Lisboa, Engagement Officer, UK Research and Innovation (UKRI) – Written Evidence (LUE0047)

Executive Summary

- Land in England is a finite resource subject to competing demands from several sectors. Making land use sustainable requires transformation in knowledge systems to enhance decision making. UK Research and Innovation (UKRI) is a major funder in delivering this knowledge and in understanding the complexity and impact of how we use our land in England.

- The move towards land use that addresses long term strategic visions requires the application of holistic approaches recognising the multi-objective and multi-level governance.

- Changing and managing land use systems requires bridging biophysical and socioeconomic perspectives on sustainability issues recognising the different time windows and spatial scales for many of these issues. Developing these perspectives requires transdisciplinary approaches.

- Climate change represents an extensive driver in changing demands on land use across all sectors. To deliver Net Zero requires a major transformation of land use sectors to meet decarbonisation objectives. However, many carbon-rich landscapes are high in biodiversity, and policy on land use could be designed with benefits to biodiversity to minimise risk of loss to biodiversity or habitat.

- We are in a period of major policy change and business development. Increasing carbon stocks may be advantageous for modified and degraded landscapes, however, we need to be mindful that the trajectory to the new habitat is understood, so the carbon stock and biodiversity change is appropriate for the maintenance and functioning of the new landscape.

Pressures and challenges

Q.1. What do you see as the most notable current challenges in relation to land use in England? How might these challenges best be tackled? How do you foresee land use in England changing over

the long term? How should competing priorities for land use be managed?

Response:

1. Land can provide many benefits to people, but is a finite resource currently exposed to unsustainable demands and increasing pressures. Decision making concerning land use is often based on specific sectoral interests with limited knowledge of wider or longer-term ramifications: this can lead to inefficiencies, costs to the public purse, conflict between sectors or land users, and degradation of natural resources.

2. Sustainability of land use is now an urgent priority in the UK and globally, requiring transformative actions that can maximise multiple benefits whilst also being resilient to present and future threats. To help achieve sustainability and ensure present and future land use is consistent with long-term strategic vision, requires transformation in knowledge systems to enhance decision making.

3. Current challenges existing around future land use in England include:
    a. Competition for water usage and hydrological management made more impactful through climate change and weather extremes effecting a change in water cycles.
    b. Competition between agriculture, biofuel production, natural environments, greenhouse gas mitigation strategies (e.g., tree planting) and councils, Government, and property developers for new housing and land.
    c. The impact of modern agriculture on soil sustainability, biodiversity and ecosystem services.

4. These challenges are multi-objective and require multi-level governance in reconciling supply and demand for land. Addressing them requires an understanding that is systems-based and uses knowledge that is decision-focussed. Tackling challenges will necessarily involve participatory approaches to support decision making. Such approaches will connect land managers with the disparate stakeholder communities affected by land use planning, delivering management decisions based upon evidence and framework methodologies shaped by extensive research.

5. There is a need to understand the range of demands and how they compete with one another for land use in England, including: biodiversity, renewable energy (including demand for biomass), climate change mitigation, carbon sequestration, catchment

management (water usage, groundwater management, quality and flood mitigation), food production, maintaining and restoring soil health, business sectors, and health (mental and physical). Holistic management considerations need to be applied to these demands so that no requirement is neglected and that multi-faceted land use solutions can be explored and implemented.

6. Collaboration across sectors on initiatives that reduce the negative impact of activities such as modern agriculture on land in England can help address these challenges. For example, UK Research and Innovation (UKRI) is collaborating with Defra on the £47.5M 'Transforming the UK Food System for healthy people and a healthy environment programme'[1] which aims to fundamentally transform the UK food system by placing healthy people and a healthy natural environment at its centre taking into account the complex interactions between health, environment and socio-economic factors. One project funded by the programme is 'Healthy soil, Healthy food, Healthy people'[2] which aims to address a range of UK government policy drivers from biodiversity to soil health and water quality, promoting clean growth and supporting the translation of scientific research and new technologies for the benefit of the UK economy and society.

7. An important consideration for England is the 'right' level of self-sufficiency for sectors competing for land use, such as food and energy. There has been a series of recent shocks to production systems (e.g., the COVID19 pandemic and geo-political shocks) which necessitates a strategic view on how we balance how much food, and what types of food, should be produced in the UK, compared to (for example) land use for energy production to support our economic security as well as resilience to climate change.

