

RESEARCH PROJECTS

Impact of Climate Change on the UK Food System

Saher Hasnain¹¹ Food Systems Transformation Group, Environmental Change Institute, University of Oxford

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FSA Research and Evidence

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Prepared by: Dr Saher Hasnain, University of Oxford

Email: saher.hasnain@ouce.ox.ac.uk

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1. Executive Summary

Climate change is having wide-ranging impacts that are already being felt in the food system. The aim of this report is to assess the most likely changes to the UK food system over the next five years resulting from climate change, with a focus on the FSA's remit. A rapid literature review, expert interviews, and analyses of relevant UK policy and programme documents were conducted to understand the complex driver landscape and potential and current impacts on the UK's food system. The areas of the UK food system considered for this assessment were food producing, processing

and manufacturing, distributing, storing, retailing, consuming, and disposing. Policies and environmental drivers relevant to these activity areas were also included in the analysis.

The impacts of climate change are demonstrable in the food system, with food production seeing the biggest consequences domestically and in international markets. Impacts related to extreme temperature events, flooding, drought, and soil erosion in particular are of great concern. Supporting infrastructure that distribution, storage, processing, retailing, and the consumers at large depend on is also impacted by extreme weather events, and there are likely to be food and product price increases because of supply chain variability. While uncertainties remain for the food sector and waste management at large in relation to consumption trend changes linked to climate change, all activities in the food system are subject to short-term shocks because of climate change related weather events.

The UK climate change policy landscape has become increasingly complex with multiple interconnecting programmes in adaptation, net zero, food, and environmental land management schemes. Taken together, all policies are aspirational and aim to positively drive transformational change for food system actors, but the near-term transition costs and experiences for stakeholders particularly in food production, processing, and consumption may be negative.

These changes could have major implications for the FSA given its broad strategy of food is safe, food is what it says it is and food is healthier and more sustainable.

2. Introduction

This report outlines the most likely changes to the UK food system resulting from climate change over the next five years, with a focus on the impacts on the three pillars of the FSA strategy. This assessment also covers the potential impacts of the UK's planned mitigation activities on a range of sectors.

A rapid literature review and an expert elicitation were carried out to examine the current state of knowledge in this area (see Annex 1 for methods). This includes an analysis of near-term climate change and mitigation activities as presented in the National Adaptation Plan, UK Food Strategy, and the Environmental Land Management (ELM) schemes.

The aims of the report are to:

1. Understand the impacts of climate change across the food system activities in the UK.

2. Understand the impacts of planned mitigation activities across food system activities in the UK.
3. Assess the implications of these impacts on FSA strategic areas.

This assessment considers food producing, processing and manufacturing, distributing, storing, retailing, consuming, and disposing as key food system activities, with a consideration of policy and research and development. These areas are considered in relation to ensuring that food is safe, is what it says it is, and is healthier and more sustainable.

This project uses the Foresight4Food food systems framework (Figure 1). This framing has been selected because it considers the food chain at the heart of the system and all the activities within it, as well as a set of supporting services and institutions that are essential for the functioning of the food system but may not always be explicitly included in most food system framings. The systems map also explicitly emphasises the embedding of the food system within the human and environmental systems more broadly, the feedback loops present between environmental, socio-economic, and food and nutrition outcomes, and the drivers of the overall system. Food system drivers in this framework are described as all influential factors that “durably alter” the activities in the food chain (Fanzo & Davis, 2021, p. 85). These influences can be internal (within the food system) or external (embedded in linked systems such as energy or water).

