CATALYSING TRANSFORMATIVE FOOD FUTURES FOR GLOBAL SUSTAINABILITY

WORKSHOP REPORT

LANDSCAPE DIVERSITY FOR FOOD SECURITY

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Acknowledgments

This workshop was led by Professor Shonil Bhagwat (principal investigator for the CATAPULT project) and Dr. Emmanuel Junior Zuza (Post-Doctoral Research Associate). We extend our sincere gratitude to the following speakers, whose insights and knowledge greatly enriched our workshop:

- Prof Martin Lukac, Professor in Sustainable Land Management, University of Reading.
- Prof Marion Pfeifer, Associate Professor in Land Systems Management, Newcastle University.
- Prof David Gowing, Professor in Botany, Open University.
- Dr Courtney Scott, Director of Policy and Research, Food, Farming & Countryside. Commission.
- Dr Lucy Dablin, Lecturer in Environment and Sustainability, Open University.
- Dr Aiora Zabala, Lecturer in Economics and the Environment, Open University.
- Mr Andrew Emmott, Visiting Research Fellow, Open University.

Executive Summary

Despite the growing recognition of the need for substantive change in the global food system, there is a lack of knowledge regarding the viable pathways for such a transformational change. The primary reason is that the food system is organised around large-scale, commercial, and intensive agriculture, emphasizing production maximisation. There are alternatives to the current mode of agriculture, food production, and food supply, but they are frequently marginalised in the global food system.

The Landscape Diversity for Food Security Workshop on 10th July 2023 aimed to examine various strategies for transforming agricultural landscapes and food systems, particularly in the United Kingdom. The workshop reviewed alternative methods for identifying routes to accomplishing these transformations.

Professor Martin Lukac, Dr. Aiora Zabala, Dr. Lucy Dablin, and Andrew Emmott contributed their expertise to discuss the significance of agroforestry and regenerative grazing in fostering biodiversity and other ecosystem services in agricultural landscapes. They acknowledged the importance of agroforestry in addressing issues such as food insecurity, biodiversity loss, and climate change.

The success stories of Prof. Marion Pfeifer in Tanzania, Prof. David Gowin in the UK, and Dr. Aiora Zabala's meta-analysis on sustainable land-use innovation drivers highlight the potential for transforming farming landscapes to address environmental concerns, nutritional requirements, and cultural traditions.

During the workshop, Prof. Shonil Bhagwat highlighted the disconnect between food, culture, and the environment. According to Dr. Courtney Scott, this disconnect has led to a global deficit of diverse food crops and limited dietary diversity. They suggested that establishing a more localised, secure, and healthful food system would benefit all citizens. This would entail increasing purchases of domestically produced foods and decreasing imports.

The Landscape Diversity for Food Security 2023 workshop delved into the frameworks that can facilitate the transformations of farming landscapes and subsequent food systems. Ultimately, will the UK be able to transition from monocultures to diverse farming systems? If so, what steps are necessary to ensure that it can be achieved?

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Introduction

Achieving a Net-Zero food system in the United Kingdom in less than three decades is one of the most formidable challenges facing British society today. While most stakeholders involved in farming, waste management, and the fossil fuel sector are in broad agreement, there remains significant uncertainty concerning the practical aspects of implementation (Choudhary et al., 2022). There is a consensus regarding the urgent need for a comprehensive transformation and decarbonisation of the entire farming and food systems, including production, processing, packaging, storage, distribution, retail, and consumption. However, there are uncertainties regarding the precise technologies, policies, interactions, and strategies that will most effectively attain these objectives within the allotted time frame.

In early July 2023, the CATAPULT research team called academics and researchers to participate in an online workshop and panel discussion titled "**Landscape Diversity for Food Security**." This workshop, which took place on 10th July 2023, aimed to collectively assess, identify, discuss, and develop research priorities addressing one of the most pressing issues confronting the British farming system: how to transition it away from carbon emissions. The key objectives of the workshop were as follows:

1. Collectively identify the fundamental principles of transforming the current farmland management practices.
2. Identify and analyse case studies showcasing successful approaches from other regions and explore their adaptability within the UK context.
3. Discuss the essential requirements for designing research activities to transform farming landscapes within the UK context.

The workshop integrated contributions from key speakers and panel discussions to harness the expertise available. This report provides a comprehensive account of the proceedings of this workshop.

The challenge of feeding 9.8 billion by 2050

The workshop's opening session centred on the persistent challenges within the global farming landscape systems, culture, and the research objectives of the CATAPULT project. The workshop intended to recognise the interconnectedness of food, environment, and culture and take proactive steps to strengthen these connections to work towards more diverse and sustainable farming landscapes that benefit both people and the planet.

