

# Green Food Project Conclusions

July 2012



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<http://www.defra.gov.uk/food-farm/food/environment/>

Supporting reports of the wheat, dairy, bread, curry and geographic areas subgroups, along with a summary of responses to the Green Food Project online forum can be found at:

<http://www.defra.gov.uk/food-farm/food/environment/>

Any enquiries regarding this document/publication should be sent to us at:

[greenfoodproject@defra.gsi.gov.uk](mailto:greenfoodproject@defra.gsi.gov.uk)

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## Welcome,

In the Natural Environment White Paper, published in June 2011, there was a commitment to *'bring together Government, industry and environmental partners to reconcile how we will achieve our goals of improving the environment and increasing food production'*. The Green Food Project is the realisation of this commitment.

It is a timely initiative; we know we need to get to grips with the rising global demand for food, alongside the increasing pressures on the natural environment. We know these pressures will only intensify going forward, and through this project we looked at how England can show leadership in addressing them.

What the Green Food Project has done for the first time, is to bring together a group of interested organisations to jointly scope out the challenges, then have a fully open debate about the food system. We have done this with the aim of reaching consensus, wherever possible, about where there is a clear way forward and where we need to do much more work. Building on a number of existing, valuable initiatives, we have focussed in this report on areas where we need to, and think we can, most make a difference.

Our conclusions address a range of topics, primarily: research and technology, knowledge exchange, our future workforce, investment, building effective structures, valuing ecosystem services, land management, consumption and waste.

We know that our conclusions are not comprehensive, and many of the challenges we need to get to grips with cannot be fixed easily in the short term. But the project is part of an evolving process of discussion that will shape policy and decision making. It is a foundation on which we will build as we work jointly together going forward.

## **The Green Food Project Steering Group**

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<b>Jim Paice MP (Chair) -</b>	Minister of State for Agriculture and Food
<b>Tony Cooke -</b>	British Hospitality Association, Business Services Association
<b>Harry Cotterell -</b>	Country Land and Business Association
<b>Mark Driscoll -</b>	WWF
<b>Caroline Drummond -</b>	Linking Environment and Farming
<b>Charles Godfray -</b>	University of Oxford
<b>John Godfrey -</b>	Agriculture and Horticulture Development Board
<b>Martin Harper -</b>	Royal Society for the Protection of Birds
<b>Sarah Hendry -</b>	Department for Environment Food and Rural Affairs
<b>Peter Kendall -</b>	National Farmers Union
<b>Andrew Kuyk -</b>	Food and Drink Federation
<b>Robin Mortimer -</b>	Department for Environment Food and Rural Affairs
<b>Andrew Opie -</b>	British Retail Consortium
<b>Sarah Palmer -</b>	National Federation of Young Farmers Clubs

The steering group are grateful for support from the synthesis group, which consisted of:

<b>Charles Godfray (Chair) -</b>	University of Oxford
<b>Tim Benton -</b>	Global Food Security Programme
<b>Phil Bicknell -</b>	National Farmers Union
<b>Richard Brand-Hardy -</b>	Department for Environment Food and Rural Affairs
<b>Peter Costigan -</b>	Department for Environment Food and Rural Affairs
<b>Lee Davies -</b>	Department for Environment Food and Rural Affairs
<b>Chris Durham -</b>	Department for Environment Food and Rural Affairs
<b>Tara Garnett -</b>	Food Climate Research Network, University of Surrey
<b>Peter Jackson -</b>	University of Sheffield
<b>Rachel Muckle -</b>	Department for Environment Food and Rural Affairs
<b>Will Peach -</b>	Royal Society for the Protection of Birds
<b>Stuart Platt -</b>	Department for Environment Food and Rural Affairs

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# 1. Introduction

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- 1.1. It has been well known for some time that as global populations rise and diets and consumption levels change, there is a substantial challenge to the world food system. Globally, we are going to need to produce more food. However, there is also increasing awareness of environmental pressures and limits and the need to protect and enhance our valuable natural resources, particularly where they have been degraded.
- 1.2. There is a widespread and ongoing debate about how to address these challenges and a number of key reports have come forward setting out the issues that need to be addressed. The need to produce more food, more sustainably, has become part of a larger debate about the idea of moving towards a greener economy. There are also wider discussions about patterns of consumption and demand across the world, given that approximately one billion people in the world suffer from hunger, a similar number from other forms of undernourishment, and approximately a further billion are overweight. Now is the time to turn the debate into the actions needed that will help us move forward.
- 1.3. The UK, although small geographically, has demonstrated international leadership in relation to food security. Our farming and food sectors produce high quality products with leading standards of sustainability and animal welfare. The food sector plays a significant role in our economy: providing approximately one in every seven jobs in the UK<sup>1</sup>. As a nation we have also championed the need to tackle environmental challenges, for example by putting in place the forward looking Climate Change Act<sup>2</sup> to tackle domestic greenhouse gas emissions and address adaption to unavoidable climate change. However, we know we have also brought about environmental damage and that we cannot be complacent about the challenges ahead and we recognise, therefore, that more needs to be done.
- 1.4. For this reason, in June 2011 the Government, within its new Natural Environment White Paper 'The Natural Choice'<sup>3</sup>, committed to take forward a practical initiative to scope out and address the key issues faced by the natural environment within the English food system. Government recognised that the scale of the challenge meant that no one group or sector could tackle it alone, which is why Defra committed to working jointly with the food, farming, retail and hospitality industries, and environmental and consumer sectors.
- 1.5. This was a new way of working; to shape a project together from the outset and work fully in partnership to discuss how to take the issues forward. But the potential reward of doing so was to reach consensus on issues that had not been resolved to date, or to identify any disagreements and how they might be overcome. The project would create a platform for a more strategic approach to food policy across all sectors going forward, that we could all sign up to.

