for public goods provisioning. Moreover, another key factor would be how well they cope with the subsidy changes. This will depend on their farm type and the extent of their reliance on direct payments. Moreover, size of their farm could be another determining factor.

4.1.2. Lifestyle/non-farming landholders

Aside from viewing their land entirely as a consumption good without any production value, lifestyle/non-farming landholders seem to purchase land for their amenities and aesthetics; an observation reflected in the interview quotes above. These group of landholders also seem to lack farming background, with most having moved from urban areas - or continue to be urban dwellers and visit their rural property on their own time, as with a subsection of lifestyle landholders termed "absentee landholders" (Kam et al., 2019). As such they generally are located within driving distance of urban centres, and also "prime tourist destinations" (Holmes, 2006). Given their consumption values, lifestyle/non-farming landholders tend to own land for a wide array of reasons, do not seek to make a profit off their land and are potentially detached from existing farming cultures of practices (Wilson, 2008); thus possessing little knowledge and experience around natural resource management (Burnley and Murphy, 2004; Dwyer and Childs, 2004; Ingemarson et al., 2006; Hollier and Reid, 2007; Gill et al., 2010; Mendham and Curtis, 2010; Petrzalka, 2012). However, they are also found to have stronger environmental values, and thus a strong readiness on their part to manage their land according to environmental and aesthetic goals (Bohnet et al., 2003; Meadows et al., 2014). Therefore, better targeted advice and information is needed to educate them - in order to couple their environmental aspirations with practical land management knowledge. These background and land management characteristics, which are distinct from farmers, perhaps also contributes to the way they see future agri-environmental schemes differently than farmers and adds greater importance to tailoring advice to the specific land use motivations of new land managers:

I think, a lifestyle buyer will see that [the ELM schemes] as an opportunity to generate income from a holding- as an additional benefit. Whereas a farmer will see it as "I've lost income and I need to replace income because I'm deriving a living from that". So subtly different, but have quite significant alternative permutations to how you view those really.
A1

4.1.3. Natural capital investors

Those who decide to enter the land market to acquire land for investment and capital appreciation reasons are also growing in number. These actors reflect the growing market and policy emphasis on the environmental aspect of land use - as exemplified by UK Government's net zero target (BEIS, 2019), the UK Prime Minister's "30 by 30" commitment (Department for Environment, Food and Rural Affairs DEFRA, 2020b) and the growing private market for natural capital growth (Evans, 2021; and further reflected in the interview quote below).

I think the private sector will, for the coming years, essentially make up the market. There might be some money coming from government because greening is always. But I think money will... any reasonable amount of money will be coming from the private market in the future on this. E5

All of which reiterates the growing appetite for individuals to purchase land for investment purposes (Evans, 2021), what we term in this typology "natural capital investors". While not much is known yet about this landholder group, some observations were made by Urquhart and Courtney (2011) in their paper on woodland owners. In that study, this

type of investors make up the smallest portion of their study sample but were found to be the most "financially oriented" of all the categories. As expected, investment opportunities are the largest motivation, but they do not manage due to lifestyle/enjoyment or protection values. This research, however, hypothesises that while they are financially oriented, they do not derive their main source of income on-farm (a distinction from main-occupation farmers). In addition, while financial returns will be a key priority, we suggest that a portion of these landholder type will also have a protection values as one of their main motivations - a slight departure from Urquhart and Courtney (2011)'s investor type. Nonetheless, examination into these landholders in the coming years will be important given their potentially sizeable presence in the land market in the coming years.