Dr Emmanuel Junior Zuza and Professor Shonil Bhagwat shared their perspectives on the global food system's requirements, focusing on the UK sector. He emphasized prioritising better nutrition, health, cultural and social contexts, and environmental sustainability to align with the FAO Strategic Framework 2022–2031 Four Betters.

Bhagwat underscored significant disconnections between culture, food, and the environment (Figure 1). Regarding this disconnect, he shed light on the highly intensive nature of current farming systems, heavily influenced by commercial stakeholders. This has resulted in a neglect of traditional farming practices, which are inherently more diverse and environmentally beneficial and commonly practiced by smallholder farmers. He further emphasized that the green revolution has intensified agriculture at the expense of environmental conservation.
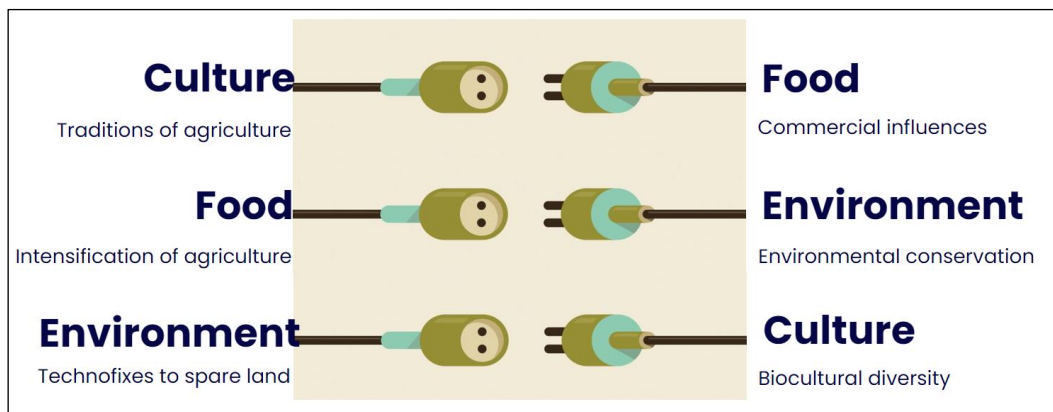
Figure 1: Disconnection between culture, food, and the environment.

Three scales of disconnection were identified (refer to Figure 2). Firstly, a landscape disconnection exists, wherein industrial and intensive farming practices dominate global farming landscapes. Despite this predominance, a remarkable 80% of global food production emanates from smallholder farmers who tend to their crops within multifunctional landscapes, employing mixed cropping and intercropping practices. To bridge the gap between food production and environmental concerns, current intensive farming practices must undergo substantial transformation and align more closely with the methods employed by smallholders.

Secondly, Bhagwat highlighted the global dependence on a limited number of species as a food source. This heavy reliance is recognised as one of the major contributors to global food insecurity and the lack of diverse diets. He advocated for promoting orphan and neglected species, focusing on those indigenous to each growing region. Thirdly, Bhagwat emphasised the limited utilisation of genetic diversity within the gene pool. Incorporating agrobiodiversity through genetically modified organisms is deemed necessary to ensure the transformation of our current food systems.

Figure 2: Scales of disconnection.

In conclusion, the following factors were identified as shaping the landscape of farming in the UK:

- A reliance on intensive agriculture, occupying 75% of available land, to meet food demand (with 60% met domestically).

- The significant influence wielded by the Big Four supermarkets over food supply chains led to the prioritisation of affordability.
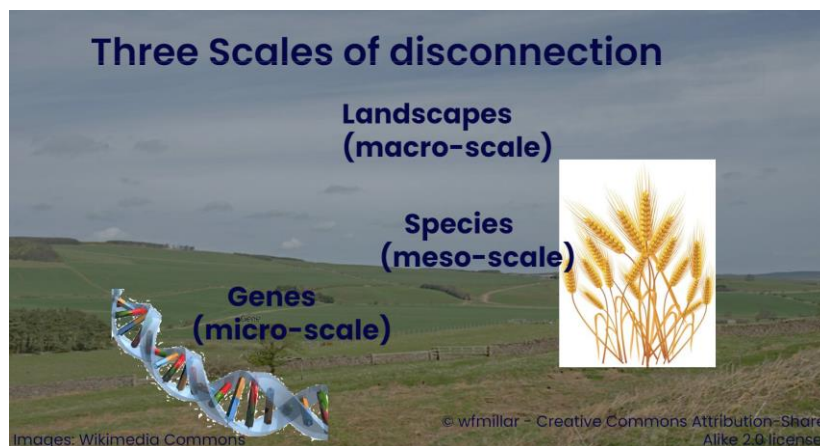
- The absence of government regulation concerning ultra-processed food resulted in the proliferation of 'food swamps.'