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<sup>1</sup> Food Matters, Cabinet Office report, 2008

<sup>2</sup> Climate Change Act, Department of Energy and Climate Change, 2008

<sup>3</sup> The Natural Choice: Securing the value of nature, HMG, 2011

- 1.6. The challenges facing the food system are wide in scope, encompassing issues such as production, the environment and natural resources, consumption, hunger, animal welfare, public health and retail competition among many others. The relationships between these issues are complex, and tackling the challenges throughout the whole food chain requires leadership from Government, business and civil society.
- 1.7. A steering group made up of representatives from a wide range of sectors was formed to carry out this new 'Green Food Project'. While recognising that the context was the food system as a whole, the group focused primarily on determining how to **“reconcile how we will achieve our goals of improving the environment and increasing food production”** in England. The project steering group agreed to be as bold and ambitious as possible in determining what steps needed to be taken to achieve those goals, identifying what obstacles are standing in our way, and who should address them and how.
- 1.8. This report sets out the early conclusions from this project. We recognise that we have not addressed the full range of issues that will be relevant, and that there will be gaps in our analysis. The project is not a recipe for solving all problems, but it is an initial focus for dialogue and action. It is only a first step, and there is a great deal more work to do. We view this report as a milestone in what will be a continual process of discussion and decision making going forward.

## 2. The Challenge

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- 2.1 The Foresight Report on the Future of Food and Farming<sup>4</sup> set out very clearly the challenge of managing a food system at a time of an “*unprecedented confluence of pressures*”. A growing, and in some cases increasingly affluent global population, alongside the increasing demand for limited resources such as water, energy, land and the pressing need to address key environmental challenges such as climate change, water availability, soil degradation and biodiversity loss, means that food security is seriously and increasingly threatened. This is a significant enough challenge in itself, but even more so starting from a point where there is already environmental damage, and pressures that will only intensify going forward.
- 2.2 There is no simple relationship between our ability to produce more food and to meet the needs of the rising world population and changing diets. In theory, the world currently produces enough food for everyone, however there are many social, economic, political and environmental factors that cause problems with access to and distribution of food and thereby lead to continued hunger. A recent report from the Food and Agriculture Organisation (FAO)<sup>5</sup> estimated that if current patterns of food consumption persist, 60% more food will need to be produced globally by 2050 (compared with 2005-07). Producing more food through a ‘business as usual’ approach is not an option. We will need to do so in a way that does not degrade the environment and, as a result, compromise the world’s capacity to produce food in the future. Tackling waste and consumption distribution are also critical in addressing the overall challenge.
- 2.3 Domestically a more competitive, profitable and resilient farming and food industry is needed. As the UK economy recovers, this sector, like all others, needs to maximise its potential for sustainable growth, maintain and increase its chance of securing European and global trading opportunities, and meet society’s needs. We also need a basic level of resilience against changing environmental conditions, price fluctuations, financial uncertainty and food availability.
- 2.4 The food chain does have a major impact on climate change, biodiversity, soil, water and the wider environment and will itself be affected by climate change. The National Ecosystem Assessment showed that in the past, increases in the productivity of farmed land have resulted in declines in other ecosystem services and the Climate Change Risk Assessment<sup>6</sup> has shown us how climate change could further undermine these. Biodiversity decline on farmland is well-documented; for example specialist farmland butterfly species declined by 39% between 1990 and 2009<sup>7</sup> and arable plants are the UK’s most threatened group of flora<sup>8</sup>. Agriculture and rural land management are the second most common reason for water bodies failing the standards set out by the Water Framework Directive<sup>9</sup>.

