



Food and the Environment

The Scottish Government has set out its ambition that Scotland becomes a Good Food Nation, a country where people from every walk of life take pride and pleasure in, and benefit from, the food they buy, serve, and eat day by day. To deliver this vision the government will launch a consultation on a Good Food Nation Bill during 2017. As part of this process, it has committed to drawing on the expertise of civic society to develop and implement its good food policy.

This discussion paper has been produced by the Soil Association Scotland and RSPB Scotland as part of our work with the Scottish Food Coalition. We believe the Good Food Nation Bill has the potential to deliver real change in the food system; one that delivers high levels of well-being, social justice and environmental stewardship now and for future generations. This discussion paper focuses on **food and the environment** and how it can contribute to the delivery of a just transition to a better food system. Following on from the Scottish Food Coalition's publication, [Plenty: Food Farming and Health in a New Scotland](#), this is one of a series of discussion papers which explores cross-cutting issues relating to food, forming part of the Scottish Food Coalition's contribution to a national Good Food Conversation.

Where are we now?

Food matters. The way we produce, process, distribute and consume our food has implications for our environment, health, economy and culture. Scotland's food model should be one that provides good food produced in sustainable ways. This discussion paper is about how we can produce food with few environmental impacts. Using the food journey from field to plate, it sets out steps we can take to making Scotland a '[Good Food Nation](#)' and a leader in [green farming](#).

Scotland has made progress in reducing its greenhouse gas (GHG) emissions. However, much more needs to be done if we are to meet our world-leading climate change target by 2020 and how we produce our food matters. Agriculture accounts for nearly a quarter of Scotland's total emissions (Scottish Government, 2016a), and our food system as a whole – from field to plate – accounts for around one third of all GHG emissions (Food Climate Research Network & WWF-UK, 2010).

Whilst there have been gains for our natural environment, largely as a result of EU legislation and investment in appropriate land management, the most recent assessments including the [State of Nature 2016: Scotland](#) (Hayhow *et al.*, 2016) report show that, overall, biodiversity and ecosystem services* have declined. The report states that Scotland's Biodiversity Intactness Index (BII) is at 81.3%. BII values below 90% indicate that ecosystems may have fallen below the point at which they can reliably meet society's needs. Increased use of chemical inputs including pesticides and fertilisers over the last 60 years, changes in land management practices, habitat loss and climate change are cited by our environmental agencies as the principal causes (Scottish Government, 2016b: 41-48).

- **44% of ecosystem services delivered by Scottish habitats are in decline**, with only 16.5% improving. Within enclosed farmland habitats, wild species diversity, water supply, soil quality and regulation of climate, hazards, pests and diseases have shown deterioration

*Ecosystem services: the processes by which the environment produces resources utilised by humans such as clean air, water, food and materials

over the last 20 years, and the abundance of wild and domestic pollinators has also declined (Scottish Government, 2016b).

- **Nine species of farmland birds which were once common in Scotland have declined seriously** in number e.g. kestrel (-77%), lapwing (-58%) and curlew (-49%) (Scottish Natural Heritage, 2015). Terrestrial birds are used as a key indicator for measuring overall health of biodiversity.
- **Around 40% of Scottish surface waterbodies are at risk of not meeting water quality targets** (Critchlow-Watton *et al.*, 2014). 22 catchments have been identified where rising levels of diffuse pollution from agricultural sources could pose a risk to drinking water quality in supplies serving over 614,000 customers (Scottish Water 2013).
- **Nearly a quarter of Scottish agriculture's total GHG emissions come from nitrous oxide** (Scottish Government, 2016a) which mainly arises from the application of synthetic nitrogen-based fertiliser to arable soils and leaching (Defra, 2015). Further emissions arise from food processing and manufacture, distribution and retail.
- **Scotland's soils are a precious resource** - just 8% of Scotland's land is classed as suitable for arable crop production (James Hutton Institute, n.d.). It takes very little time to blow or wash away, but hundreds of years to replace.
- **75% of Scotland is under agricultural management of which 44% is identified as High Nature Value (HNV)** (Scottish Government, 2016b). HNV farming and crofting face a range of pressures including low financial returns and pressure to intensify production or conversely, to abandon it.
- **There is a large and growing body of scientific evidence that some pesticides (including those approved for use) are harmful** to wildlife, ecosystems (Task Force on Systemic Pesticides, n.d.) and human health (International Agency for Research on Cancer, 2014).
- **Over-use of antibiotics** in farming contributes to antimicrobial resistance in humans and farm animals (Review on Antimicrobial Resistance, 2015).
- **Over one third of all food produced, sold and prepared for human consumption is never eaten** (UNRIC, n.d.). Inputs used to produce the food are wasted not to mention the GHG emissions created through processing, storage, transportation and landfill.