Q.2. What are the key drivers of land use change which need to be planned for, and how should they be planned for? What is the role of multifunctional land use strategies in implementing these plans?

Response:

8. We are in a period of major policy and business development, in terms of sectoral policies, this includes agriculture, energy, forestry, food and drink (including the National Food Strategy), water resources, flooding and coastal erosion, nature conservation (e.g., Biodiversity 2030 targets), soils, heritage, energy, housing and

[1] UKRI Transforming the UK Food System for healthy people and a healthy environment SPF programme
[2] Transforming-UK-Food-Systems-Funded-Projects-Call-1-3.pdf (foodsecurity.ac.uk)

infrastructure, communities, economic development, Net Zero targets, and public health and wellbeing. Competition for space is interconnected and societal expectations regarding land use outcomes will, and have, changed. Decisions made now on land use will have impacts for decades. To deliver necessary planning requires emphasis on using research to advance the dialogue on what we want from our land, and how to achieve that future goal from the current position. Improved knowledge of systemic relationships including governance, practices, and behaviours and improved understanding of our dependence on global trade, is a pre-requisite for effective actions across the broad diversity of land-based stakeholders and to reduce current conflicts and inefficiencies.

9. Climate change represents an extensive driver of change in demands on land use across all sectors. To deliver Net Zero requires a major transformation of land use sectors to meet decarbonisation objectives. Climate change will also affect both the availability and capability of land to meet these changing demands. Furthermore, the biodiversity crisis is driving a re-evaluation and a re-prioritisation of land use towards supporting nature, whether through more sustainable agricultural practice or through increased sparing of productive land for wildlife. Securing safe and sufficient water resources and managing more extreme hydrological events (floods and drought) adds to this mix of challenging needs under a changing climate and the need for clean growth. An example of this in action is the new Government drive to promote woodland creation grants for landowners across England[3]. These grants will support the appropriate conversion of marginal and unproductive crop land to woodland, aiding in carbon capture and increasing biodiversity. The Natural Environment Research Council (NERC)-led 'Future of UK Treescapes' programme is delivering new understanding of the types of UK treescapes and their beneficial functions, and how these treescapes can be successfully expanded and made resilient to drivers of change.

10. A particular challenge for multifunctional land use policy is to ensure measures are not just coherent across multiple objectives, but also avoid issues associated with stacking, bundling, and the additionality of sectoral schemes from a cross-sectoral perspective. This is to ensure they do not produce perverse incentives that cause sectoral conflicts and inefficient competition for land.

11. Changing and managing land use systems requires bridging biophysical and socio-economic perspectives on sustainability issues recognising the different time windows and spatial scales for many

[3] https://www.gov.uk/government/news/new-drive-to-promote-woodland-creation-grants-for-landowners

of these issues. Developing these perspectives requires transdisciplinary approaches, bringing together diverse academic and stakeholder communities with a common focus on cross-scale, multi-objective, land use decisions. Such an approach must recognise win-wins are not always possible and tools which allow exploration of different options must be explored within and between communities. The NERC 'Changing the environment' programme recognises this transdisciplinary challenge; it supports cross discipline connections to help realise the full potential of the UK contribution to address tractable environmental challenges or topics. A programme of work that can lead to tangible outcomes and environmental solutions at an appropriate scale through a whole system approach is underway and includes programmes for example on improving biodiversity and regenerating landscapes.

Q.3. How might we achieve greater and more effective coordination, integration and delivery of land use policy and management at a central, regional, local and landscape level?

Response:

12. Multiple level land use policy and management is predicated upon the delivery of interdisciplinary teams and transdisciplinary partnerships to collectively assess the efficiency, effectiveness, and inclusivity of land use decisions against multiple objectives, whilst also incorporating requirements to better plan. In addition to advances in technical skills (e.g., multi-objective modelling and systems mapping), this will require new thinking on participatory governance and engagement to develop more inclusive decisions.