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<sup>4</sup> The Future of Food And Farming, Government Office for Science, 2011

<sup>5</sup> How to Feed the World in 2050, FAO, 2009

<sup>6</sup> <http://www.defra.gov.uk/environment/climate/government/risk-assessment/>

<sup>7</sup> <http://www.defra.gov.uk/statistics/files/defra-stats-observatory-indicators-de6.pdf>

<sup>8</sup> Plantlife: [http://www.plantlife.org.uk/wild\\_plants/key\\_habitats/farmland/](http://www.plantlife.org.uk/wild_plants/key_habitats/farmland/)

<sup>9</sup> <http://www.defra.gov.uk/environment/quality/water/legislation/water-framework-directive/>



- 2.5 We need to ensure a flourishing natural environment and the current Government has committed that this will be the first generation to leave the natural environment in a better state than it inherited. The aim is that natural assets should be both protected and enhanced, and a network of ecological resources resilient to climatic, demographic and other pressures should be created<sup>10</sup>. A healthy, properly functioning environment and the maintenance of essential ecosystem functions are also a foundation for sustaining food production.
- 2.6 Although the relative impact that food production in England will have on this global picture is small, the Green Food Project steering group recognised nevertheless that what we do, and the decisions that policy makers and other organisations make in England, have global implications. The project steering group agreed that as a country we have a moral obligation to do what we can both domestically and through our influence on other countries to help address the critical long term food security issue, as well as the more pressing issue of hunger in some parts of the world. There are many ways in which we can do this. The project steering group agreed that in England we should capitalise on comparative advantages we have as a result of our historic farming legacy and climatic conditions and our ability to produce and manufacture many food products competitively, but also to share our experience and knowledge with others, from whom we can also learn.
- 2.7 England also has moral and legal obligations to protect biodiversity and the wider environment. This includes protecting our own resources such as our water, soil and air, to secure a sustainable quality of life for future generations. However we must also play a role in tackling global environmental challenges such as climate change or halting global biodiversity loss. Furthermore, England supports populations of internationally threatened species, so our conservation efforts will have global significance.
- 2.8 The challenge for the Green Food Project was to look at the potential to increase our own food production, whilst also improving the environment and ensuring that we are operating within environmental limits now and in the future, thereby ensuring we could play a positive role in the need for global food security. The project steering group set out to determine how and where we could do this, and particularly given that there is unlikely to be more land available than we have now, to determine if there were ways to sustainably increase the output of food from the land that is already in production.
- 2.9 The various pressures on the food system mean that we need to plan for the strong possibility of rising prices in agricultural products over the next few decades. As the behaviour of food producers is largely driven by the market, we need to ensure that our producers are well placed to respond to those market signals. We also need to be prepared for the effect that changing food commodity prices will have on the affordability of food for the consumer.
- 2.10 Ensuring the right behaviour towards the environment and the full range of 'ecosystem services' is, however, much more complex. The value of those services is not yet fully understood, and our systems of monitoring the location and quality of services and the natural resources from which these flow also need improvement. It

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<sup>10</sup> Natural Environment White Paper, 2011, Executive Summary

is therefore difficult to move towards a position where the true value is reflected in markets and food prices, in a way that influences behaviour throughout the supply chain and the results in improvements to those ecosystem services. There is a role for policy makers to ensure that this happens, in the UK and internationally.

## 3. Project Approach

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- 3.1 The project steering group brought together a small 'synthesis' group of interested scientists, social scientists, statisticians and policy makers to help create a clear framework for the project, and to ensure that work was taken forward on the basis of clear and consistent evidence.
- 3.2 Given the overwhelming influence of food commodity prices on the profitability and general behaviour of producers and the market, the synthesis group first considered the possibility of various scenarios of price stability or volatility. They considered the period from now until 2050 to ensure that generational change was taken into account, rather than only the implications of the existing European and domestic legislative and policy framework.
- 3.3 The synthesis group then framed the discussions of the project around the following issues:
- actions which might have the greatest potential to increase productivity<sup>11</sup>, either incrementally or through a step change, and which of these might also have the most potential for a positive or negative effect on the environment (such as the protection of natural resources and biodiversity, or levels of pollution or greenhouse gas emissions);
  - actions that might have the greatest potential for an improvement in the state of the environment, either incrementally or through a step change, and which of these might have the most potential to support an increase or decrease in productivity;
  - post production actions which could lead to higher value or less environmentally damaging food reaching the consumer and whether changes in consumer behaviour would be a required driver for change;
  - where key trade-offs would occur between increasing productivity and improving the environment, what potential there would be to mitigate these trade-offs, through for example using new technology, and how acceptable different resolutions of the trade-offs might be;
  - implications of taking action for existing initiatives and policies, and the kinds of policy interventions and decisions that would accelerate progress;
  - the potentially radical developments that could affect the situation in coming decades and the likely key pressures or opportunities that might arise.

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<sup>11</sup> The efficiency at which inputs are converted into outputs. Productivity can increase through an increase in outputs, decrease in inputs, or both.