- Post-Brexit food policies adopted by all devolved nations emphasise international trade in food.

- A shift in farmland management focus from food production to carbon and nature conservation.

Monoculture farming landscape transformation to agroforestry systems

In this section, Professor Martin Lukac delivered a presentation on agroforestry, motivated by the imperatives of rapid population growth, food security, and the pressing need for climate change adaptation and mitigation. Professor Lukac's presentation raised thought-provoking questions, encapsulated in his remark:

"More people need more food, but where do we put all the trees then?"

This question underscored the central theme of his talk, which explored agroforestry as a viable option for transforming farming landscapes, ultimately resulting in diversified, sustainable farmlands. This presentation shed light on the potential benefits offered by agroforestry systems, including enhanced productivity (as evidenced by published research on Land Equivalent Ratio in Europe), the promotion of biodiversity within farming landscapes, carbon sequestration, and a range of other ecosystem services, both above and below ground.

Lukac also pointed out a significant gap in research concerning agroforestry systems in the UK. As illustrated in Figure 3, this research deficiency has hindered farmer adoption of the technology. Lukac emphasised that due to this research gap, there is a risk of experiencing

negative returns from agroforestry systems in the UK, as observed in other regions. For example, improper implementation of agroforestry systems, such as incorrect plant density, growth patterns, and competing root systems, can lead to crop competition for light and water resources, potentially impacting overall yields. Therefore, while farmers express willingness to adopt agroforestry systems, there is an obligation to research and evidence associated implications.

- o Need a network of systems to observe long-term
- o Need to develop simple indicators of function at scale
- o To max impact, need to link sustainability to livelihoods

Figure 3: Research gaps on agroforestry systems in the UK.

Climate-Smart Macadamia Agroforestry: Case study of Malawi

In this section, Andrew Emmott presented a compelling case study on macadamia agroforestry, illustrating the myriad benefits of these systems and emphasising the crucial need for collaborative data collection to facilitate long-term monitoring. Of particular interest was Emmott's demonstration of how agroforestry systems can act as a buffer against heat, as evidenced by temperature comparisons with bare soil (as depicted in Figure 4). This highlighted the potential for these systems to contribute to climate resilience and their other benefits.

Emmott concluded his presentation by emphasising the pivotal role played by citizen scientists in collecting data for the long-term monitoring of tree growth. He advocated adopting such an approach in the UK, underlining its potential to enhance research and monitoring efforts. This

case study serves as a compelling example of the positive impact of agroforestry systems, not only in addressing immediate agricultural challenges but also in contributing to climate-smart and sustainable solutions.
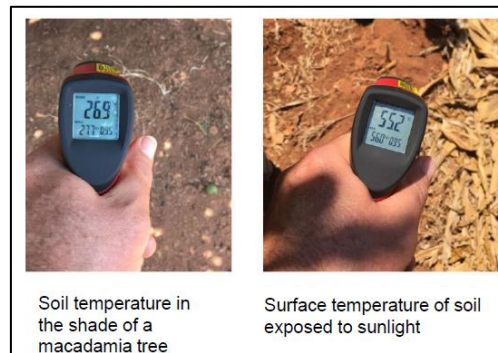
Figure 4: Benefits of agroforestry systems in buffering extreme heat.

Silvopastoral agroforestry: a case of regenerative cattle farming in Amazon

During this section, Dr Lucy Dablin focussed on silvopastoral systems in the Amazon, offering it as a viable model for farming landscape transformation with potential applications in the UK. Dr Dablin's presentation shed light on the profound impact of livestock grazing on deforestation, revealing that 17% of Amazon land has been deforested over the past 50 years, with 80% now serving as cattle pasture. This alarming example parallels the UK, where livestock grazing occupies over 35% of the total agricultural land and is a significant source of methane emissions. Dr. Dablin highlighted that large commercial supermarkets, such as Cargill and JBS, promote unsustainable beef production in the Amazon to meet consumer demands. This echoes Professor Bhagwat's observation that certain commercial entities promote unsustainable agricultural methods to satisfy their consumer bases, i.e., cheap food.

Dr Dablin has been researching silvo-pastoral agroforestry, which involves integrating trees and shrubs into livestock production to address the issue of degraded lands in the Amazon. This approach offers multiple benefits, including improved animal welfare, extended grass

seasons, fodder availability during the dry season, increased ecosystem resilience, natural pest control, nutrient cycling, and reduced soil erosion. As emphasised by Professor Martin Lukac, selecting the right trees for specific locations is crucial. Dr. Dablin reported success in identifying potential trees that can be incorporated into cattle diets, with ongoing research into the impact of novel forage on cattle health. This underscores the need for understanding which trees or shrubs are suitable for livestock feeding if introduced into the UK.