Scotland has an evolving range of policies to address many of the issues. The Scottish Government's Land Use Strategy is the national plan which sets out the framework for land-based businesses to work with nature and responsible stewardship of Scotland's natural resources for the benefit of Scottish society and prosperity. It underpins the ambitions set out in the discussion documents '[The Future of Scottish Agriculture](#)' for a greener, innovative and profitable agriculture industry, and '[Becoming a Good Food Nation](#)' for our food to be increasingly environmentally sustainable and healthy.

In addition, we have [Organic Ambitions](#) which sets out actions to grow organic food and farming, a biodiversity strategy which promotes HNV farming, a framework for protecting our soils and in development a strategy to protect pollinators, a new vision for our uplands and suite of proposals to reduce GHG emissions from farming. Crucially, shared and complementary

objectives across all these and other relevant policies need to be joined-up to ensure integration and synergy and achieve the desired outcomes for becoming a Good Food Nation.

What are others doing well?

Nature-friendly farming systems including agroecological and organic farming practices are low input, low-intensity production systems which have a scientific evidence-base for protecting and enhancing the natural environment. By using fewer or no chemical inputs these farming systems generally support more biodiversity and produce less pollution and GHG emissions. For example, wildlife is 50% more abundant on organic farms than non-organic farms (Bengtsson, Ahnstrom & Weibull, 2005), organic farms support a third more species and soils which are managed organically release less GHG emissions than chemically fertilised soils (Skinner *et al.*, 2014). The introduction of wildlife-friendly management on non-organic arable farms has also been shown to have agricultural benefits and increase yield (Pywell *et al.*, 2015).

Agroecological and organic farming are gaining momentum around the world. European countries such as Switzerland and Germany have put producing food to high agroecological standards at the centre of their agricultural policies, and in [France](#) it has been enacted into legislation (Government of the French Republic, 2014). Across Europe the area of land managed organically and demand for organic food has continued to grow year-on-year over the last two decades. However, Scotland still lags well behind most of Europe in terms of the percentage of land managed organically and market demand for organic food.

What do we want?

We want to see a transition to nature-friendly farming which produces enough good [food](#) to eat while mitigating climate change, enhancing biodiversity and reducing resource use. We want to see greener, healthier and fairer food chains which benefit the whole of society. We want Scotland to have a good food culture and diet, where everyone has access to heathy and sustainable food.

How do we get there?

[Nature-friendly farming](#)

We need agroecological and organic farming to become much more widespread in Scotland and for all farmers everywhere to consider how such farming methods can be incorporated into their farming operations. Currently, just over 8% of payments made to Scottish farmers and crofters through the CAP is specifically for environmentally and climate friendly farming (Scottish Government, 2015)[†]. A transition to a payment system which redirects more of the budget (which is public money) to support sustainable farming, coupled with stimulating public demand for sustainable and healthy food, will help increase the area of Scottish farmland under agroecological and organic management. A new system should also include support for habitat creation and management in the wider countryside at a landscape level and protecting important

[†]Calculation: AECS as a percentage of total annual Pillar 1 & Pillar 2 payments made for supporting agricultural & crofting activity. Total Pillar 1 (£438m) + Pillar 2 AECS (£46.8) LFASS (£65.5m) + AECS (£46.8m) + Crofting Assistance (£0.3m).

conservation sites including SSSIs and Natura 2000.

As well as organic and other agroecological farming systems, which are good for wildlife, Scotland also has a large area of HNV farming and crofting predominantly found in the Highlands and Islands. Constrained by the climate and soils, production methods in HNV areas are low input and follow traditional practices. As a result, HNV farming is associated with the maintenance of iconic landscapes, carbon storage in peaty soils, an abundance of wildlife and sustaining a rich cultural heritage. **We need solutions to secure a long-term viable and sustainable future for HNV farming and crofting communities and the land they manage.**

Good soil management is vital everywhere. Healthy soils, rich in organic matter, are essential for food production and biodiversity, store huge amounts of carbon and are more resilient to floods and droughts. [Seven Ways to Save our Soils](#) in Scotland sets out a range of actions that all farmers and policy makers should adopt for good soil management. **Scottish agriculture also needs to minimise its use of synthetic nitrogen-based fertilisers** which are a major contributor to GHG emissions and source of diffuse pollution. Agroecological and organic practices help reduce emissions by using nitrogen fixing legumes and green manures in place of manufactured fertilisers while good grassland management can reduce the need for fertilisers but maintain yield.