- 3.4 The project steering group decided to do an initial examination of how we might reconcile the objectives of improving the environment and increasing food production by examining five ‘test cases’. These test cases would focus on different aspects of the food supply chain from raw agricultural products through to processed food products and dishes, and with a focus on different scales of land use from around England. We realised that while this would initially only provide answers to questions for a small set of examples, it would highlight issues with possibly wider relevance. Five ‘subgroups’, consisting of a number of individuals from across a range of sectors, considered the following test cases:

**Wheat crops:** was chosen because of the importance of wheat as a major domestic crop, the considerable potential for commercial yield increases despite the plateau in yields in recent years, and the scope for considering applying new technology. The subgroup considered a number of key challenges, including the implications of changing weather patterns, increasing water shortages, diffuse water pollution, losses of land due to coastal erosion and land use change, and also issues associated with effective nutrient management, realising genetic potential, the economics of rotation, incentivising increased yields and the diversion from food to energy crops.

**The Dairy Sector:** was chosen because of the wealth of information already available as a result of processes such as the development of the Dairy Roadmap<sup>12</sup>, and the opportunity to explore issues such as intensive versus extensive systems. The subgroup considered how the industry could advance through for example the wholesale adoption of new technology, improved breeds and feed conversion efficiency, greater exploitation of export potential, and better joining up within the dairy supply chain and with other sectors. They also considered how the environmental footprint of the industry could be reduced including looking at issues such as biodiversity, nutrient management, import of soy and greenhouse gas emissions.

**Bread:** was chosen because it is a household staple food product, which is widely consumed and its principal ingredient of wheat is largely grown and traded in the UK. The subgroup considered the varying environmental, social and economic impacts throughout the bread and wheat supply chains, the production and environmental benefits that could be achieved from energy efficiency post farm gate, transport and packaging impacts and influences on consumer behaviour. They also considered the implications of innovation, research and knowledge transfer on productivity and the industry’s responsiveness to changing prices.

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<sup>12</sup> <http://www.dairyco.org.uk/resources-library/research-development/environment/dairy-roadmap/>

**A Curry Dish:** was chosen because it is a popular and a widely consumed national dish, and the consumption of more varied foreign and ethnic foods is expected to increase in future. It is also a dish that contains a number of ingredients that can be grown in England, but also global commodities such as rice and spices that enable consideration of some of the global implications of UK production. The subgroup considered the potential for reformulation of products and substitution of those ingredients with a high environmental impact, food waste issues, the role of retailers, the Government and the food service sector in influencing consumers on healthy diets and sustainability, and waste reduction patterns. They also considered the implications of innovation, research and development, knowledge transfer in increasing food production efficiently and consumer acceptance of new technologies.

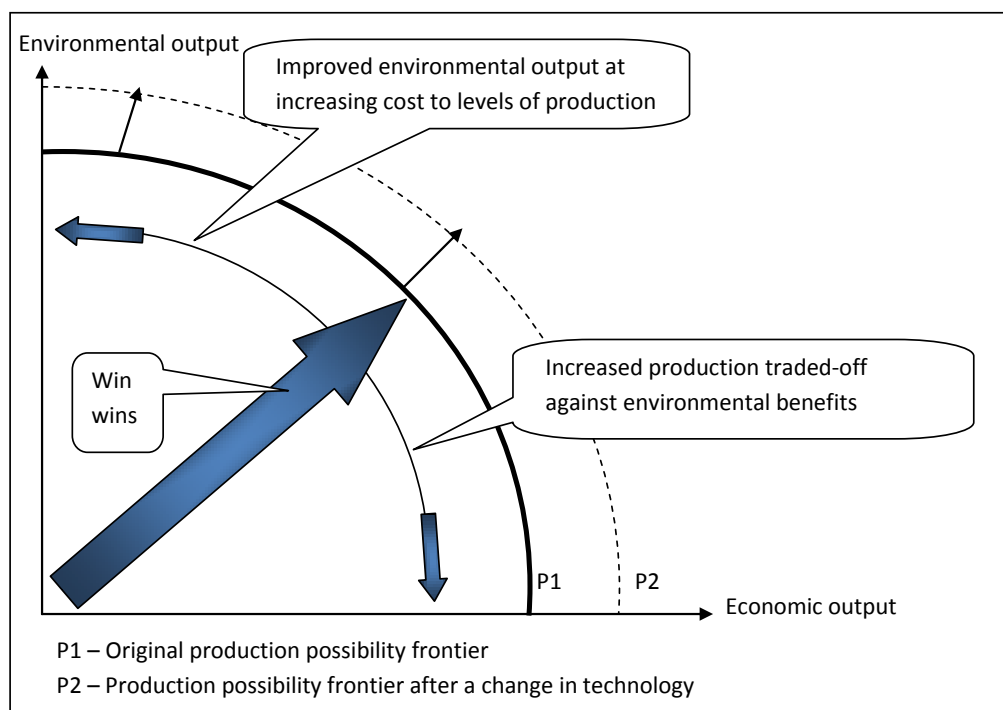
**Geographical Areas:** The subgroup considered three examples of various geographical scales - a farm level study in North Norfolk, a catchment level study of the Tamar of South West England, and a 'landscape scale' study of the Lake District. They considered the current and potential interactions between food production and a range of priority environmental goods and services, treating food production as one of a range of ecosystem services, and building on the work of the National Ecosystem Assessment<sup>13</sup> and site specific studies.

