

REGENERATIVE AGRICULTURE AND NATURE NETWORKS

WORKSHOP BRIEFING

1. INTRODUCTION

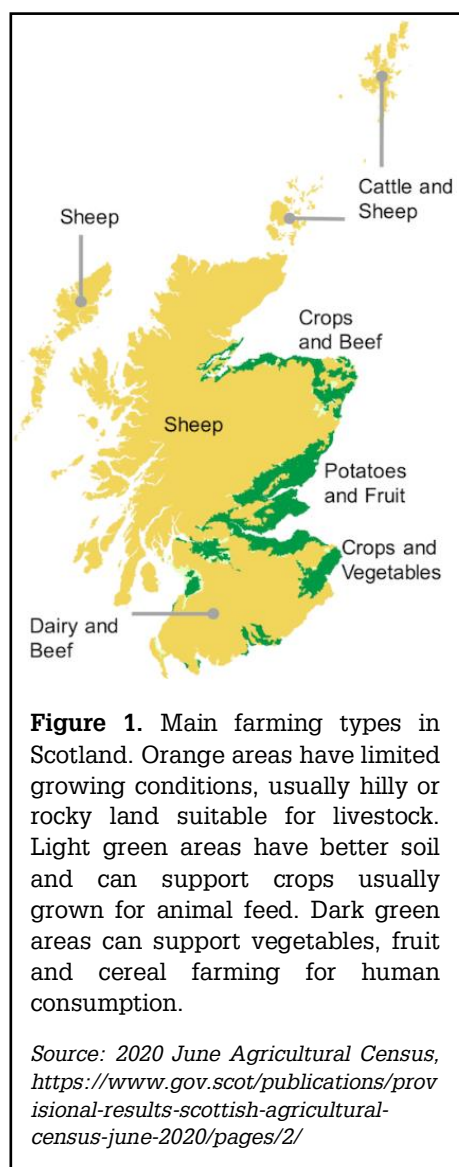
The British Ecological Society - Scottish Policy Group (BES-SPG) organised a closed online workshop with a diverse set of stakeholders (including farmers, crofters, academics, land managers, and key individuals from research institutes, unions, and membership associations) on *Regenerative Agriculture and Nature Networks* on the 16th of June 2022. The workshop operated on Chatham House Rules¹ and this briefing provides a summary of the discussion held during the workshop. At the end of the document there are some policy recommendations based on key themes and issues highlighted by participants. Please note this is not intended to be a literature review or an explanatory guide: **it is a reflection of the discussion of the participants who attended the workshop.**

Around 80% of Scotland's land area is used for agriculture (5.67 million hectares; Figure 1). How this land is managed has a direct effect on biodiversity and the ecological connectivity of habitats. Improving the sustainability of Scottish agricultural land management will be essential in the journey to net zero, as well as to a nature-positive future.

Figure 1 shows how land in Scotland is currently used, mostly using modern, intensive agricultural methods. It is the use of larger machinery, modern genetics and production-focused land management strategies that have shaped the characteristics of farm systems across the country, and determined how the land is used. In particular, hilly or rocky land are not suitable for intensive land use management with machinery, and therefore is mostly used for livestock. Transitioning towards a different strategy, which is less dependent on machinery and in some cases less focused on high yields may result in different land uses than the ones showed in Figure 1.

This will be beneficial for biodiversity because in the past 50 years the use of pesticides and fertilisers, continuous cropping, changed sowing seasons, loss of non-cropped habitat and major loss and fragmentation of farmland habitats have exerted significant pressure on biodiversity in Scotland².