Animal welfare matters. Cattle and sheep livestock farming accounts for around 50% of Scotland's agricultural output. High welfare livestock systems including extensive grassland rearing and organic are less dependent on antibiotic use because animals spend more time outdoors, have more space, more of a natural diet and in the case of organic must have animal health plans which promote high standards for animal health and welfare. These plans focus on using animal husbandry skills to prevent disease and over-use of antibiotics, save money and achieve better environmental outcomes (Animal Health Planning System, n.d.).

More investment in research, development and innovation for organic, other agroecological and HNV farming systems is needed to further improve their economic performance, and to find environmentally sustainable solutions for issues such as pest control which affect all farmers. **Knowledge, skills and training programmes and an expert advisory service are also essential to mainstream best practice** for sustainable farming and high standards of environmental stewardship across the whole of Scottish farming. These recommendations are also made in a recent major study of agroecological systems commissioned by the UK's Nature Conservation agencies including SNH (Lampkin *et al.*, 2015). **Ultimately, we need to maintain and ensure effective implementation and enforcement of all existing domestic and EU legislation and regulations which protect and enhance our environment**, promote healthy and sustainable food and farming and ensure food safety.

[Greener, healthier and fairer food chains](#)

In the developed world, food's post farm-gate GHG emissions account for around 50% of its carbon footprint (Garnett, 2010). Shorter food chains should reduce emissions associated with transportation (12%) and refrigeration which accounts for around 15% of food's total carbon footprint across all stages of the food chain (Garnett, 2008).

Our current food system is dominated by big food companies which have a monopoly over choice and price. **We need more famers, crofters and growers - including new entrants - producing food (veg, fruit and livestock produce for human consumption) and selling direct, or through local SMEs, to communities for example using farmers' markets, cooperatives and local shops** - reconnecting our towns and cities with sustainable local food production.

This needs to be supported by investment in supply chain infrastructure; collaborative actions which encourage SMEs to cooperate to improve collection and distribution channels; improving energy and resource efficiency; using cleaner and renewable energy e.g. purchased green energy; and business development activities which help SMEs to effectively engage with retailers and caterers.

[Sustainable Food Cities](#) (SFC) is an exemplar of a UK place-based model which encourages public, private and third sector organisations and local communities to work together to improve their food systems and tackle environmental, social and economic issues. 45 cities and areas across the UK including [Glasgow](#) and [Edinburgh](#) have achieved SFC status and set-up cross-sector partnerships. **More urban and rural areas across Scotland should be supported to adopt the Sustainable Food Cities model.**

National and local government should show leadership in the way they procure 'public food' for schools, hospitals, care homes, work-place canteens etc. Public procurement of local and sustainable food offers one of the most effective mechanisms for driving transformation in food production and supply – helping to create shorter, greener and fairer supply chains and supporting local jobs, businesses and communities by engaging them in the procurement process. This has worked well through the [Food for Life Catering Mark](#) award scheme and in neighbouring countries like Denmark and France.

In Copenhagen a close partnership between the city council and a non-commercial foundation, [Copenhagen House of Food](#), developed an innovative approach for increasing organic food in public canteens. Instead of replacing conventional ingredients with organic ingredients, Copenhagen House of Food placed an emphasis on creating balanced diet plans using less meat, more vegetables, purchasing in-season and reducing waste by 50%. The result: healthier, organic, climate-friendly meals, and pride among the 1,700 kitchen staff. [France](#) has passed a law requiring all of the nation's public institutions to source at least 40% of their food locally from certified sustainable sources by 2020 (Assemblée National, 2015).

Good food culture and diet

To transform the way Scotland farms, we need to transform Scotland's food culture and diet, and create greener and fairer food systems which provide everyone with the right to eat sustainable food that is climate-friendly, healthy, nutritious and produced as locally as possible to high ethical, environmental and animal welfare standards.

Food education - including curricular, vocational, community-based and public-facing campaigns - is also vital to engendering good food behaviours and food choices for the environment and public health. Many European countries are using organic farming to drive sustainable, productive and profitable agriculture, whilst creating public demand for organic food

13% making up total food sales in the city and 90% of food served in the city's public institutions is organic. Sweden reported an extraordinary leap of 40% in total organic sales in 2014, and [Denmark](#) has the highest organic market share in the world at 7.6%.