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<sup>13</sup> UK National Ecosystem Assessment, <http://uknea.unep-wcmc.org/>.

## 4. Conclusions

- 4.1 The Green Food Project examined the two broad and potentially conflicting objectives of increasing food production and improving the environment in England. In breaking down the objective on food production, the project steering group considered production levels but also increases in productivity, profitability and growth in the agri-food sector. In relation to the environment the project steering group considered improvements across a range of different aspects of the environment, for example water, soils, greenhouse gas emissions and biodiversity. Importantly we considered how to ensure that environmental limits would not be exceeded so that food production would be sustainable for the long term. The project steering group considered the whole food supply chain, from the agricultural production of raw materials through to the behaviour of the consumer.
- 4.2 Through the project, the steering group aimed wherever possible to find ways to generate improvements in both production and the environment, i.e. to achieve 'win wins'. However, where this was not achievable because improvement was possible more easily in one direction rather than the other, we considered the 'trade-offs' involved in balancing the two. We considered what evidence or policy interventions might help support that decision and the likely consumer and political acceptability. Such interventions might for example include an increase in investment, a policy intervention that alters market behaviour in some way, or the adoption of a new land use policy.



**Figure 1.** Different points on the frontier represent different levels of trade-off between production and environmental outputs (i.e. how we might trade-off environmental benefits in favour of production and vice versa). By definition, moving from one point on the frontier to another requires a trade-off. If we can alter the balance of inputs and outputs through improving practice, technology or efficiency, we may be able to achieve some 'win-wins'. However, where trade-offs become increasingly difficult we may need to explore more significant changes, such as altering the way in which land is used.

4.3 This is however quite a 'crude' conceptual way of looking at the relationship between production and environmental 'outputs' or the degree of environmental change. There are a few nuances to this process, for example:

- In the short term, a farmer might sacrifice some production in favour of environmental benefits. However, in doing this they might safeguard or improve some natural resources that would enable greater sustainability in the future (for example by taking steps to improve soil fertility, which in the longer term would support crop growth). Economic difficulties might discourage this longer term approach being taken, but farmers can be supported to overcome that with clearer advice about the longer term benefits. In some cases, a short term decision like this might be rewarded sooner, for example if a reduction in size of herd or flock were to bring about animal welfare benefits that resulted in overall profitability.
- A food business may choose to sacrifice a small amount of production in order to generate additional environmental or other benefits. They are then able to, however, label and market their produce on the basis of their environmental performance, or charge a premium for a higher quality product and thereby boost their economic performance through increased profit margins. The challenge is therefore how to engineer greater rewards for more sustainable food products, to encourage this to happen, while giving consumers adequate information to make informed choices, which in turn helps shape demand.
- Although the Green Food Project has focused primarily on the relationship between food production and the environment, we recognise that trade-offs occur between production, the environment and other factors such as animal welfare, or other things of social value or for the 'public good', for example through the adoption of free range poultry or livestock systems.
- Businesses and people will not make progress equally; there will be high performers who lead on progress because they are more able or willing to develop their practices or exploit new technologies. In trying to make progress we should concentrate on both driving forward this 'frontier' of leading performers, and on bringing the performance of others up to the standard of that frontier.

4.4 One key difficulty in calculating how to balance or 'trade-off' improvements between production and the environment, is in finding appropriate ways to measure progress. Some simple indicators exist for measuring production performance, such as total production in terms of tonnes or calories, or yield per hectare, or unit of other output such as water or nitrogen, although it is important to choose measures appropriate for each situation.

4.5 There is no single indicator of the state of, or rate of change in, the environment which enables it to be compared or contrasted easily with production performance, although there are some individual indicators of specific aspects of the natural environment, such as levels of greenhouse gas emissions or numbers of particular bird species. Even if it were possible to arrive at a single metric or indicator for the environment as a whole, this would need to involve making some kind of value or subjective judgement about what was important. There are also a number of legal requirements that we have to comply with, which to an extent reflect scientific

understanding and societal valuation of the environment. It is difficult therefore to compare changes in environmental goods, such as climate, water and biodiversity, with each other and to agree and advise food producers on how they should reach an understanding or reconcile the value of different things. The conclusions of the Green Food Project are feeding into work being carried out in a follow up to the National Ecosystem Assessment, part of which is to create a better understanding of the monetised and non-monetised value of different ecosystem services.