Dr. Dablin's study showcased the potential of trees and shrubs as livestock feed, including *Erythrina berteroana*, *Inga edulis*, *Leucaena leucocephala*, *Senegalia loretensis*, and *Ceiba pentandra*, as well as their role in restoring degraded lands. Consequently, there is a pressing need for research into potential candidates of trees and shrubs that can be integrated into UK pastures, aligning with silvopastoral agroforestry principles.

Sustainable land-use innovation among smallholders

For this section, Dr. Aiora Zabala delivered a presentation on the factors that influence the adoption of sustainable land-use innovations, particularly the integration of trees into farmlands. Drawing lessons from a case study in a community in southernmost Mexico (Ejido of Los Angeles), Dr. Zabala provided insights on why understanding farmer behaviour towards innovations and technologies is essential, as it significantly affects adoption rates.

The core of Dr. Zabala's presentation revolved around the motivations and incentives for farmers to plant trees. She highlighted a critical issue – many initiatives promoting tree planting often overlook farmer opinions and their decision-making processes regarding resource allocation across livelihood activities. This oversight results in non-inclusive approaches, often leading to low adoption rates of tree-planting practices despite the willingness of farmers to embrace them. In her presentation, Dr. Zabala highlighted five factors that affect the adoption of agroforestry based on a meta-analysis she conducted.

These factors are grouped into external or contextual, related to the practice, and intrinsic to the individual. External factors include the social environment, institutions, policies, and farm and household characteristics. Factors related to the practice include its technical feasibility, costs and benefits, and knowledge and information. Individual factors can be objective (such as age, gender, education level) or subjective (including attitudes, beliefs, etc.). The various factors in sustainable land-use change decisions underscore the complexity of transforming farming landscapes. However, Dr. Zabala stressed a crucial factor – active involvement by local communities and farmers in policies related to landscape transformations. She cited an example involving DEFRA's Environmental Land Management Schemes, where many farmers lack a clear understanding of the expectations despite their willingness to adopt the practices outlined in the new policy.

To conclude her presentation, Dr. Zabala shared five essential points aimed at facilitating the transformation of farming landscapes:

1. **Knowledge and Information**

Engaging with farmers on various farming landscape transformation technologies and innovations. This includes access to information, extension training, and building trust in the source of information, whether it be government or universities.

2. **Technical Feasibility**

Asking difficult questions about farmers' technical potential, considering economic, behavioural, and policy potentials. Ensuring that farmers have the necessary resources to adopt technologies.

3. **Economic Rational Motives**

Ensuring all stakeholders understand the costs and benefits of farming landscape transformation. This includes access to credit and markets for specific farming methods, such as organic farming.

4. Farm Household Characteristics

Considering factors such as land size and tenure, biophysical characteristics, production levels, farmer and land manager experiences, income, socio-economic status, and labor requirements for transforming farming landscapes.

5. Social Environment and Institutions

Emphasizing networks and communication channels to ensure stakeholders are well-informed. Evaluating subjective norms and social pressures impacting the adoption of farming landscape transformation practices and involving stakeholders in participatory consultation processes before policy implementation.

Floodplain meadows: a case study of land sharing and sparing

This presentation was by Professor David Gowing, focusing on the debate of land sharing and sparing the case of floodplain meadows in the UK. Prof. Gowing highlighted the importance of floodplain meadows as hotspots of biodiversity and food security (hay-making for livestock). As such, Gowin noted two issues arising from floodplains, i.e., conservation of biodiversity and pressure from agricultural expansion due to their fertile soils. This is a real-world scenario where land sharing (farming and conservation coexistence) and land sparing (isolated conservation areas) can be evaluated. Prof. Gowing pointed out that most of the floodplain meadows are managed in common by all farmers in a parish. This shows that local communities are responsible for looking after their floodplains, ensuring accountability and sustainability.

However, due to population growth and the need to feed more people, Gowing reported that the majority of these floodplain meadows are under intensive cultivation, with less than 3000 hectares (ha) remaining in the UK. Approximately 1,000 ha are under restoration, and Natural England has published a target of 70,000 ha. Consequently, Gowing posed a question on "Sharing and Sparing meadows."