Training and continuous professional development should be supported throughout the supply chain: farmers sharing best practice for sustainable production techniques in a changing climate; small food businesses learning vital skills to make their venture a success; caterers acquiring the know-how to make their menus more healthy and sustainable while staying within budget; and kitchen staff learning new food preparation skills.

Changing our behaviour around food will also be vital to reducing food's GHG emissions. **Scottish households throw away 600,000 tonnes of food every year – nearly a third of all household waste.** Eliminating this food waste would save the equivalent of at least 17 million tonnes of carbon dioxide, the same benefit as taking 1 in every 4 cars off our roads (Love Food Hate Waste, n.d.). Some recent studies also identify reducing consumption of energy intensive foods – including processed food, red meat and dairy products – as priority actions to reduce food's environmental impact. **Giving everyone the skills, knowledge, confidence and access to eat healthy and sustainable food will be an essential ingredient for becoming a 'Good Food Nation'.**

How do we measure progress?

The Scottish Government uses a set of [indicators](#) to measure progress towards meeting its Land Use Strategy objectives. We need to ensure this data gathering continues and positive progress is made in three key areas:

- Improvement in the condition of [ecosystems services](#): soil fertility, [water quality](#), pollination etc.
- Reduction in [GHG emissions](#) and diffuse pollution from Scottish agriculture.
- Increase in [HNV farmland](#) and [farmland biodiversity](#), and improvement in the condition of [protected sites](#).

However, more work needs to be done to develop meaningful and measurable indicators for the post-farmgate sustainability of food.

About the Scottish Food Coalition

We are a civil society coalition working on food in Scotland. We are made up of established organisations working on the environment, poverty, health, workers' rights, food production and animal welfare. We have come together in recognition that the problems in our current food system are interconnected and cannot be changed by focusing on a single issue.

We are calling for a just transition to a better food system.

This coalition wants to see a vibrant and thriving food sector and food culture that puts people and the natural environment at its heart. We believe a successful food system is one that delivers high levels of well-being, social justice and environmental stewardship now and for future generations, in Scotland and abroad.