- 4.6 There is no single 'correct' path to achieving win wins and making decisions in the presence of trade-offs between production and the environment, because often it will depend on the particular circumstances at a given time and in a given location. It will also be influenced by a huge range of factors, such as political priorities at any given time, legal requirements that are in place, and whether the geographic area where the decision is being taken has been designated as having specific local, national or international importance. There are already some broad national mechanisms in place designed to advise, incentivise, or require land managers to deliver the required outcomes. These include agri-environment payments, various pieces of regulation and restrictions on land management choices that have been created within protected areas. However, generally decisions still have to be tailored to individual situations.
- 4.7 The dialogue the project steering group have had through the Green Food Project process identified a number of strategic steps we can take, which will put us in a better position to achieve win wins and make sensible decisions about where trade-offs should be made:
- **Research and technology:** We want to improve our knowledge base and science capability, firstly by continuing to encourage and build on existing 'blue sky' research, but also by ensuring this is matched by applied research and development. Applied research should be underpinned by fundamental science, which should be relevant to business need, or be carried out in a way that ensures it can be taken up into practice and used to drive forward innovation and technology. We also want to be able to better forecast likely environmental, population and other changes and consider scenarios we might face in the future in order to enable ourselves to prepare better and become more resilient. We also want to further enhance and build on the actions that have been taken to reduce or reverse problems we are facing, such as biodiversity decline, soil degradation and poor water quality in some areas.
  - **Knowledge exchange:** We want to continue to support a better coordinated research effort and improvements to the way in which research and advice is shared or exchanged throughout the food, farming and environment sectors, Government and other institutions such as in civil society.
  - **Future workforce:** We want to ensure we are attracting the right numbers and calibre of enthusiastic, entrepreneurial and environmentally literate people into careers in food, farming and environmental management and protection, and that they are equipped with the skills and knowledge they need to succeed in these careers.
  - **Investment:** We want to ensure that farmers and food businesses feel confident in making investments and securing the physical and human capital they will



need to respond to the challenges faced in the food system and maintain their competitiveness. Investment will also be critical to support businesses in improving their environmental performance and ensure resilience to climate change.

- **Effective structures:** We want to ensure that our business structures, markets and supply chains are operating fairly and effectively to support high levels of growth and sustainability.
- **Valuing ecosystem services:** We want to ensure that we have a clear understanding of the monetised and non monetised value of ecosystem services, the economic costs and risks of allowing deterioration of those services to take place and the drivers for that deterioration, and that this understanding carries through into policy and decision making.
- **Land management:** We want to derive more economic and environmental benefit from our agricultural land and do so sustainably, in a way that reflects the value of the range of ecosystem services it produces and the best potential to achieve win wins between them.
- **Consumption and waste:** We want to initiate further work within the project to consider how consumption, demand and waste can be tackled and to ensure that this feeds into wider strategic thinking about the food system as a whole.

## Research and technology

4.8 The application of existing and new knowledge on farm and in food businesses can make improvements to yield, sustainability and resource efficiency. Ongoing long term investment in innovation and research and development is essential so that we can improve our domestic performance, reduce environmental impacts and maintain our competitiveness. These issues are explored in more detail in a number of recent reports such as the Foresight Report into the Future of Food and Farming<sup>14</sup>, the Taylor Review Science for a New Age of Agriculture<sup>15</sup>, and the UK House of Lords Inquiry into Innovation in EU Agriculture<sup>16</sup>.

4.9 The Green Food Project concluded that there is a need for a more strategic and joined up effort in relation to innovation, research and development, and noted in particular that:

- whilst there has been a relatively consistent level of investment in 'blue skies' agri-food research, which is important to maintain, this has not been balanced with applied or near-market research in recent years;
- there is a significant time lag in new science and technological development reaching the market due to the time taken for products to be developed and approved (citing in particular examples of plant breeding innovations or crop protection discoveries);

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<sup>14</sup> The Future of Food and Farming, Foresight, 2011

<sup>15</sup> Science for a New Age of Agriculture, Lord Taylor, 2010

<sup>16</sup> Innovation in EU Agriculture, House of Lords Inquiry, 2011

- further work is needed to incorporate research outputs into productive and sustainable farming systems in a way that can be more easily adopted by industry. Research should also be underpinning strategic approaches to land use and management, in order that they account for geographical variations in land capability and environmental susceptibility over farmed landscapes;
- underpinning this, there is an ongoing need for more investment in research into specific areas, such as soil science, agronomy, ecosystem services and socio-economic research;
- improved cooperation is required to reduce the number of ad hoc and overlapping research activities and ensure better cooperation between different disciplines, acknowledging that some effort has been made to address this nationally (e.g. through Global Food Security<sup>17</sup> programme) and at an EU and international scale (e.g. Global Research Alliance<sup>18</sup>);
- more effort is needed to encourage applied or user-inspired research and technology transfer and to join up different elements of the agri-food sector to get two-way flows of knowledge, ideas and innovation moving from lab to field and back to lab;
- new technologies such as biotechnology could play a role in addressing the challenges identified by the Green Food Project, but lack of investment and the emotive nature of the debate around genetic modification in particular, have affected the progress of these technologies across the EU. Some project steering group members felt that the approvals process is creating unnecessary delays to new products reaching the market. However, new technologies can raise important health and environmental concerns, which need to be assessed fairly within a comparative risks framework.