4.1.4. Conservation organisations

With reference to new land managers with protection as a dominant value, this includes - but is not limited to - conservation organisations. Prior studies have found these organisations to have low motivation for profit (Urquhart and Courtney, 2011), with the land they own generally located in lands of "low market value for production or consumption purposes" but retains "pristine or near-pristine natural ecosystems also with wilderness values" (Holmes, 2006, p. 149). As such, the aims of these organisations tend to be around delivering "countryside benefits" (Hodge, 1988). Their conservation aims means that these institutions can provide perhaps another piece of the jigsaw when it comes to delivering public goods and coordinating the conservation of land at a landscape scale (Dwyer and Hodge, 1996). This is due to several factors: their growing "capacity and influence", as exemplified by the increasing amounts of land that are being owned by these organisations over recent decades (Munton, 2009), and ability to respond better to policy initiatives means that they might be well-positioned to contribute to future ELMs projects around large scale and long term collaboration (Dwyer and Hodge, 1996; Hodge and Adams, 2012). This is aided further by their experience and involvement in large scale collaborations (Hodge, 1988; Oecd, 2001; Hodge and Adams, 2012), such as the Living Landscapes programme run by the Wildlife Trusts (2011), and RSPB's Futurescapes project (2010). Moreover, their expert knowledge and skills in specific conservation and environmental issues (Hodge, 2001) - which could supplement those which are lacking or inadequate from individual landholders. What remains to be seen is how they can work together with other landholder types in a collaboration setting to achieve their aims.

4.2. Who should deliver public goods in the UK?

An emerging and much more diverse land management community suggests a need to refresh the debate about who should deliver public goods in our rural spaces in the years to come. It has long been recognised that only a small set of institutions are utilised thus far when it comes to the provisioning of public goods in the countryside (Hodge, 2001), with prior schemes targeting mainly farmers to deliver them. In his paper, Hodge (2001) proposes two solutions: a CARTs model, in which trusts with similarly aligned objectives as the state are utilised to provide the goods demanded by society, and a more effective model which includes better incentives for landholders to work together to deliver these public goods on a larger scale (Hodge, 1988, 2001). Ultimately, what these solutions point towards is the need for policy to accommodate for the broadening spectrum of public goods providers. This means that while main occupation farmers continue to play a key role, a wider array of landholders, with varying land use aspirations, will also need to be recruited.

The challenge of recruiting these diverse range of landholders will not be straightforward. Based on findings from literature review and this research study, the diversification of landholder types brings with it distinct and often widely differing land use motivations and goals as well as different ways of thinking about the land and its safeguarding. The

coming task for policymakers is arguably to design and implement a suite of interventions that are sufficiently open in their eligibility conditions and targeting to ensure that each of these landowner types is able to make a contribution, either individually or in collaboration. The importance of a coordinated approach to delivering these public goods on a large scale is underlined by the ineffectiveness of many previous agri-environmental schemes, most of which approached conservation through the aggregation of actions from individual holdings. Issues such as the lack of co-ordination between landholders, and consequently the mismatch of actions (Prager et al., 2012; Häfner and Piorr, 2021), transpired as a result. Nonetheless, a clearer and more current investigation of the characteristics of these new land managers would provide the crucial first steps in addressing this challenge.

A typology, such as the one presented above, offers a means in which to inform policy-makers about the targeted interventions required for each specific landholder type. Policy-makers would be able to attune their interventions according to the “specificities of different and distinct characteristics” (Sutherland et al., 2019) of various groups, and ensure the compatibility of the policy with diversity of landholders, and ultimately the overall success of the programme (Emtage et al., 2006; Fischer 2012 in Nielsen-Pincus et al., 2015). Not only will there be a more effective targeting and delivery of advice, but this also affords policy-makers the insights needed to create a multitude of programmes that are better tailored to the interest and knowledge levels of this heterogenous population. This will be crucial especially for new land managers, as it will enable them to be embedded into knowledge networks, and for advisory groups and policy makers to gain their trust (Bohnet et al., 2003; Redmon et al., 2004; Finley and Kittredge, 2006; Moon and Cocklin, 2011). Better targeted advice and information will also be needed to provide more practical land management knowledge. Furthermore, better targeted advice will be needed when considering that different types of landholders might be better suited to deliver certain public goods in accordance with their location/landscape, or how it aligns with their land use goals and practices (Urquhart and Courtney, 2011). Therefore, this provides policy-makers with a more effective strategy in how they would go about recruiting these new land managers, and also how public goods can be delivered to the desired level in a range of different settings.