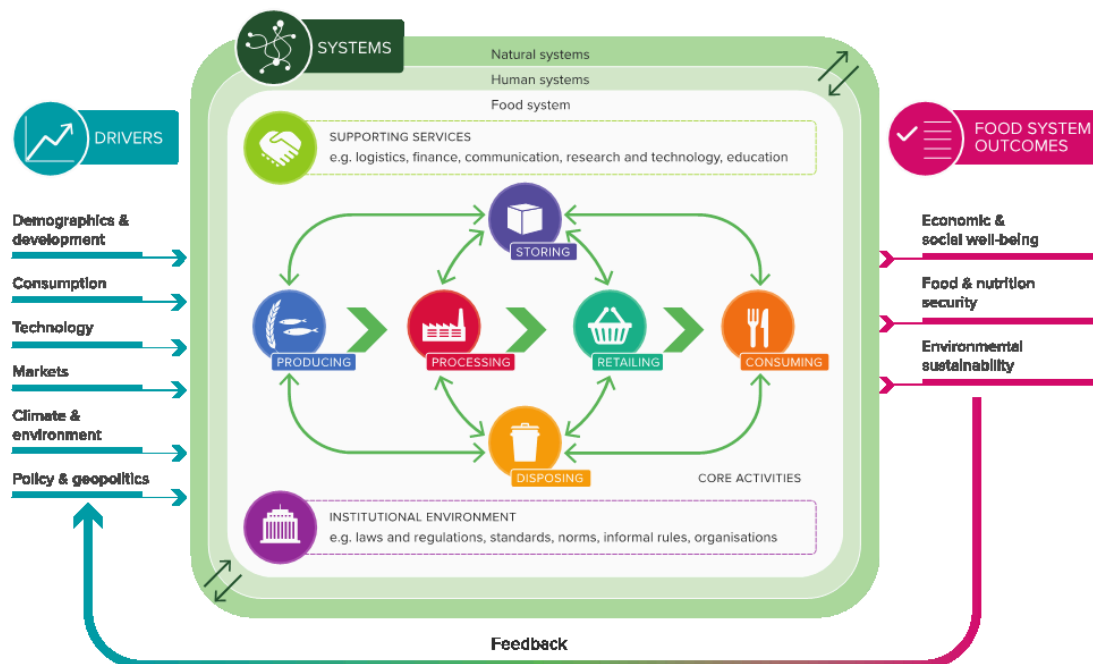


Figure 1. Foresight4Food food systems framework (Foresight4Food, 2019)

For the purposes of this assessment, the analysis in this report keeps the activities within the food chain as the focus, but also includes supporting services and the embedded systems. Only outcomes relevant to the FSA strategy and remit were included in the analysis presented in this report.

Recognizing that climate change is a global phenomenon and that the food system's activities span multiple regions, this report is focused on activities and outcomes affecting the UK population even if the primary activity is taking place outside the country. Given that the UK purchases food from other regions that may be impacted by climate change, this will have a direct impact on the UK population and the FSA as a regulating body.

The report acknowledges the comprehensive data analysis and collection by other institutions and authors, particularly the IPCC and does not seek to replicate the effort. The report's findings function as a framing and guiding document that refers to existing literature and emphasises areas of interest for the FSA.

Further, the report acknowledges the two-way relationship between food systems and climate change, but does not include the impacts of food system activities on the climate.

The report is organized as follows: the impacts of climate change on the food system is followed by the impacts of selected policy drivers in the environmental space on the food system. The report finishes with key conclusions.

3. Methods

The first phase of the project consisted of a scoping and framing exercise through discussions and interviews with the FSA, the Food Systems Group in the University of Oxford's Environmental Change Institute (ECI), School of Business and Society at the University of York, and with projects in the Transforming the UK Food System. The aim of these discussions was to establish the boundaries of the task, particularly given the wealth of literature and data already existing in the food system and climate change space.

The second phase of the project consisted of a broad-based literature review of the field using Google Scholar, Web of Science, SCOPUS, and ScienceDirect. The focus of the review was to uncover relevant issues linked to the multiple areas of the food system of interest, with evidence of the near-term temporal scale. Given that this was not a systematic literature search, it is possible that some areas may have been missed, but the iterative process of expert engagement and the saturation of information points raised in the literature search have significantly reduced this possibility. This phase of the project also included a deep analysis of the activities and recommendations made in the National

Adaptation Plan, Net Zero strategy, the UK Food Strategy, and the ELM schemes, as the experts had determined these policy areas to have the most significant impacts in the near term for the UK's food system.

The third phase of the project was to delineate and populate the matrix of impacts and food system activities. This was an iterative and interlinked process with the literature review and expert elicitation given the fragmented data available on near term climate impacts and linkage of impacts with areas of the food system not related to food production and food safety.