The workshop's aim was to start to explore how regenerative agriculture could support Nature Networks³ which are "nature's highways where areas of good quality habitat are connected



¹ <https://politicaldictionary.com/words/chatham-house-rule/>

² <https://www.nature.scot/sites/default/files/2019-10/State-of-nature-Report-2019-Scotland-full-report.pdf>

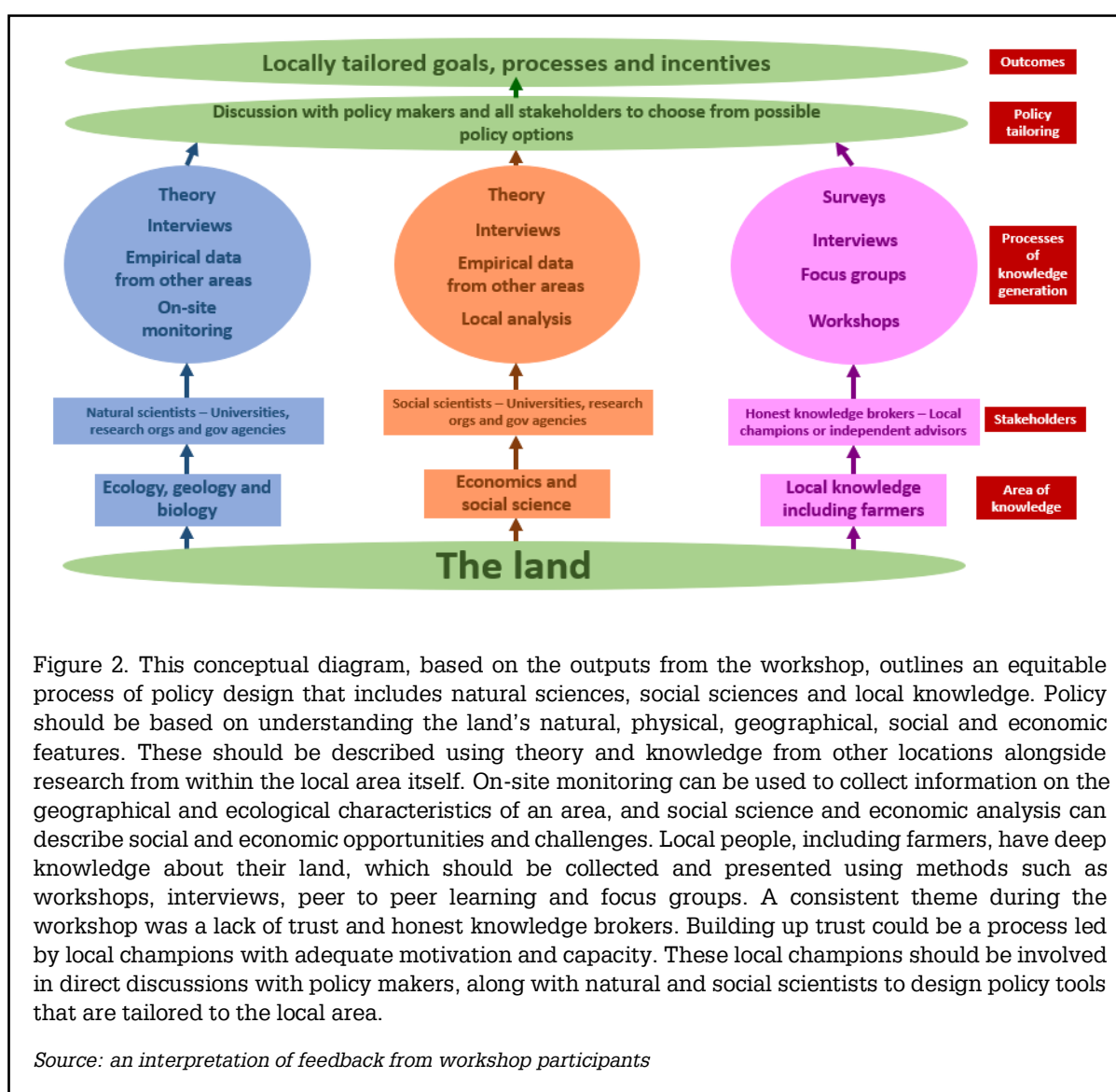
³ For an overview and definition, please see <https://www.scotlink.org/publication/nature-networks/>

either physically or ecologically so that wildlife is able to move easily across areas of landscape". Workshop participants explored the concept of regenerative agriculture and how it can contribute to reversing the decline in biodiversity, provide ecosystem services and support land managers to mitigate and adapt to climate change.