4.10 The project steering group acknowledges that there have been positive recent steps and renewed activity in addressing these challenges. In particular the announcement that the Biotechnology and Biological Sciences Research Council are making a £250m strategic investment in UK bioscience<sup>19</sup>. The reinvested funding has been distributed across many areas identified in the subgroup reports, including wheat pre-breeding and the tackling of vector-borne diseases in livestock. In addition, the Technology Strategy Board Sustainable Agriculture and Food Innovation Platform<sup>20</sup> provides a key mechanism for driving forward innovation in new technology in agriculture and food. Government and the research councils are working together through the Global Food Security programme<sup>21</sup> and have an active role in the Food Research Partnership<sup>22</sup>, chaired by the Chief Scientist Professor Sir John Beddington, to maximise research impact in addressing the grand challenges.

<sup>17</sup> <http://www.foodsecurity.ac.uk/>

<sup>18</sup> <http://www.globalresearchalliance.org/>

<sup>19</sup> Announced on 24<sup>th</sup> May 2012 <http://www.bbsrc.ac.uk/news/policy/2012/120524-pr-minister-announces-250m-investment.aspx>.

<sup>20</sup> <http://www.innovateuk.org/ourstrategy/innovationplatforms/sustainableagricultureandfood.ashx>

<sup>21</sup> <http://www.foodsecurity.ac.uk/>

<sup>22</sup> <http://www.bis.gov.uk/go-science/science-in-government/global-issues/food>

- 4.11 To complement these initiatives, the Government is also exploring a proposal with the Food Research Partnership and the Global Food Security Strategic Board to form a 'Leadership Council' on agri-food research. Jointly chaired by Ministers from Defra and the Department for Business Innovation and Skills, this will include the Technology Strategy Board, Biotechnology and Biological Sciences Research Council and senior industry representatives. The creation of the Leadership Council is in response to the need for greater strategic co-ordination and allocation of agri-science funding, and the need to achieve an optimal balance between cutting edge science and applied research. The work of the Council will be aligned with the Technology Strategy Board's programmes and industry research strategies, currently being developed by the Agriculture and Horticulture Development Board, the National Farmers Union and the Royal Agricultural Society of England.
- 4.12 We recognise that the opportunities and risks presented by new technologies and their associated management need to be considered on a case by case basis, and assessed against the specific problem or issue the technologies can address. If big advances are to be made at the field level in the next 30 to 40 years, research into new agricultural products and advances in genomics need to begin now, as many areas of research have long lead-in times or take a long time and significant investment to get reliable results. The wheat subgroup acknowledged that breeding advances must continue to make a significant contribution to yield improvement, and the introduction of genetic resistance to biotic and abiotic stresses has clear environmental benefits. However, the use of genetically modified organisms is only one possible approach, and the promise of future technologies does not negate the need to act now to improve the sustainability of food production with the tools we currently have at our disposal.

## Case study - Hi-Tech Solutions



A wide variety of “high-tech” solutions are being used on beef and dairy herds across the UK. For example, **artificial insemination with sexed semen** avoids unnecessary production of bull calves and allows rapid replacement of aging heifers or suckler cows and expansion of herd size, making the businesses more profitable and efficient.

Jonathan Jackson of Longpools Farm, Hinstock, Market Drayton, Shropshire has moved from using conventional semen to Cogent sexed semen on his heifers. This ensures that he is both improving the genetic quality of the heifers while at the same time keeping a closed dairy herd. This also means Jonathan does not have to rear or dispose of unwanted dairy bull calves and also improves the reproductive performance of his herd, thus increasing milk yield and also reducing emissions per unit of milk.

Many new technologies are also under development. For example, the Technology Strategy Board is supporting a project to develop the **‘texting cow’** technology, which will allow farmers to monitor the health and conditions of their cows. Each cow wears an intelligent collar, using technology developed for the Wii gaming console, that detects subtle changes in movement while maintaining a continuous record of activity patterns. Farmers can then receive data via a text to their phone indicating when a cow is in distress, coming in to heat or entering labour. With both efficient insemination and cow health and welfare crucial for farm profitability, the development could help to sustain the financial future of farms.