Floodplain meadow sharing

This land management and conservation approach seeks to integrate farming activities with the preservation and sustainable use of floodplain meadows. In this scenario, farmers engage in activities like crop cultivation, livestock grazing, or haymaking while maintaining meadow ecosystems. This results in farming landscape transformations with the following benefits:

- Mixed land use where patches of the floodplain are interspersed with farming fields. As such can provide benefits for both farming and conservation.
- Biodiversity conservation.
- Sustainable agriculture by promoting practices that minimise soil erosion, pesticide use, and other activities that can harm the ecosystem.
- Successful floodplain meadow-sharing initiatives often involve local communities and farmers in decision-making processes. This engagement can lead to more effective and locally tailored conservation efforts.

Floodplain meadow sparing

This approach to land management and conservation prioritises protecting and preserving floodplain meadows by separating them from intensive farming activities. In this approach, specific zones within the floodplain are designated as conservation reserves where natural habitats, including meadows, are left undisturbed. The primary goal is to safeguard these ecosystems and their associated biodiversity. Despite the potential benefits of floodplain meadow sparing, Gowing highlighted that with rapid population growth and urbanisation, this

would become difficult and, as such, the need to focus on sharing. Nevertheless, achieving a sustainable balance between these goals often requires thoughtful land management strategies and collaboration between conservationists and farmers.

In his conclusion, Prof. Gowing provided the following points:

- Floodplain meadow sharing seeks to balance farming and conservation within floodplain landscapes.
- Floodplain meadow sparing prioritises the protection of natural habitats and biodiversity over farming expansion.
- The choice between these approaches depends on local environmental conditions, conservation goals, and the need for farming productivity, with sharing being promoted for sustainability.
- Successful floodplain management often involves a combination of these strategies tailored to specific circumstances.

What to plant, when, and where: restoration for people and biodiversity in rural tropical landscapes

During this session, Professor Marion Pfeifer presented the benefits of Nature-based Solutions (NbS) for rural communities and biodiversity in tropical landscapes. She emphasized the critical role of context in NbS considerations, considering factors such as location, local communities, and the initiative's purpose. It was noted that to develop a just and effective approach to restoration, it is necessary to work with the people who live on and make a living from the land to identify their priorities for restoration.

As evident from the quote above and the insights shared by previous presenters, it becomes clear that local communities are at the heart of farming landscape transformations. Therefore, if the UK aims to achieve successful farming landscape transformations, it is imperative to actively involve local communities, farmers, and land managers in the decision-making and implementation processes. Prof. Pfeifer also underscored that the outcomes associated with

changing landscape configurations are influenced by external drivers, interventions, and farmers' demographics and socio-economic factors (Figure 5).

Professor Pfeifer's research in Tanzania revealed that local communities preferred landscape restoration, including fruit trees, firewood or timber trees for cooking and construction, beekeeping for income generation, and livestock and crops. However, farmers also raised concerns related to the challenges posed by an increased number of trees. These challenges included higher costs, the risk of fires (mainly due to sugarcane cultivation), the creation of wildlife habitats, and security issues such as theft and reduced visibility of wild animals and farmers to one another.

Building upon these insights, Professor Pfeifer's team and the Tanzanian government can develop tailored restoration programs that carefully manage where and what to plant, aligning components for farming and conservation in the local communities. These strategies can be valuable lessons for the UK government and policymakers when considering farming landscape transformation initiatives.
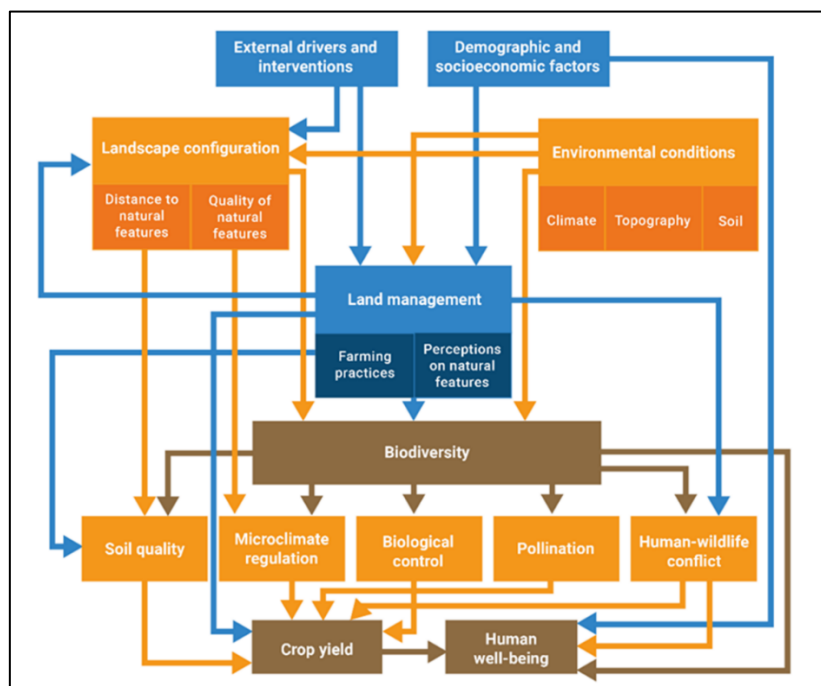