13. Data must be at the heart of land use decision making from environmental, social, and economic sources to ensure ongoing sustainability. With respect to environmental data, enhanced use of digital technology, the core use of harmonised observational datasets, advanced analytical tools, and high-performance computing platforms to provide cross-scale, multi-objective, decision-evaluation capability should all be used to address current data deficits. Data are required for baseline characterization, cost-effective monitoring of policy and management interventions, and modelling of changing spatial and temporal patterns or the impact of changing land use. In addition, this capability will also facilitate creation of detailed virtual environments, supported by the requisite Digital Research Infrastructure and High Performance Computing, that can simulate alternative futures through the use of new digital approaches in AI and digital twins, benefitting both interdisciplinary collaboration and enhanced stakeholder transdisciplinary engagement with policy, businesses, NGOs, public, and

parliamentarians, through sharing of expertise and knowledge. Data across scales from Earth Observation to ground based low-cost sensors need to be part of harmonised observational datasets that can be combined with new approaches such Hydro-JULES[4] for the terrestrial water cycle.

14. Increased links across disciplines to integrate and combine a wide range of social and economic data which could create a barrier or opportunity to land use decision based on environmental potential is also essential going forward. These include issues such as income and debt levels, land tenure, skills shortage, farmer behaviour surveys, transport and processing networks etc. This will require the adoption of common approaches toward data standards and a shared commitment towards the production of findable, accessible, interoperable, and reusable (FAIR) data[5]. It may also require further work to allow for the development and availability of new data products which combine environmental data, which is usually open by default, with more sensitive or restricted sources of information.

15. Many gaps remain such as for planning for Net Zero, including the measurement of greenhouse gases at landscape levels of detail. Gap filling requires building upon project tools from research including the UKRI Strategic Priorities Programme 'Towards a new framework for using Land assets in the UK'[6]; and projects within that (e.g. 'Advancing Analysis of Natural Capital in landscape decisions'[7] (ADVANCES) and 'New Science to Enable the Design of Agricultural Landscapes that Deliver Multiple Functions'[8] (AgLand). Defra funded work to build integrated modelling platforms 'EVAST' which bring together the best of a range national, well-tested models for landscape planning for multiple outcomes helps fill some of these gaps for more integrated and holistic approaches.

16. Further data sources and analysis include building upon UKRI national capability initiatives that can provide core digital resources. The NERC National Capability projects 'Achieving Sustainable Agricultural Systems' (ASSIST)[9] with the Biotechnology and Biological Sciences Research Council (BBSRC) and 'UK Status, Change and Projections of the Environment' (UK-SCaPE)[10] provide

[4] Hydro-JULES | UK Centre for Ecology & Hydrology (ceh.ac.uk)
[5] https://www.go-fair.org/fair-principles/
[6] Landscape Decisions - Landscape Decisions
[7] GtR (ukri.org)
[8] GtR (ukri.org)
[9] GtR (ukri.org)
[10] GtR (ukri.org)

detailed national scale datasets for soil, water and air, focussed on agriculture, water pollutants, river flows, greenhouse gasses, soil moisture, biodiversity etc. Such datasets provide the capacity to answer cross cutting questions, model parameterisation and sustainable management systems at the landscape level.

Farming and land management

Q.4. What impacts are changes to farming and agricultural practices, including food production, likely to have on land use in England? What is the role of new technology and changing standards of land management?

Response:

17. New, innovative technologies and changing land management standards have the potential, if used appropriately, to significantly alleviate the pressures currently placed on land-use in England by modern agriculture and food production systems. One of the major aims of the 'Transforming the UK Food System for healthy people and a healthy environment' is to reduce GHG emissions from the food system including via the use of nature-based solutions (NbS). The programme includes projects looking at regenerative farming up to landscape scale to reduce fertiliser use and GHG emissions; combining hydroponics with soil-based agriculture; and regenerative food systems that embed sustainability from farm to fork. The NERC and BBSRC 'Molecules to Landscapes' programme explores the transformation of agroecological practices at the molecular level, to provide an enhanced understanding and knowledge of molecular changes that can be scaled up and implemented. Example areas include biosystems sensors, data-intensive research, and new tools and technologies and methods (such as genetic and DNA tracing technologies and engineering biology) to appraise the ecology and biodiversity of agricultural land.

18. The potential issue of displacement of the environmental footprint of food and fibre production as approaches move towards more sustainable practices of higher environmental standards needs to be more critically considered. Many more sustainable approaches will often decrease overall production although potentially may increase resilience and predictability of production. Without changes to diet and waste re-use, production could be either moved and or intensified to land not in agri-environment schemes and or to other countries. There are a range of options being explored for new production technologies which could reduce the environmental burden of current agricultural practices (e.g., vertical farming, improved genetic stock etc) which could deliver

efficiencies and production levels but changes in diet and re-use of natural resources will need to play apart.