4. Climate and policy impacts on the UK food system

4.1. Climate change and food system

The food system is heavily dependent on changes within the natural environment that includes ecosystems and biodiversity. Climate change impacts the entire food system through changes in temperature, precipitation, sea-levels, and extreme weather events. These climate-mediated changes then impact food system outcomes such as food security, environmental sustainability, and livelihoods and equity for stakeholders (Fanzo & Davis, 2021). For the purposes of this report, environmental drivers will focus on the impacts emerging from climate change. Changes in ecosystems and biodiversity are acknowledged but will be included only if influenced primarily by climate-mediated changes.

Climate driven changes in weather are considered to have significant impacts on the UK's food system (HM Government, 2022). The impacts on primary production are well-established in the literature (Berry & Brown, 2021; Mbow et al., 2019; Watts et al., 2020). However, the risks extend to other parts of the food system which are essential in delivering food. These risks require further analysis, but concerns have been raised over issues such as the impact of the variability of food supply on the standards and reliability of supply chains, impacts of heat and cold stress on workforces, variability of moisture and temperature on storage, impact of extreme weather on trade and physical infrastructure, and changes in consumer demand in response to seasonal and food price changes (Bezner Kerr et al., 2022; Falloon et al., 2022).

Research is needed to understand the systemic impact of extreme weather and climate change impacts on multiple food system activities. To increase resilience of the UK's food system, changes would need to be made across multiple areas of the system with the participation of a diverse range of

stakeholders. However, realising the benefits of these activities will require a deeper understanding of the current functioning of the system and the impact of multiple stresses and shocks on several scales and levels.

[Table 1](#) below presents climate drivers and food system activities. The drivers are discussed in further detail in terms of associated hazards, risks, and secondary drivers.

4.1.1. Impacts of temperature change on food system activities

This driver category includes an increase in annual mean temperature. This temperature increase leads to warmer seasons and fewer winter frosts (WSP, 2020). This is then associated with biodiversity loss in multiple ecosystems. The impacts of these changes can be noted particularly in:

- **Food producing:** Changes in yield, crop types, cost, labour, and time for food producers through increases in fertilizer and pesticide applications, driven by:
 - an increase in livestock temperature stress potentially leading to disease and death,
 - an increase in plant and weed growth,
 - changes in seasonal timings for plants (e.g. flowering times),
 - changes in range of crop grown,
 - changes and degradation in habitat for multiple species,
 - frost damage from more frequent and severe seasonal frosts, and
 - pest infestation from changes in habitats (WSP, 2020).
- **Food processing:**
 - cost and time impact from changes in consumption driven by seasons (e.g. increase in ice-cream and barbeque food), and
 - changing energy requirements for heating and cooling buildings to ensure safety and performance of production processes (Zhang et al., 2021).
- **Transport, distribution, and storage:** Cost and time to ensure staying within operational and safety requirements and preventing the growth of toxins (EFSA, 2020; Fanzo & Davis, 2021)

Table 1. Indicative impact of environmental drivers on food system activities in the next five years (see sections below for detailed category breakdown, discussion, and sources). Red indicates an overall negative impact, orange indicated a likely negative impact in the transition to positive future outcomes,^a and grey indicates that no judgement can be made at this time given current evidence.

Climate Drivers	Food system activities						
	Producing	Processing	Transporting	Storing	Retailing	Consuming	Disposing
Temperature change (+ and -)	Red	Orange	Orange	Orange	Orange	Grey	Red
Precipitation change (+ and -)	Red	Orange	Orange	Orange	Orange	Orange	Orange
Extreme events	Red	Grey	Red	Orange	Orange	Orange	Red
Sea-level rise and surges	Red	Grey	Red	Grey	Grey	Orange	Red

^a As this report is focused on the near-term (the next five years), it is anticipated that the negative impacts will be over this time period, but followed by positive impacts.

and ensuring appropriate animal welfare standards during transportation of livestock (Davie et al., 2021; Macdiarmid & Whybrow, 2019; Mbow et al., 2019; Wreford & Topp, 2020).