Workshop participants remarked that regenerative agriculture is about principles, rather than a set of practices, as practices can vary considerably depending on the context. This is because the outcomes that are possible depend on the unique context of the land; there is no "one size fits all" approach.

There is a need to be cautious with terminology and definitions because regenerative agriculture is defined based on the context in which it is being practiced and the outcomes that it creates for each situation. Academics and practitioners define regenerative agriculture in different ways, although there are some common elements to their definitions^{4,5,6}.

2. THE AIMS OF A REGENERATIVE SYSTEM



⁴ <https://www.frontiersin.org/articles/10.3389/fsufs.2020.577723/full>

⁵ <https://www.sciencedirect.com/science/article/pii/S2211912420300584>

⁶ <https://www.jswnonline.org/content/jswn/early/2020/07/31/jswn.2020.0620A.full.pdf>

Understanding the land. Workshop participants identified that understanding the land is at the heart of regenerative agriculture. Participants highlighted that understanding local agronomic, climate and socio-economic factors is key to optimising the delivery of food, ecosystem services and benefits to local communities: there is no “one size fits all” solution. Adopting regenerative agriculture starts with understanding the diverse social, economic and ecological contexts of land use. This is essential to achieving positive outcomes for climate, biodiversity and people. Such an understanding requires integrating ecological theory with the knowledge and experience of those working on the land. Having tailored, holistic, multifunctional goals, based on scientific evidence and the experience of land managers, will be key to build and support healthy, diverse ecosystems and crop diversity.

Ecosystem Services. Participants identified the key elements that support delivery of ecosystem services provided by regenerative agriculture as regeneration (soil health, biodiversity), connectivity and restoring habitat mosaics and quality. These elements introduce more complexity and diversity into the landscape, which result in the provision of ecosystem services like flood protection, controlling soil erosion, carbon sequestration, nutrient cycling, resilience against the impacts of climate change (e.g drought), alongside food production. These ecosystem services contribute to intergenerational equity in terms of food security, and human health and wellbeing.

The importance of people. Workshop participants recognised the importance of reconnecting people with nature and the food system, understanding cultural heritage, intergenerational food security, well-being, public health, and equity for farmers and crofters in this process. It is important to build trust between all stakeholders, considering that people will be integral to making regenerative agriculture work and securing desired outcomes for people and nature.

Profit. This remains an important aim of regenerative agriculture. The combined effect of understanding the land, ecosystem service provision, and people’s needs may, through supported transition, result in the profit, yield and productivity needed to sustain food production and the livelihood of local communities.

3. REGENERATIVE AGRICULTURE, ECOSYSTEM SERVICES AND CLIMATE CHANGE ADAPTATION

The [Nature-based Solutions \(NbS\) report](#), published by the British Ecological Society in 2021, defined NbS as solutions that “work with and enhance nature to mitigate or adapt to climate change while simultaneously providing benefits to biodiversity and people”⁷.

During the workshop, it was generally agreed that regenerative agriculture practices can be considered NbS. This is partly due to the multifunctionality of the land providing the different social and environmental benefits which are central to both NbS and regenerative agriculture. Seeing regenerative agriculture through the lens of NbS can be useful, as it highlights that the land can provide much more than just food.

It was noted in the workshop that a diversity of approaches and integration of habitats will be key to realising NbS through regenerative agriculture, and encouraging this diversity requires that local knowledge is fully considered and integrated within decision-making at all scales. Different stakeholders may have different objectives, which could result in potential conflicts. However to make regenerative agriculture work across a landscape, collaboration between multiple land managers and other stakeholders will be required. Alongside this will be the need for access to a space for sharing experiences and ideas.