Q.5. What impact are the forthcoming environmental land management schemes likely to have on agriculture, biodiversity and wellbeing? What do you see as their merits and disadvantages?

Response:

19. The potential impact of forthcoming environmental land management schemes will depend on several factors influenced by the scale of uptake of the new scheme by land managers. Many actions are highly location or contextually dependent, and the impact of changes in management practices to location and outcome will have both co-benefits and trade-offs. Access to training and advice is needed by land managers to deliver the required change in management practices. Currently the likely lack of affordable, independent, and accredited advice is a concern as whilst there may be a willingness to change practices without the skills and advice, many may not be willing or able to take up the challenge.

20. If critical importance is the availability of data to track the outcomes in a repeatable and robust approach to provide adaptive management going forward (i.e., modifying schemes to adjust to new knowledge and ongoing challenge of unexpected response to climate extremes). Monitoring in England is required to build the data streams at a national scale to capture impacts on land both in and out of land management schemes.

Nature, landscape and biodiversity

Q.6. What do you see as the key threats to nature and biodiversity in England in the short and longer term, and what role should land use policy have in tackling these?

Response:

21. Many carbon-rich landscapes are high in biodiversity, and policy on land use could be designed with benefits to biodiversity as conditions to minimise risk of loss to biodiversity or habitat. Making policy-based decisions in isolation is recognised as a threat as distinct strands of science-policy interaction have emerged but with limited interaction between them on the implied land use trade-offs (i.e., trade-offs are not made explicit or assessed). A notable example is the separation of biodiversity, agriculture and food assessments, and water or flooding assessments despite their very

important cross-sectoral land-use interactions and trade-offs, which are becoming even more critical in the context of climate change adaptation and net zero.

22. Increasing carbon stocks may be advantageous for modified and degraded landscapes, however, we need to be mindful that the trajectory to the new habitat is understood, so the carbon stock and biodiversity increase is appropriate for the maintenance and functioning of the new landscape[11].

23. Maintaining high biodiversity in the landscape requires a rich mosaic of appropriate habitats to be maintained and remain connected. Attention should not be focussed on a single land use based on high carbon capture or storage potential. Shifting focus to finding complementary carbon capture land uses will provide better synergies between priorities[6].

24. Any net zero carbon land use interventions should support or increase biodiversity and bio abundance. Carbon capture as a land use requires it to be a part of the multiple functions of that land which includes a biodiverse landscape. This is linked to local and place-specific net zero practices and so requires local governance. Landscapes represent cultural associations of space, and any change that threatens those can potentially become the object of conflict and rejection by society. Hence the trade-offs and synergies between net zero and other goals including a biodiverse landscape need to be fully considered through a systems-based approach. Two projects in the UKRI 'Landscapes Decisions' programme are considering the significance of landscape aesthetics and the potential for identifying and changing expectations. The 'AgLand'[12] project focuses on identification of 'landscape archetypes' which describe the typical look-and-feel of landscapes in different regions of the UK. These are characterised by specific physical features, land cover types, landscape structures and land use and feature specific aesthetics and cultural values. The 'Tipping Points'[13] project is concerned with how our expectations in relation to landscape appearance may need to shift if we are to accept the kinds of landscape changes essential for reaching targets in relation to biodiversity and net zero carbon[6].

25. In the past 18 months, BBSRC has actively sought to engage with Defra on the Convention on Biological Diversity[14]. We expect biodiversity loss to become an increasingly important policy area

[11] Making Landscape Decisions to Meet Net Zero Carbon: Pathways that consider ethics, socio-ecological diversity, and landscape functions (figshare.com)
[12] AGLAND - Landscape Decisions
[13] Tipping Points: - Landscape Decisions
[14] Home | Convention on Biological Diversity (cbd.int)

nationally and internationally in both the short-term and long-term. BBSRC's agriculture and food research investments, in terms of managed land will be particularly relevant in this context.

26. The use of land for infrastructure rather than re-use of existing urban space can reduce land available for production and impacts on biodiversity levels. As such, the re-use of urban land for new infrastructure is an approach to tackle such threats. Similarly approaches that connect soil removed during construction to re-use would ensure the greater protection of England's soil resource[15].