REFERENCES

- Animal Health Planning System (n.d.) *The Animal Health Planning System*. Website. Available from: <https://www.sahps.co.uk/> [Accessed: 11/11/2016].
- Assemblée Nationale (2015). 'Proposition de loi visant à favoriser l'ancrage territorial de l'alimentation' Legal proposal. Online. Available from: <http://www.assemblee-nationale.fr/14/propositions/pion3280.asp>. [Accessed: 11/11/2016].
- Bengtsson, J., Ahnstrom, J. and Weibull A-C. (2005) The effects of organic agriculture on biodiversity and abundance: a meta-analysis. *Journal of Applied Ecology*, 42(2), 261-269 <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2664.2005.01005.x/pdf>
- Critchlow-Watton, N., Dobbie, K.E., Bell, R., Campbell, S.D.G., Hinze, D., Motion, A., Robertson, K., Russell, M., Simpson, J., Thomson, D. and Towers, W. (eds) (2014) *Scotland's State of the Environment Report, 2014*. Scotland's Environment Web. <http://www.environment.scotland.gov.uk/> DEFRA (2015) Observatory monitoring framework - indicator data sheet. Environmental impact: Climate change. Indicator DD2: Nitrous oxide emissions https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/408685/agindicator-dd2-03mar15.pdf
- Food Climate Research Network & WWF-UK (2010) *How Low Can We Go?* Online report. Available from: <http://www.fcrn.org.uk/fcrn/publications/how-low-can-we-go>
- Garnett, T. (2008). *Cooking up a storm: food, greenhouse gas emissions and our changing climate*. Food Climate Research Network Centre for Environmental Strategy, University of Surrey. Online report. Available from: http://www.fcrn.org.uk/sites/default/files/CuaS_web.pdf
- Garnett, T. (2010) Where are the best opportunities for reducing greenhouse gas emissions in the food system (including the food chain)? *Food Policy*. 36(11). S23-S32. Online. Available from: <http://www.futureoffood.ox.ac.uk/sites/futureoffood.ox.ac.uk/files/Reducing%20food%20system%20GHGS.pdf>
- Government of the French Republic (2014) 'Law on the future of agriculture: major advances for farmers and citizens'. Government of the French Republic website. Online. Available from: <http://www.gouvernement.fr/en/law-on-the-future-of-agriculture-major-advances-for-farmers-and-citizens>. [Accessed: 22/11/2016].
- Hayhow DB, Burns F, Eaton MA, Bacon L, Bingham C, Brookman E, Burgess S, Daniels M, Darvill B, De Massimi, S, Densham J, Douglas DJT, Duncan C, Elliott S, Ewing SR, Keegan M, Kirkland P, Long D, Luxmore RA, Macadam CR, Malone K, Minting P, Stevenson K, Prescott T, Varnham KJ, Youngman A and Gregory RD (2016) *State of Nature 2016: Scotland*. The State of Nature partnership. Available from: http://www.rspb.org.uk/Images/StateOfNature2016_Scotland_1%20Sept%20pages_tcm9-424988.pdf
- International Agency for Research on Cancer (2015) *Monographs Volume 112 Evaluation of five organophosphate insecticides and herbicides*. World Health Organisation <http://www.iarc.fr/en/media-centre/iarcnews/pdf/MonographVolume112.pdf>
- James Hutton Institute (n.d.) *Land Capability for Agriculture in Scotland*. Online. Available from: http://www.hutton.ac.uk/sites/default/files/files/soils/lca_leaflet_hutton.pdf [Accessed: 11/11/2016].
- Lampkin, N.H., Pearce, B.D., Leake, A.R., Creissen, H., Gerrard, C.L., Girling, R., Lloyd, S., Padel, S., Smith, J., Smith, L.G., Vieweger, A., Wolfe, M.S. (2015). *The role of agroecology in sustainable intensification: report for the Land Use Policy Group*. Organic Research Centre, Elm Farm and Game & Wildlife Conservation Trust. Online. Available from: <http://www.snh.gov.uk/docs/A1652615.pdf>
- Love Food Hate Waste (n.d.). 'Help save the environment simply by wasting less food'. Love Food Hate Waste campaign. Online. Available from: <http://scotland.lovefoodhatewaste.com/content/help-save-environment-simply-wasting-less-food> [Accessed: 11/11/2016].
- Pywell RF, Heard MS, Woodcock BA, Hinsley S, Ridding L, Nowakowski M, Bullock JM. (2015) Wildlife friendly farming increases crop yield: evidence for ecological intensification. *Proceedings of the Royal Society B*. 282(1816). Available from: <http://rspb.royalsocietypublishing.org/content/royprsb/282/1816/20151740.full.pdf> [Accessed: 22/11/2016].
- Review on Antimicrobial Resistance (2015) *Antimicrobials in agriculture and the environment: reducing unnecessary use and waste*. Report from the Review on Antimicrobial Resistance chaired by Jim O'Neill. Online. Available from: <https://amr-review.org/sites/default/files/Antimicrobials%20in%20agriculture%20and%20the%20environment%20-%20Reducing%20unnecessary%20use%20and%20waste.pdf>
- Scottish Government (2015) *Scotland's Spending Plans & Draft Budget 2016/17*. Scottish Government publication. Online. Available from: <http://www.gov.scot/Resource/0049/00491140.pdf> [Accessed: 11/11/2016]
- Scottish Government (2016a) *Scottish Greenhouse Gas Emissions 2014* <http://www.gov.scot/Resource/0050/00503570.pdf>
- Scottish Government (2016b) *Scottish Rural Development Plan 2014-2020* <http://www.gov.scot/Resource/0050/00501661.pdf>
- Scottish Natural Heritage (2015) *Index of Abundance for Scottish Terrestrial Breeding Birds 1994 to 2014* <http://www.snh.gov.uk/docs/A1817370.pdf>
- Scottish Water (2013) 'Appendix 5: Improving drinking water quality', *Scottish Water Draft Business Plan 2015 – 2021*. Online. Available from: <http://www.scottishwater.co.uk/assets/about%20us/files/strategic%20projections/appendix5improvingdrinkingwaterquality.pdf> [Accessed: 11/11/2016].
- Skinner, C., Gattinger, A., Muller, A., Mader, P., Fließback, A., Stolze, M., Ruzer, R., Niggli, U. (2014) Greenhouse gas fluxes from agricultural soils under organic and non-organic management - a global meta-analysis. *Science of the Total Environment*. 468-9. P. 553-563. Available from: <http://www.sciencedirect.com/science/article/pii/S0048969713010255>.
- Task Force on Systemic Pesticides (n.d.). Main Findings. Online. Available from: <http://www.tfsp.info/findings/> [Accessed: 11/11/2016].
- [UNRIC] United Nations Regional Information Centre for Western Europe (n.d.) 'One third of all food wasted' Online article. Available from: <http://www.unric.org/en/food-waste/27133-one-third-of-all-food-wasted> [Accessed: 11/11/2016].