- **Retailing:** Cost and time to ensure food safety during temperature extremes. Chilling and refrigeration equipment have a narrow temperature range for function and can fail during heatwaves (Zhang et al., 2021).
- **Consuming:**
 - Changing food preferences driven by seasons and temperature changes (see above) (Met Office, 2021),
 - Increased risk of foodborne illnesses if proper food storage and refrigeration is not carried out (FSA, 2020), and
 - Volatility in price and availability through upstream supply changes (Fanzo & Davis, 2021).
- **Disposing:** Disposal processes may experience extra loads if there are increases in food products being wasted at the production stage (e.g. from crop damage), and from other stages if storage conditions do not meet food safety standards (EFSA, 2020).
- **Food system actors:** Heat stress impacts on working conditions and well-being of the workforce to be experienced for activities such as processing, retailing, and packaging (Watts et al., 2020).
- **Supply Chain:** Damage to supporting infrastructure (e.g. railways experiencing speed reductions, reduced labour due to temperature extremes, and curtailed processes to stay within operational needs) increases supply chain volatility and impacts food system actors through reduced and uncertain availability of items and increased costs (Hanlon et al., 2021; Siderius et al., 2021).

4.1.2. Impacts of precipitation change on food system activities

This driver category covers an increase in winter rainfall, which is connected with higher river flows and ground saturation, and a reduction in summer rainfall, which is connected to a reduction in aquifer levels and droughts (WSP, 2020). Precipitation change is one of the most significant impacts of climate change on the food system. This can impact the food system in the following ways:

- **Food producing:**

- Crops are sensitive to changes in precipitation and moisture. Too much rain can lead to flooding and crop damage, while too little rain can lead to drought and crop failure. In general, crops are more sensitive to drought than to flooding but floods can damage crops by washing them away or burying them in sediment.
 - Farmland and access to farmland can be lost through flooding-related inundation, soil erosion, and through drought (Berry & Brown, 2021; Mbow et al., 2019).
 - Livestock production is also sensitive to changes in precipitation. Drought can reduce the availability of forage and water for livestock, while flooding can contaminate water supplies and spread disease.
 - Drought can reduce the availability of water for irrigation, making it difficult to grow crops in some areas.
- **Transport, distribution, and storing:** Flooding can damage roads and bridges and warehouses making it difficult to transport and store food safely (Dasaklis & Pappis, 2013).
 - **Retailing:** Variability in supply for retailers if producers experience reduced crop yields or have crop failures and if just-in-time supply chains are affected in the short term because of flood-disrupted roads and bridges.
 - **Consuming:** Flooding can contaminate water supplies and spread disease, which can increase the risk of foodborne illness for consumers. Longer term precipitation and temperature changes are linked to changes in crop growing regions, so consumers may have access to different types of foods. When crop yields are reduced, food prices tend to increase because of reduced availability in the face of demand.
 - **Disposing:** Food disposal such as composting and landfills require a balance of moisture that can be disrupted through changes in precipitation.
 - **Food system actors and the supply chain:** Actors across the chain may need to adapt their activities and respond to cost increases if the types of crops grown in an area need to be changed in response to changes in precipitation patterns.

4.1.3. Impacts of extreme weather events on food system activities

This driver category includes extreme summer temperatures, frost days, hail and ice, heavy snow and cold, floods, and an increase in storm frequency and intensity (WSP, 2020). Extreme weather events can have a significant impact on food system activities. These events can damage crops, livestock, and infrastructure, and can make it difficult to distribute food. As a result, extreme weather events can lead to food shortages, price increases, and food insecurity.

- **Food producing:**
 - Damage to farmland and livestock through inundation, eventual salinisation (from rising sea-levels that effects salinity of surface and ground water through intrusion of salt water, and high evapotranspiration from soils because of high temperatures that increases the level of salt in the soil), and flushing of nutrients, and crop damage and wastage (Berry & Brown, 2021; Mbow et al., 2019).
 - Extreme events related to temperature and precipitation are discussed earlier in this report
- **Food processing and retailing:** Activities connecting suppliers can be impacted by damaged infrastructure (see transport, distribution, and storage below), and processing sites themselves can be damaged by extreme weather events that may not have been experienced before in the region.
- **Transport, distribution, and storing:** Extreme weather events can damage infrastructure, such as ports, roads, bridges, the power grid, and storage facilities which would make it difficult to transport and distribute food.
- **Consuming:** Extreme weather events can lead to increased food prices. This is because the reduced supply of food may not match demand, driving up prices. This impacts consumers even if the extreme events take place in other countries and regions (Lake et al., 2009).
- **Disposing:** Sites may experience increased load from crop and food damage at other parts in the chain, and composting and landfilling sites may be impacted by flooding.