Figure 5: Factors influencing landscape transformation

Long-term food security: the role of agroecology and land use framework

The final segment of the workshop was led by Dr. Courtney Scott, who centred her discussion on the transformation of the UK's food system. Dr. Scott underscored that farming is pivotal in driving change within the UK's food system. She pointed out that current policies have been primarily aimed at producing "cheap" food, yet household food insecurity has increased. However, Dr. Scott emphasized that this pursuit of "cheap" food has resulted in several negative consequences, including a lack of diversity in the types of food grown, limited dietary diversity, and a decline in wildlife populations within the UK (Figure 6).
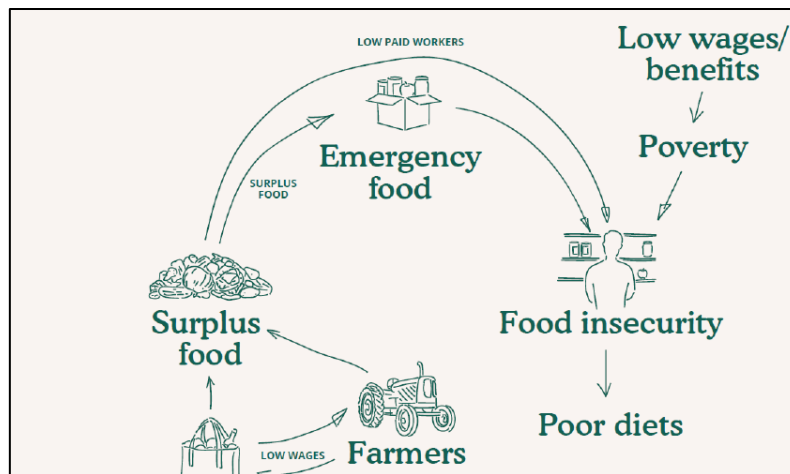
Figure 6: Consequences of cheap food.

Despite the challenges posed by the pursuit of "cheap" food, Dr. Scott emphasized that agroecology, coupled with the land use framework, holds the potential to address these issues by diversifying the crops grown, improving dietary diversity, and promoting biodiversity conservation. This is because agroecology involves farmers and food producers adopting fair and sustainable regenerative practices, leading to a healthier food system that can address climate change and contribute to landscape regeneration and nature restoration. According to Dr. Scott's presentation, a fair and sustainable farming landscape transformation in the UK should revolve around the following principles:

- Growing more of what the land is ecologically suited to grow without chemicals.

- Sustaining viable farm businesses in a flourishing rural economy.

- A more localised, healthy, and secure food system that works for all citizens.

Potential benefits of agroecology in the UK

- Supporting species abundance and restoring 10% of current farming land for nature-friendly farming.

- Prioritising healthy and sustainable food production, including fruits, vegetables, nuts, and pulses.

- Ending the UK's contribution to deforestation driven by intensive livestock farming.

- Transitioning to a net carbon store by restoring nature and sequestering carbon in various ecosystems, such as soils, grasslands, wetlands, peatlands, hedgerows, and agroforestry.

Dr. Scott further highlighted that accelerating the adoption of agroecological practices in the UK could lead to land use changes that offer multiple benefits, aligning with a land use framework approach (Figure 7). In conclusion, Dr. Scott emphasized the following key considerations:

1. A serious, well-resourced transition plan for food and farming based on agroecology engages all government departments and gives farmers the right signals and the resources to deliver both healthy and sustainable food production and climate and nature adaptation.

2. The government to use regulation and legislation wisely and effectively to level the playing field, so it is good business to do the right thing for climate, nature, and health, and increasingly difficult, expensive, or illegal to damage them.