⁷ <https://www.britishecologicalsociety.org/policy/nature-based-solutions/read-the-report/>

Workshop participants identified the below as NbS that have the potential to benefit agricultural productivity:⁸

- **Agroforestry**⁹, which is the integration of woody perennials (trees or shrubs) in agricultural systems. Agroforestry provides key benefits including carbon storage, reduced soil erosion and flood prevention. It can also benefit the wellbeing of livestock through providing shaded areas and shelter. Additionally riparian planting along streams and rivers helps to slow water flow and prevent floods. It also provides carbon sequestration and has health benefits, including mental health benefits for people using green and blue spaces.
- **Landscape features**¹⁰, such as wildflower margins and hedgerows, provide natural pest control and habitat for pollinators, water retention and wind protection. Wetlands provide benefits for biodiversity and water retention, and help regulate nutrient flows into surface water, resulting in less pollution as well as flood prevention.
- **“Mob grazing”**¹¹ reflects the natural way in which wild animals would graze. It is short duration, high density grazing with a longer than usual grass recovery period. This has been shown to have some benefits for soil health and livestock, but further research is needed.
- **Cover crops**¹² are grown between rows of main crops, or in the period between two main crops, to prevent soil erosion. Cover crops help reduce surface runoff by improving infiltration, and can also function as catch crops, which use the remaining nitrogen after the main crop is harvested; this reduces nutrient losses from leaching. Cover crops are temporary crops that can later be incorporated into the soil, mechanically or through grazing by animals providing additional nutrients.
- **Mixed cropping**¹³, for example growing barley and peas in the same field, has been shown to have positive effects on the crops’ nutrient uptake and can decrease pest abundance/prevalence and improve soil health.

4. BARRIERS TO THE UPTAKE OF REGENERATIVE AGRICULTURE

Workshop participants highlighted the importance of understanding that biodiversity protection and restoration, climate mitigation and social objectives are common objectives for many groups of stakeholders, including farmers and crofters, government, society, etc. Therefore, it is crucial not to frame the narrative as a conflict between the interests of different stakeholders. A better approach is to focus on shared goals.

Participants determined that the current barriers to uptake of regenerative agriculture are a lack of 1) incentives, including financial incentives and other forms of support such as training, 2) constructive and inclusive policy, 3) monitoring, 4) education, and 5) a safe space to share information. Importantly, seeing the benefits of regenerative agriculture takes time and this may only be possible through trial and error. As 80% of Scotland’s land is used for agriculture, overcoming the barriers to regenerative agriculture will be key to restoring biodiversity and addressing climate change.

Potentially lower yields/profitability. Participants noted that the main challenge of regenerative agriculture is the potential for lower yields or profitability during the transition from existing to regenerative agriculture practices. For example, when transitioning to agroforestry,

⁸ This is what the workshop participants identified as NbS. We note that some may feel they might not match up with technical definitions.

⁹ <https://wikis.ec.europa.eu/display/IMAP/Agroforestry>

¹⁰ <https://wikis.ec.europa.eu/display/IMAP/Landscape+features>

¹¹ <https://www.soilassociation.org/our-work-in-scotland/scotland-farming-programmes/mob-grazing/what-is-mob-grazing/>

¹² <https://wikis.ec.europa.eu/display/IMAP/Cover+and+catch+crops>

¹³ <https://wikis.ec.europa.eu/display/IMAP/Intercropping>

there is a need to protect the growing saplings, which has an impact on grazing practices. A current risk recognised by workshop participants is that government subsidies are currently being designed in terms of the *amount* of land, instead of what is being *done* with the land.

Fear of change. It was identified that exchanging information and positive experiences could help overcome the fear of change. Additionally, the language used in framing regenerative agriculture needs to be considered very carefully. For example, asking farmers “not to till” may raise opposition. It is better to use a more positive language, such as “appropriate tillage”.