- **Food system actors and the supply chain:** Supply chain volatility will impact activities and livelihoods across the system and result in cost increases and sourcing uncertainties. Supply chain volatility and delays will particularly affect internationally connected actors in climate-sensitive areas.

4.1.4. Impacts of sea-level rises and storm surges on food system activities

This driver category includes sea-level rises and storm surges. These are connected to coastal flooding, coastal erosion, tidal regime changes, saltwater intrusions, embankment failures, and high river water flows (WSP, 2020). Sea level rises can inundate coastal farmland, making it unusable for agriculture. This can lead to food shortages and higher food prices. Sea level rises can damage infrastructure, such as roads, bridges, and storage facilities, impacting distribution and food accessibility by consumers. Impacts on other food system activities will be felt through changes in foods produced in particular areas and supply chain volatility due to damaged infrastructure. Impacts of storm surges will be similar to other extreme events (see above) but for locations in coastal areas.

4.2. The Policy Landscape and the Food System

This section focuses on the impact of different UK government policy drivers on UK food system activities. The National Adaptation Programme, Net Zero Strategy, National Food Strategy, and ELM schemes were chosen because of their potential near-term impacts on the UK food system.

[Table 2](#) below presents policy drivers and food system activities. The drivers are discussed in further detail in terms of the specified policies.

4.2.1. National Adaptation Plan

This section is based on the recommendations from the second National Adaptation Programme (NAP) report, which builds on the first report. The focus is on the set of actions to be undertaken between 2018-2022 as part of the five-yearly cycle of requirements established in the Climate Change Act 2008. This section focuses on those proposed actions that will have a direct and indirect impact on food system activities within the next five years.

The key actions proposed in the NAP address the following:

- Flooding and coastal change risks to communities, businesses, and infrastructure

Table 2. Indicative impact of policy drivers on food system activities in the next five years (see sections below for detailed category breakdown, discussion, and sources) Red indicates an overall negative impact, orange indicated a likely future negative impact in the transition to positive future outcomes,^a green an overall positive impact, and grey indicates that no judgement can be made at this time given current evidence.

Policy Drivers	Food system activities						
	Producing	Processing	Transporting	Storing	Retailing	Consuming	Disposing
National Adaptation Plan	Green	Grey	Green	Grey	Grey	Orange	Grey
Net Zero Strategy	Orange	Grey	Green	Grey	Grey	Orange	Green
National Food Strategy	Orange	Orange	Grey	Grey	Orange	Green	Grey
ELM Schemes	Orange	Grey	Grey	Grey	Grey	Grey	Grey

^a As this report is focused on the near-term (the next five years), it is anticipated that the negative impacts will be over this time period, but followed by positive impacts.

- Risks to health, well-being, and productivity from high temperatures
- Risks to public water supply shortage affecting agriculture, industry, and energy generation
- Risks to natural capital, domestic and international food production and trade, and new and emerging pests and diseases and invasive species.

Food production activities will be positively impacted by adaptation activities targeting soil and ecosystem health, protection from flood and erosion-related harm, more resilient supply chain infrastructure (particularly in terms of water supply), and biodiversity protection on land and sea. Actions on pests, diseases, and invasive species will also benefit food producers by addressing current risks and protecting them from emerging ones. A more robust supply chain that is less vulnerable to short-term shocks will benefit the food distribution, processing, and retailing industries. Actions proposed around resilience of communities and infrastructure to flood risks have the potential to protect transportation and distribution activities from disruptions.

While it is anticipated that there will be benefits for consumption in the short term, further investigation will be needed, particularly given the overlapping actions with the National Food Strategy. There is potential for improved functioning and resilience for food processing, storing, retailing, and disposing given the wide-ranging infrastructure and service-related actions in the NAP, but comprehensive sector-specific insights will be required to gauge impacts in the short-term.