3. Minimum core environmental and animal welfare standards to ensure that progress in the UK is not undercut by food produced to lower costs and standards overseas.
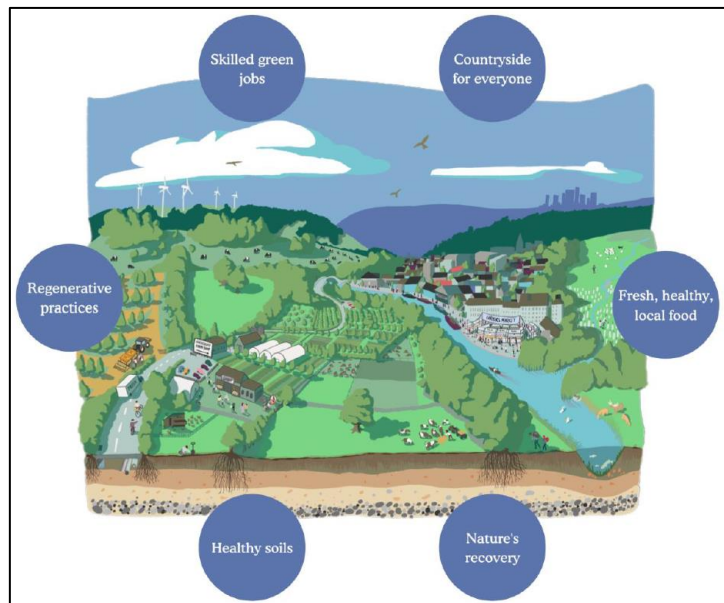
Figure 7: Benefits of agroecology acceleration.

Panel discussions

a. Agroforestry

Agroforestry systems present valuable opportunities for achieving increased productivity, stable economic returns, and a wide array of outputs and benefits in a sustainable manner. Certain tree species are essential in supporting and enhancing crop yields by contributing to soil improvement, enhancing soil structure and fertility, and mitigating soil erosion. As a result, the presence of trees within farming landscapes delivers numerous advantages for both livelihoods and the environment, including:

1. Increased genetic and crop diversity on farms

Agroforestry promotes cultivating various crops and tree species within the same landscape. This diversity can enhance genetic resources and crop diversity on farms, reducing the risk of crop failure due to pests, diseases, or adverse weather conditions.

2. Increased access to dietary diversity

The presence of diverse crops and tree products in agroforestry systems offers communities greater access to a wide range of foods. This dietary diversity can help combat undernutrition by providing essential nutrients and reducing dependency on a limited number of staple crops.

3. Safety net and resilience

Agroforestry contributes to the resilience of farming systems in the face of climate variability. Trees can provide food and income sources year-round as a safety net during crop failure or climate-related challenges.

4. Improved soil fertility and livestock productivity

Including trees in agroforestry systems enhances soil fertility through nutrient cycling and improved organic matter content. This, in turn, can lead to increased livestock productivity as animals benefit from improved forage quality.

5. Balanced productivity and natural resource management

Agroforestry balances achieving higher productivity and maintaining the sustainable management of natural resources. It promotes practices that enhance both agricultural output and environmental sustainability.

6. Supply of environmental services:

Agroforestry systems provide a stable or enhanced supply of various environmental services within agricultural landscapes. These services include improved water quality and retention, enhanced soil health, carbon sequestration, and biodiversity conservation. By doing so, agroforestry contributes to broader ecosystem benefits.

Overall, agroforestry demonstrates its potential to address multiple challenges in agriculture, nutrition, climate resilience, and environmental sustainability. Its holistic approach integrates

various elements of farming to create resilient and productive landscapes that benefit both farmers and the environment.

Knowledge gaps in agroforestry

Despite the potential benefits of agroforestry reported elsewhere, our panel discussion highlighted that there are some knowledge gaps that need to be addressed in the UK. These include:

- Lack of evidence/data on micro-climate benefits of agroforestry designs in rural landscapes in the UK.

- Lack of evidence on tree: crop interactions: whether positive or negative, i.e., which trees can be grown effectively with which crop to produce specific yield outcomes (for either or both) in given biophysical contexts (soil, topography, etc.)

- Lack of data on the actual adoption of agroforestry practices by farmers and their motivations for doing so, i.e., pilot studies exist, but no study has been conducted at a large scale.

- Lack of data/ evidence on the potential of agroforestry for carbon stocks in soil and trees and biodiversity and associated costs (pests) and benefits (pest control, soil fertility).

b. **Technology generation and dissemination**

To increase farming landscape diversity and production in the United Kingdom, the technology generation, dissemination, and adoption process must be strengthened. All the discussants agreed that efforts should be directed towards enhancing public research and extension systems' efficiency and effectiveness to meet farmers' needs and develop and transfer technologies essential for achieving food security and sustainable agricultural growth. These initiatives should encompass:

- Prioritising and intensifying applied research and extension programs tailored to farming landscape diversification.

- Enhancing the capacities of research and extension systems to address technology needs for sustainable agricultural productivity across all gender categories.

- Strengthening result-oriented, gender-sensitive research and extension activities and improving the relevance and responsiveness of services that cater to farmers' requirements.

- Farmers are improving the efficiency of input utilisation, including seeds, fertilisers, and chemicals.