Time. Seeing the benefits of a regenerative systems takes time. It can be hard to get soils to be more biologically active, and often this process needs to happen through trial and error. There may also be a period of loss of productivity and profitability early in the uptake of regenerative practices, so incentives providing support during the vulnerable transition phase are needed. This makes regenerative agriculture initially hard to fit within an existing subsidy systems and makes outcome-based rewards difficult during the transition.

The individual costs of restructuring. Traditional systems can constrain integration of different land uses because they have been designed for monocultures and single-use farm systems. Therefore, when transitioning towards regenerative agriculture, every farmer will need to assess the costs and benefits of this transition. For example, if animals are introduced in arable land, water points and stock proofing will be needed. A new supply chain will be needed for livestock products, and new knowledge will be required for handling livestock in addition to arable systems. Although it was noted that with regenerative agriculture there are fewer costs related to agrochemicals, a key question raised during the workshop was: How can profitability be ensured, and who will be financially responsible for the risks to yields during the transitional period?

Trust. There is a need to strengthen and increase the visibility of the provision of impartial information sharing, as participants highlighted there is a lack of “honest brokers” for information sharing. It was noted that farmers and crofters may not fully trust the government or other stakeholders in the food industry to provide impartial information.

Access to the market. The value chains of agricultural products are often long, with farmers and crofters often receiving the fewest economic benefits. Shorter (more local) value chains that empower farmers and crofters have been suggested by the participants as a solution to this problem.

Food security. Perceptions exist that regenerative agriculture results in reduced productivity. However, during the workshop it was noted that a significant amount of food is wasted in the UK and a large portion of the grain crops produced in Scotland are used for feeding cattle or making whisky. Changing diets and habits would result in a substantial decrease in food demand, and therefore in an increase of food security.

Peer pressure. Some regenerative farmers and crofters can appear to feel they are ‘morally superior’ to others. In reality, the differences in techniques used are on a gradient rather than being binary (i.e. regenerative vs. conventional). If neighbouring land managers are using more conventional methods, it can be hard for farmers and crofters to break the norm and undertake more regenerative practices. An additional challenge exists where more intensive agricultural practices are very profitable, e.g in North East Scotland, where seed potatoes are profitable but damaging to the soil. Changing norms is difficult and will take time to happen. Farmer networks are key to helping shift norms through facilitating knowledge sharing.

Monitoring. What are the best means to measure the potential benefits resulting from a transition towards regenerative agriculture practices and to establish a baseline from which to measure them? It was noted that policy tools to encourage collaboration at a landscape scale are challenging to establish. Using a common performance metric to allow comparison across the landscape could help. Audits will be prerequisites for claiming funding linked to the benefits provided by regenerative agriculture, such as biodiversity conservation or improvement, carbon

sequestration and soil health. For this reason, data availability needs to be ensured and methodological challenges need to be addressed.

5. INCENTIVISING REGENERATIVE AGRICULTURE

Influencing consumer thinking was suggested as a key aspect. A key question raised was: how do we encourage consumers to value regenerative agriculture products over products from conventional agriculture? In addition, the cost of living crisis also needs to be considered; it isn't realistic to ask consumers to pay for the cost of transitioning to regenerative agriculture at the current time. Therefore the market may not reward the work involved in producing quality products through regenerative agriculture. This will require to think about how to finance the transition towards regenerative agriculture.

Government policy. The workshop participants noted that policy should not be too prescriptive: outcomes-based reward schemes, e.g. NatureScot's 'Piloting an Outcomes Based Approach in Scotland' (POBAS) project¹⁴, allow flexibility to farmers and crofters regarding the practices they can adopt to achieve a desired outcome, and can potentially make the environmental benefits of regenerative agriculture more visible to them, as well as to the wider society. However, it was noted that during the transition towards regenerative agriculture practices, it may be difficult to put in place outcome-based rewards, because outcomes can take a long time to be delivered.