27. Soil biodiversity is central to effective functioning of soil and is exposed to numerous threats because of land use change and management approaches. Land use policy as a driver for environmental standards which recognise soil, and its biodiversity requires a more sophisticated approach to regulation. As an example, to address chemical contaminants in soil, policy limiting land use with high levels of control chemicals near to sensitive sites could be one approach to address the flow of a chemical load into the wider environment.

Q.7. What are the merits and challenges of emerging policies such as nature-based solutions (including eco-system and carbon markets), local nature recovery strategies and the biodiversity net gain requirement? Are these policies compatible, and how can we ensure they support one another, and that they deliver effective benefits for nature?

Response:

28. Nature-based solutions (NbS) and local nature recovery strategies combine solutions from a range of disciplines and can help foster a collaborative approach to tackling land-use challenges, whilst delivering effective benefits for nature. One such approach was demonstrated through the 'Valuing Nature Programme'[16] (2013-21) a £6.5m investment from NERC, Arts and Humanities Research Council (AHRC), BBSRC, Economics and Social Research Council (ESRC) and Defra that resulted in seven projects across two research challenges (tipping points, and human health and wellbeing). The programme aimed to improve understanding and representation of the complexities of the natural environment in valuation analyses and to consider the wider societal value of ecosystems services. Programme outputs enhanced understanding

[15] https://www.the-ies.org/news/society-environment-launches. Land use policy for infrastructure and construction could directly address this issue.

[16] https://nerc.ukri.org/research/funded/programmes/valuingnature/

of the co-benefits of potential NbS, how NbS can fit into the UK's broader land use, forestry and agricultural planning, and how policy and financing can support delivery of NbS[17].

29. The Greenhouse Gas Removal (GGR) Directorate Hub funded as part of the UKRI 'Greenhouse Gas Removal Demonstrators' programme[18,19] are co-ordinating and evaluating a suite of GGR approaches including some classed as 'nature based'. The programme will explore sensible policy initiatives exploring the merits and challenges including the roles of carbon markets.

30. Increased emphasis is now also being placed on the fundamental importance of a healthy natural environment for human wellbeing, through ecosystem services, natural capital, and NbS, which are all strongly associated with land use decisions. The recent Dasgupta Review on the Economics of Biodiversity highlighted the need for a radical reform of government economic strategy to better accommodate biodiversity, which also effectively means that land is valued in a very different way, identifying a potentially pivotal role for Green Finance within nature-based solutions.

31. Evidence is clear that a simple 'one-size-fits-all' type approach to ecosystem and natural capital approaches will not be successful, and that spatial targeting of incentives based upon local landscape contexts is required. Fundamental questions remain on how to deliver such a more nuanced approach that is more adaptable to local contexts, especially avoiding uptake being dominated by those who are most aware of how to opportunistically access schemes. The role of partnership building, the framing of incentives, and the most appropriate scientifically based metrics to measure progress towards desired outcomes (including metrics that can be widely measured and implemented at local level) require research and agreement. Such nuanced approaches are being explored by current UKRI research programmes such as the 'Future of UK Treescapes' led by NERC and co-funded with AHRC and ESRC, and the Economics of Biodiversity programme supported by NERC and ESRC.

Environment, climate change, energy and infrastructure

Q.8. How will commitments such as the 25-year environment plan and the net zero target require changes to land use in England, and what other impacts might these changes have?

[17] https:/valuing-nature.net/
[18] UK invests over £30m in large-scale greenhouse gas removal – UKRI
[19] GtR (ukri.org)

Response:

32. UKRI supports a number of investments into greenhouse gas removal (GGR) technologies, all of which have the potential to contribute to the UK's net zero target. These include utilisation of effective land-management techniques to contribute to this target. One collaborative example includes the Greenhouse Gas Removal Demonstrators (GGR-D) initiative16(2021-25), a £31.5m investment by NERC, BBSRC, Innovate UK, AHRC, Engineering and Physical Sciences Research Council (EPSRC) and ESRC, and sponsored by BEIS and Defra. GGR-D will deliver options for a balanced suite of GGR technologies to provide a sustainable GGR solution focussing on the UK.