4.2.2. Net Zero Strategy

Achieving the UK government's net zero goal is going to require significant changes to the food system particularly in terms of land-use, namely the expansion of forestry and energy crops (HM Government, 2021). This will entail a reduction in land availability for food production. These changes to food production will require a big shift by food producers, all while staying within the guidelines presented by the ELM schemes and proposed actions in the NAP.

In the short term, actions to do with changing the energy production mix and energy use in different sectors will have an impact on food processing, distributing, and storing, in particular where these activities have high-energy usage (e.g. temperature control). In the medium term, positive impacts for the food system will come through indirect measures like skill-development and employment opportunities. Technological innovation in

low carbon technology in particular may drive economic gains within particular sectors. However, further research is needed on the systemic impacts of these technologies and their development.

Consumers will be impacted by activities around energy bill discounts, efficiency upgrades, and co-benefits related to more diverse food products being available through the changes in the food production system. Actions and investments in the transport sector could benefit vulnerable populations by improving accessibility to food and essential social services.

4.2.3. National Food Strategy

This section acknowledges the completed actions from Part One of the National Food Strategy and the stated actions from Part Two.

Four of the seven recommendations from the food strategy have been actioned thus far:

1. Extension of the Holiday Activities and Food Program (HAF) for England over 2021. These provided hot food, cooking lessons, advice for families for sourcing and preparing low cost and nutritional foods, and recreational activities for children. These programs were free for those receiving free school meals (FSM) and available for a small fee for those not on FSM in most local authorities.
2. Increased value of the Healthy Start Vouchers from 3.10 to 4.25 GBP per week. Parents and carers of babies under 12 months receive two Healthy Start vouchers per week for fruits, vegetables, milk, and vitamins. Several national supermarkets have also supplemented the value of the vouchers (e.g. Sainsbury's topping up the vouchers by an extra 2 GBP).
3. Continuation of data collection, assessment, and monitoring for people suffering from food insecurity. The Cost of Living Roundtable (established by the Department for Work and Pensions) discusses food vulnerability across the government and the Food Security Assessment and Family Resource Survey (DWP) have been updated to cover household food insecurity.
4. Adoption of recommendation for commissioning an independent report on any proposed trade agreements for assessing impacts on food safety and public health, economic productivity, climate change and environment, society and labour, human rights, and animal welfare. This assessment should be presented with the government's response when treaties are brought before Parliament.

While the implemented changes have not been in place long enough for a rigorous impact analysis, the assessment here includes insights from broader literature on similar transformation pathways and expert judgement. For the recommendations made in Part Two, the analysis considers impacts in a scenario where the proposed changes are applied as stated because of their focus on immediate action for longer-term change.

The recommendations from Part Two focused on agricultural payments for supporting the transition to a sustainable food system and creating a longer-term shift in food culture are focused on in this analysis. Other recommendations on sugar and salt reformulations and extending the eligibility for free school meals have not been included in the scope of this report:

1. Making the best use of land by guaranteeing a budget for agricultural payments until at least 2029 to help in the transition for more sustainable land use, creating a Rural Land Use Framework based on the three-compartment model of land use, and defining minimum standards for trade and a mechanism for protecting them.
2. Creating a long-term shift in food culture by investing a billion pounds in innovation for creating a better food system, creating a national food system data programme, strengthening government procurement rules for ensuring that taxes are spent on healthy and sustainable food, and setting clear targets and bringing legislation for long-term change.

These recommendations in particular drive longer-term changes in the UK food system and support the transitions in the ELM schemes in the near-term.

In combination with the ELM and other schemes, farmers face transition through multiple avenues. Guaranteeing payments for farmers and earmarking a proportion of these for ecologically restorative activities could provide a measure of stability. Ensuring that land and environmental management schemes do not disadvantage farmers with different ownership models will be essential to ensure that policy changes benefit vulnerable producers and livelihoods are decent and sustainable. It is anticipated that there will be a period of uncertainty and instability potentially marked with financial loss for vulnerable producers. The food producers will have to respond to multiple drivers, not only from policy, but also changing messages from processors and consumers as food consumption trends shift towards healthier and more plant-focused diets.