Financial support is vital to ensuring that some farmers and crofters can make a livelihood out of regenerative agriculture. This financial support needs to be tailored to the initial context in which the farmer is working during the transitional phase and then also tied to outcomes that the land produces (for example, positive outcomes for biodiversity and carbon storage). The support may vary based on individual needs, and perhaps offered in phases. For example, an incentive system based on practices could be designed for the transitional period and an outcome-based one could be put in place for when outcomes are being delivered. It is important to gain an understanding on what outputs can be assessed now and what can be measured in the future. There is a loss of productivity and profitability early in the uptake of regenerative agriculture, so incentives need to provide support to farmers and crofters, particularly during the transition phase.

Education and knowledge sharing will be key for all stakeholders, including policy-makers, farmers and crofters, and the public. Farmers and crofters will need to try different practices to "work with nature". One solution to this is to embed ecology within agricultural courses. Some will work, others not; it is a learning process. Peer-to-peer learning and knowledge sharing will be crucial in order to navigate the transition towards regenerative agriculture; discussions between farmers and crofters about their successes and failures can assist this, providing insight into practices that promote profitability. Impartial knowledge exchange will help to build trust between stakeholders in the system. It should also be considered that not all farmers and crofters are internet users, therefore other channels of discussion are needed.

Workshop participants suggested that buy-in to regenerative agriculture will grow as it becomes more established and that peer-to-peer influence in the community will be important for uptake. Nevertheless, there may be scepticism early on, which highlights the need for exemplary farmers and crofters who share knowledge and encouragement.

6. PRODUCTIVITY

Productivity can be increased through more efficient and less specialised farming. Overall, there may be some yield losses initially, but there is evidence that yields will stabilise. In general, growing more diverse crops leads to increased productivity, but there is still a limited evidence base on this issue. Some changes can save a considerable amount of money whilst increasing

¹⁴ <https://www.nature.scot/doc/piloting-outcomes-based-approach-scotland-pobas-project>

productivity , e.g. keeping livestock and poultry together which can result in better parasite risk management.

Reducing inputs and understanding the capacity of the land. For example, inputs can be reduced through choosing appropriate breeds of livestock to fit the environment and intercropping or using cover crops to bring diversity into the field and reduce reliance on inputs. Profitability should be increased through on the capacity of the farm, e.g. rotational grazing and clean grazing systems. These are well-known methods that would be easy to encourage farmers and crofters to use.

7. CHALLENGES

Food vs. feed: There is a trade-off between land used to grow food and land used to produce feed for livestock. A large amount of Scotland's grain becomes alcohol or animal feed. For this reason, shifts in grain use and consumption would facilitate increased food production and food security.

Location: In Scotland there are big questions about the future of the uplands, which are traditionally used for livestock rearing, as much of the land is hilly and rocky and doesn't provide good conditions for conventional methods used to grow crops. Changing these farming systems is a huge undertaking and there are distinct differences between the potential of regenerative agriculture in uplands, lowlands, and the intermediate land. It will take a lot of research, as well as incentives, to give farmers and crofters the confidence that it is desirable and possible to farm in these areas and thereby benefit biodiversity.

Pressure to maintain yields: Farming has become more intensive because of the pressure on farmers and crofters to keep producing and maintaining yields to meet demand and keep prices low in a very competitive market. The current structure of subsidies also encourages intensive farming.

There has been a loss of trust between farmers/crofters and big food companies/supermarkets that are making large profits. Farmers and crofters feel they receive only a small share of the profits generated along food supply chains.

Regulation and monitoring: There is a need for improved regulation of regenerative agriculture to ensure consistency and positive outcomes for people and nature. Regulation can be effective, e.g. nitrogen pollution of waterways will be important delivering the benefits of regenerative agriculture. Metrics are important to consider in order that change can be effectively measured from appropriate baselines. Appropriate and standardised metrics for biodiversity monitoring and ecosystem health that can be used by land managers/regulatory agencies would be useful. This could also help ensure data gathered from on farm experimentation is standardised and can be brought together for analyses.