4.3. Research limitations and areas for future research

The initial intention of this research was to investigate and profile each landholder type found in Fig. 6. Covid meant that this study had not been able to undertake a deeper exploration of the attitudes and motivations of certain new land managers groups or conduct a deeper comparison between them and more conventional and longer established land managers such as farmers. Thus, future research will need to better understand the unique characteristics of each landholder type, and the distinctions between them to allow for tailored policy interventions.

The growing significance of conservation organisations, in terms resources, knowledge and experience means that more research must be undertaken to understand their role as public good providers and how policies can be tailored to engage them. The same applies to natural capital investors. This landholder type remained elusive during study recruitment, and is therefore the least known landholder type in the typology of this paper. However, natural capital investors reflects the shifting sentiment in policy and private market towards, with findings further affirming a growing appetite for purchasing land for natural capital investment. Understanding the extent to which they are inclined to participate in collaborations would provide a better sense of their role in collaborative conservation projects and the degree to which policies should engage them into future schemes.

Nonetheless, we have only begun to explore the complexities of land occupancy and occupancy changes. The need to address this is attributed not just to the gap identified above, but due to the insufficient data

coverage on land occupancy and with the scale of our study as well. Our focus on England in our investigation of changes in rural land occupancy patterns means that the extent to which these findings can be applied to other devolved nations in the UK remain poorly understood, especially given how future agri-environmental policies will be implemented differently outside of England. In addition, more comprehensive and data rich analysis of land occupancy change will provide a clearer understanding of how it is linked to land use. As Munton (2009, p. 559) pointed out: “within the traditional land ownership categories, properties and owners are too heterogeneous for us to expect similar land-use outcomes”. Given the recognised disparity between land ownership and occupancy, bridging the knowledge gap between who occupies land and how it is used will be crucial in the future if we are to better understand the wider implications land occupancy change has towards the environment. Building on the work from this paper, a spatial or geographical analysis of land occupancy changes occurring in the various regions of England could yield richer insights into these changes, and the specific drivers shaping these changes, on a region/landscape level. Therefore, this remains another avenue for future research to investigate.

5. Conclusion

The greater emphasis on delivering public goods under a new set of agri-environmental schemes, coincided with the changing identity and complexion of those individuals and organisations holding land, means policy-makers arguably need to revise their assumptions about the target group for public goods type production. Findings from this paper indicate a growing diversification of landholder types, with a growing presence of lifestyle/non-farming landholders in the rural land market. Their motivation of owning land appears to be more aligned with consumption and protection values, with interview respondents noting a preference for locations that suit their recreational and environmental aspirations. Moreover, findings also suggest an increasing appetite for owning land for natural capital investments due to the growing environmental market and the shifting policies more focused on conservation outcomes. These demand-driven pressures, coupled with longstanding and incoming pressures reshaping the agriculture industry, will have implications on the demographic make-up of the rural land management community. Therefore, more attention will need to be given towards engaging and integrating these emerging actors into ELMs to ensure the full potential of public goods provision in the countryside is realised. Such undertaking invariably brings challenges owing to the diversity of these group of landholders, and the heterogenous motivations they possess. Addressing these challenges will undoubtedly require a multitude of solutions and actions. With regards to tackling the issue of heterogeneity and widening diversity amongst these group of landholders, this paper proposes the wider referencing of typologies such as the one presented here as a first step towards a more inclusive, and likely more effective, engagement with the land ownership and management community of the future. Following from that, understanding how likely these various groups of landholders are to collaborate with main occupation farmers, and what will be required to engage them in collaboration, will be a further challenge for future research to address in the years ahead.

CRedit authorship contribution statement

Kam Hermann: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Potter Clive:** Writing – review & editing, Validation, Supervision, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial

interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.landusepol.2024.107072](https://doi.org/10.1016/j.landusepol.2024.107072).

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