33. The commitments in the 25-year environment plan to increasing woodland cover, creating or restoring priority habitats, sustainable soil management, and cutting greenhouse gas emissions from land use and land use change will all require changes to land use. For example, the woodland cover targets will necessitate a combination of complete conversion of some agricultural land to plantation forestry and increased mixed use through the establishment of urban and farm woodland and agroforestry. Also, Defra has targets for the restoration of peatland habitats and the reduction of greenhouse gas emissions from agricultural organic soils (England Peat Action Plan), targets are likely to require the reduction of livestock grazing in upland areas and changes agricultural use and management on lowland organic soils. Additional actions in the Net Zero strategy include increased production of bioenergy crops on cropland and grassland and food waste reduction.

34. Impacts of these commitments may be negative as well as positive, on biodiversity, water resources, resilience to environmental hazards, air quality and the sustainability of rural communities, and there will likely be trade-offs depending upon the prioritisation of commitments. Unintended negative outcomes of such commitments could include moving the food and biomass production footprint abroad, and the capacity to monitor England's natural assets as the commitments are addressed (e.g., soil carbon, and erosion and water quality). Understanding the broad impact of such commitments, and predicting their impacts relies not only on the broad-scale monitoring but improved capability across molecular, data, agricultural and environmental sciences that enable the integrated and system-wide approach based on research and modelling.

Q.9. How should land use pressures around energy and infrastructure be managed?

Response:

35. No UKRI response.

Land use planning

Q.10. What do you see as the advantages and disadvantages of the existing land use planning system and associated frameworks in England? How effectively does the system manage competing demands on land, including the Government's housing and development objectives? What would be the merits of introducing a formal spatial planning framework or frameworks, and how might it be implemented?

Response:

36. No UKRI response.

Q.11.What lessons may be learned from land use planning frameworks in the devolved nations and abroad, and how might these lessons apply to England?

Response:

37. The Welsh Government previously invested in a joint monitoring and modelling platform to support land use and management planning and robustly track and report on the outcomes of policy implementation (i.e., the GMEP and ERAMMP programmes[20] .This work is ongoing and could be a model for England going forward. The programme includes a rapid expert review of time-sensitive policy needs, and the building of an integrated community modelling platforms for scenario exploration of land use change for multiple outcomes including economic valuation, and national integrated monitoring programmes. Importantly the approach has built a multi-organisation research community and partnership which works closely and in partnership with Welsh Government to provide integrated, long term and collaborative thinking on a wide range of issues relating to land use and management and its outcomes for biodiversity, water, soil, climate mitigation, cultural heritage, access and recreation, health and well-being, farmer and public surveys and much more.

[20] https://erammp.wales/en

Conclusion

Q.12. Which organisations would be best placed to plan and decide on the allocation of land for the various competing agendas for land use in England, and how should they set about doing so?

Response:

38. Four main groups of key stakeholders can be distinguished: (i) national policymakers and implementation agencies across the UK; (ii) NGOs, sectoral representative bodies, and large businesses; (iii) landscape-level organisations including local government, national parks etc.; (iv) land managers including farmer groups and cooperatives, local people, and local businesses at specific localities. To deliver a sustainable land use system required bringing together expertise of biological, physical, environmental, economic, and social processes that influence land use decisions and outcomes.

39. Stakeholder feedback and numerous events held by the Landscape Decisions Programme have shown a strong need for new findings and thinking on the social and economic benefits from land, and of governance arrangements. A central focus emerges around inclusivity and joined-up forms of multi-level governance, including polycentric approaches linking national objectives to local landscapes, and the role of community-led initiatives to take more control over landscape-level decisions and their target outcomes.

About UKRI

40. Launched in April 2018, UKRI is a non-departmental public body sponsored by the Department for Business, Energy and Industrial Strategy (BEIS). Operating across the whole of the UK with a combined budget of more than £7.9 billion (2021-22), UK Research and Innovation (UKRI) brings together the seven disciplinary research councils, Innovate UK and Research England. Our vision is for an outstanding research and innovation system in the UK that gives everyone the opportunity to contribute and to benefit, enriching lives locally, nationally and internationally. Our mission is to convene, catalyse and invest in close collaboration with others to build a thriving inclusive research and innovation system that connects discovery to prosperity and public good.

41. This inquiry is relevant to active research interests supported by the Natural Environment Research Council, and addresses issues of land management and use of interest within UKRI more widely. Understanding how we evidence and so consider the short and longer-term outlook for how land use may change and may need to change, and the most appropriate response to these changes, a key

challenge of this inquiry, is central to the vision of NERC science that understands tackling complex problems demands both a deep understanding of environmental science and place this at the heart of whole systems approaches to how we live within the planets boundaries.

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