Separately from these recommendations, the food strategy emphasises the importance of trade deals for the food system transition, particularly if the UK markets are opened up to cheaper food imported from places with lower standards. A trade policy that supports environmental ambitions while ensuring that environmental harms are not exported to other regions is essential, particularly given the focus on UK farmers to change their activities in terms of emission reduction and biodiversity conservation. Local transitions to a sustainable food system would be undercut if cheaper, lower welfare, and potentially unhealthy food is imported.

Procurement, catering, and wholesaling will need to respond to the changes in these areas which might lead to difficult decisions around managing increasing costs of certain items and potentially passing them to stakeholders on either end of their supply chain. Businesses dependent on trade will need agility and high responsiveness to adapt activities to new trade deals, restrictions on standards, and potentially new certifications. Investigation will be required to gauge the impact on supply chains with nodes in other countries of reformulated products and a shift towards healthier diets.

4.2.4. Environmental Land Management (ELM) Schemes

The Environmental Land Management (ELM) schemes are part of the UK's efforts to phase out land ownership and tenure subsidies and improve the government's services to farmers. This section focuses primarily on the schemes that pay for environmental and climate goods and services:

1. Sustainable Farming Incentive (SFI) will pay farmers to adopt and maintain sustainable farming practices focused on the protection and enhancement of the environment while supporting farm productivity and animal welfare. This includes the Animal Health and Welfare pathway for improving animal health and welfare supported by vets, the wider industry, and the supply chain for UK farmers.
2. Countryside Stewardship (CS) is a more targeted effort for particular locations, features, and habitats.
3. Landscape Recovery is focused on larger scale, longer-term and bespoke projects that enhance the natural environment.

The 40,000 agreements in these three schemes cover about 34% of agricultural land. The plan is to increase these to 70,000 schemes covering 70% of farmed land and 70% of all farms by 2028 (Defra, 2023).

Food producers and landowners are the most impacted stakeholders given the SFI's focus on food production and environmental management of land (Defra, 2023). The payment plans have considered the evolution of the CS scheme and are designed to avoid disadvantaging stakeholders currently on multiple schemes. As the schemes evolve, SFI and CS will be offered in a single and integrated service where food producers can select actions that work best for their situations.

The schemes as stated are designed to provide support to farmers through payments, and support for on-farm productivity, innovation, and development. It is anticipated that responding to the changes will require adaptation, time, and cost from farmers and other food producers. These adaptations will be supported by actors like Defra, the National Farmers Union (NFU), and regional farm clusters.

While the resilience and environmental benefits of ELM schemes will have longer-term impacts on the UK's ecosystems and biodiversity, the current state of knowledge does not provide indications of direct impacts on the other food system activities. If the activities of the ELM schemes are combined with the National Food Strategy, the Net Zero Strategy, and other climate pledges, a shift in product formulation and diets may be expected in the near-term.

5. Discussion

The FSA's main statutory objective is to protect public health from risks which may arise in connection with the consumption of food (including risks caused by the way in which it is produced or supplied) and otherwise to protect the interests of consumers in relation to food. The FSA's vision is to have a food system in which the food is safe, is what it says it is, and is healthier and more sustainable.

This assessment has focused on understanding the most likely changes to the UK food system over the next five years resulting from climate change with a focus on the FSA's remit. The analysis has resulted in the following key conclusions:

- In the near-term future (i.e. next five years), environmentally driven changes in the food system will result in:
 - Increased volatility for supply chains.
 - Increased costs for the consumer.
 - Increased food safety risks across the supply chains.
- In the near-term future (i.e. next five years), developments in the UK's policy landscape will result in:

- Improved support and incentives for food producers to adapt their activities.
- Improved resilience of the food system's infrastructure to short-term shocks.
- Increased costs, labour, and time inputs for FBOs to adapt their activities.
- Regulatory challenges from complementary and overlapping areas of remit.

The scientific literature on the impacts of environmental and climate change is rapidly increasing. While the concentration of effort has historically been on activities of the food system related to food production, attention is increasingly shifting to the other activities between producing and consuming. While further research is needed, the evidence and experience of countries around the world demonstrates that urgent action is needed to enhance the resilience of food systems to short-term shocks and longer-term stresses in order to enable food security, environmental sustainability, and decent and equitable livelihoods for all.



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