8. SKILLS AND CAPACITY FOR WIDER UPTAKE

Knowledge and training: There is a need for a knowledge base and normalising of regenerative agriculture practices. A fundamental problem is trust. For example, some stakeholders who are in advisory roles may also be selling chemicals and machinery. This contributes to situation where there is a lack of high quality, independent advice. There is a need to rethink and strengthen current advisory systems. Currently, farmers and crofters may not be trained enough to effectively plan for a transition to regenerative agriculture practices. There is a need to support farmers through this process, because if they don't adopt the most effective practices for their land and receive reduced profits, they may revert back to conventional practices.

Honest brokers: There is currently an issue with polarisation of information provided by nature conservation groups, farming groups, etc. There is a need to strengthen provision for farmers and crofters to obtain impartial advice.

9. METHODS FOR KNOWLEDGE EXCHANGE

There is a need for a better connection between stakeholders, academics, advisors, farmers and crofters, consumers and the public. Some understanding of behavioural science is also required; different things motivate different people, and there is a need to recognise that there may be a risk in trying something new. There are people on the innovative edge who are open to trying new things. Others need to hear of successful case studies first, or to see their peers changing their practices before they are convinced it can work for them too. Often trust is more powerful than data, and what is taught and how this knowledge is shared needs to be tailored to its audience. Age and gender are also important factors to consider in communication¹⁵.

Suggested methods for knowledge exchange

- Farmer clusters and peer-to-peer support networks.
- In-person farm meetings with a diverse set of stakeholders to allow people to see what is happening on the ground and share information on the challenges faced (ensuring this happens at the right times of year).
- Raising public awareness about regenerative agriculture and farming.
- Short, easy and accessible material from an honest broker.
- Centres of expertise on areas such as plant health could help fill the knowledge gaps.

10. CONCLUSION

It is clear that the way agricultural land is managed can deliver a wide range of ecosystem services, providing multiple benefits for nature, people and farming itself. These outcomes will support nature networks.

Measuring the outcomes of regenerative agriculture can be challenging and expensive. More discussion is needed to establish the best way to design, implement and monitor output-based policy tools.

In this context, the key question is: what is the best way to ensure a context-based, tailored approach to regenerative agriculture?

11. RECOMMENDATIONS

Recommendations based on the workshop discussions:

- a) Trust building and knowledge sharing:** This needs to happen between a diverse set of stakeholders, perhaps through an impartial independent body. A series of co-designed workshops could be a useful starting point in understanding the wider contextual challenges of regenerative agriculture, allowing the sharing of knowledge and experience between farmers/crofters, policy makers, land managers and ecologists. The workshops need to be perceived as a safe space to share information. The workshop participants identified that there is a need to strengthen and diversify honest brokers to provide impartial advice and information.
- b) A better understanding of how regenerative practices could support nature networks and the 30 by 30 target.** The workshop participants identified the positive effects regenerative agriculture has for soil health and biodiversity, with some clear connections being made between farming practices and nature networks, e.g, through hedgerows and wildflower margins. We recommend further exploration of these connections, so that nature networks can be considered in farming practices and vice versa.

¹⁵ <https://ffcc.co.uk/conversations/agroecology-in-scotland> <https://sefari.scot/document/the-adoption-of-agroecological-principles-in-scottish-farming-and-their-contribution>

- c) **Tailored government support:** The transition to regenerative agriculture takes time and in the transition period farmers may experience risk and losses. For this reason, the government may need to take on some of the risk during the transition period. Clear incentives to support farmers and crofters adopting regenerative agriculture practices, and encouraging shorter supply chains would incentivise the transition towards regenerative agriculture.
- d) **A clear roadmap:** A roadmap that highlights key stages in the transition towards regenerative agriculture and what support exists for farmers and crofters is needed. It will be important that the roadmap manages expectations and includes common goals.
- e) **Co-designed policy and monitoring:** an approach to policy making that allows for co-design and mutual understanding between farmers and crofters and policy makers. It should incorporate both bottom-up and top-down thinking. It needs to reconcile the need for a tailored approach with the broad and consistent monitoring and evaluation needed to design and implement subsidies and grants.