- Disseminating technologies related to good agricultural practices to enhance agricultural productivity.

- Providing essential policy and regulatory support services to facilitate the successful implementation of these initiatives.

c. Climate change

Addressing climate change is a multifaceted challenge spanning environmental, social, and economic dimensions. It is a challenge that surpasses the capabilities of individuals or governments alone, necessitating a collaborative, multi-stakeholder approach that extends beyond borders to effectively tackle climate change and enhance food systems. The United Kingdom and countries worldwide recognise the urgency of concerted efforts. Within this context, the discussants acknowledged the importance of such a multi-stakeholder approach in orchestrating effective climate change adaptation and mitigation strategies to transform farming landscapes and improve the food system. However, projects that focus on these areas need to encompass a range of interventions designed to mitigate the adverse effects of climate change. These interventions include:

1. Improvement of early warning systems and weather insurance

Enhancing early warning systems and facilitating access to weather insurance mechanisms are pivotal in building resilience to climate change and farming landscape transformation. Timely information and financial protection can help communities and farmers prepare for and recover from extreme weather events.

2. Protection of catchment areas and fragile ecosystems

Preserving the integrity of catchment areas and fragile ecosystems such as peatlands and floodplain meadows is essential for maintaining the natural balance of water resources and safeguarding biodiversity. These areas serve as critical buffers against climate-induced challenges.

3. **Developing and implementing drought preparedness strategies**

Droughts are a recurring threat exacerbated by climate change. Developing and implementing comprehensive drought preparedness strategies to minimise the impact of water scarcity on agriculture and livelihoods is key. As a way of becoming drought-proof, farming practices such as agroforestry, intercropping, and mixed cropping can ensure that farmers have multiple crop yields in a year, permanent crop cover, and promotion of water infiltration and management of pests and diseases.

4. **Utilising neglected crop species**

Agricultural resilience hinges on adopting neglected crop species that exhibit resilience to drought conditions. Promoting and disseminating these crop species is integral to mitigating climate-related crop failures.

5. **Utilising recommended improved livestock breeds**

In parallel, improving livestock resilience is crucial for climate change adaptation. Encouraging improved livestock breeds that thrive in changing environmental conditions enhances food security.

d. Food regionalism

Agriculture is pivotal in ensuring access to diverse nutritious food, underpinning nutrition and income security for communities. In response, governments and development partners are increasingly directing their investments toward nutrition-sensitive agricultural programs and incorporating these considerations into national policies and strategies.

One intriguing approach gaining attention is the concept of regional food systems. This approach entails sourcing a significant portion of the food consumed within a region from local producers. However, the question arises: can regional food systems alleviate some of the challenges associated with the globalised food system?

In theory, people might be willing to embrace a more limited array of food choices if it translate into positive and constructive outcomes, such as improved nutrition, community well-being, and sustainable agricultural practices. Additionally, regional food systems can contribute to reduced reliance on food imports, promoting local consumption and thus diminishing the carbon footprint associated with the food supply chain.

However, it is important to acknowledge that while this concept holds promise in theory, its practical implementation is intricate and demands meticulous monitoring to assess its effectiveness. The transition to regional food systems involves numerous stakeholders, including farmers, producers, distributors, and consumers, who must be engaged and aligned with the vision of a more localized and sustainable food ecosystem.

Ultimately, the journey toward regional food systems signifies a profound shift in how we think about our food sources, with potential benefits for individual health, community prosperity, and the planet's well-being. It explores a future where the concept of "local" takes center stage in our food choices and contributes to a more resilient and sustainable food landscape.

Conclusions

The "Landscape Diversity for Food Security" workshop highlighted the intricate challenges of achieving a Net-Zero food system in the UK. It emphasized the need to reconnect food, culture, and the environment while addressing existing disconnections within farming landscapes. The workshop showcased innovative practices like agroforestry, which have the potential to enhance food security and climate resilience by diversifying crops and promoting dietary diversity, all while conserving biodiversity.

Furthermore, the workshop highlighted the critical role of local communities and farmers in shaping the future of farming landscapes. By embracing agroecology and adopting a comprehensive land use framework, we can create sustainable, regenerative farming systems that benefit both people and the environment. The workshop underscored the importance of collaborative efforts, including early warning systems and resilient farming practices, as climate change looms to address this multifaceted challenge.

Finally, exploring regional food systems in the workshop signifies a profound shift in how we think about our food sources. This shift, closely linked with farming landscape transformation, could contribute significantly to a more resilient and sustainable food ecosystem, where the concept of "local" take centre stage, linking food culture with landscape diversity for a more sustainable future.

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