<http://www.embeddedtech.co.uk/node/72>

- ✘ **Defra will develop a research programme that brings together researchers working on the productive, environmental, social and economic aspects of farming through coordinated research activities. The platform will seek to address evidence gaps highlighted by the Green Food Project and deliver more cohesive messages to policy makers and farmers. Through the programme Defra will focus on improving the productivity, general economic performance and environmental sustainability of agricultural land management by:**
- **developing, testing and demonstrating integrated farm management systems,**
  - **developing strategic, landscape-scale approaches to target improvements to land use and management, and**
  - **improving understanding of the potential role of the wider food supply chain in influencing farm practices.**

- ✘ **Government is proposing to develop a Leadership Council to better coordinate research in agriculture and food, and ensure optimal allocation and targeting of funding to enhance sustainable and competitive farming.**
- ✘ **Defra will commission further work to investigate the impact of possible future changes in world prices of agricultural products and their inputs, focusing on what this could mean for the production decisions faced by English farmers and the potential impact this may have on consumers.**
- ✘ **Members of the Green Food Project steering group will work together to manage a debate between farming and food retail and manufacturing sectors, environmental and consumer organisations about the adoption of new and novel technologies in the food chain, including genetic modification. They will consider how to facilitate better awareness of the potential benefits and risks of new technologies domestically and internationally, and will ask the Leadership Council to consider these issues within its remit.**
- ✘ **Defra will continue to play a leading role in pressing for proportionate and pragmatic regulation in Europe. Defra will continue to argue for decisions on new agricultural products to be science-based and allow fair and more predictable market access for products that have undergone a thorough risk assessment.**

## Knowledge exchange

4.13 Getting the most out of the current system, by applying best practice and developing industry standards across the agri-food sector, is an important part of moving towards delivering the longer term objectives of the Green Food Project. This is true for the both the agriculture and food service sectors, where there is a wide spread between the highest and lowest levels of performance. In the food service sector, some of the industry organisations and further education colleges are starting to consider how this gap in performance can be addressed; the British Retail Consortium's 'Retail and Farming – Investing in our Futures'<sup>23</sup> report that sets out the ground breaking work that retailers are doing directly with farmers and colleges to help boost farmers' returns and benefit from meeting customers' needs. Further action and coordination is needed, however, across the relevant industries and by all concerned, including trade bodies such as the Food and Drink Federation and the British Hospitality Association.

4.14 In the agriculture sector, significant yield increases and improvements in environmental management would be possible if best practice, were applied more widely. Combinable crop yield mapping already reveals pockets in many fields yielding double the national average where this best practice has been applied. Evidence also shows that there is correlation between improved efficiency (reflected in economic performance) and reduced environmental impact; for example reductions in nitrogen use efficiency without diminution in yield have been observed over a sustained period, though there is room for considerable further improvement.

<sup>23</sup> [http://www.brc.org.uk/downloads/Retail\\_and\\_Farming\\_Investing\\_in\\_our\\_Futures.pdf](http://www.brc.org.uk/downloads/Retail_and_Farming_Investing_in_our_Futures.pdf)

Where certain farming practices, such as Integrated Pest Management and minimum tillage (where appropriate) can deliver both environmental and economic benefits, knowledge exchange mechanisms should focus on securing improved understanding and uptake of these.

- 4.15 For the full effect and benefit of improvements in productivity, production and environmental outcomes to be seen, everyone across the supply chain needs to take the necessary actions, both to benefit themselves and for the general good. Better knowledge exchange is central to delivering this improvement, by helping the top performers to continue to raise the bar and others to raise their standards. This can be achieved through peer-to-peer communication including through demonstration and monitor farms, such as Linking Environment and Farming's (LEAF) network of demonstration farms. In addition, farm-level decision support tools and developing a network of advisers and experts, offering more integrated advice to facilitate delivery of messaging at a local level, can be important ways to support farmers to adopt best practices. Work is underway in Defra to review the framework of advice, incentives and voluntary approaches that relate to farming, the outcome of which will support the effective delivery of messages to farmers<sup>24</sup>.
- 4.16 There is a need to pay more attention to the training and continuous professional development of agricultural advisers (in both the public and commercial sectors), who are critical to the delivery of knowledge and expertise to farmers. Current and developing scientific understanding of the interactions between farming practices and ecosystem service provision must be translated into practical advice for farmers, including how to reduce tensions and promote synergies between food production and the environment, specific to the individual farming system and geographic location. This includes the proper integration of advice on production and environmental issues, that is evidence based and outcome focused, to enable a move towards a system based approach. A new EU initiative proposes to build a bridge between scientific research and practical application of innovative techniques on the farm, promoting better communication and cooperation between stakeholders, including farmers, businesses, industry, advisory services and NGOs. Development of the European Innovation Partnerships on Agricultural Productivity and Sustainability<sup>25</sup> is currently in the early stages, and further consideration is needed to determine how this can operate effectively in England.

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<sup>24</sup> Commitments 18 and 20 in the Natural Environment White Paper, The Natural Choice: Securing the value of nature, HMG, 2011.

<sup>25</sup> Further information can be found at [http://ec.europa.eu/agriculture/eip/index\\_en.htm](http://ec.europa.eu/agriculture/eip/index_en.htm).

- ✘ **Led by the Agriculture and Horticulture Development Board, and working with the National Farmers Union as well as other interested parties, the industry will make concerted efforts to encourage the delivery of consistent, coherent, non-contradictory messages and advice to farmers. They will adopt an approach addressing both productivity and environmental impact with delivery through the commercial and publicly funded advisers who influence farmers and growers (including veterinary practices and agronomists). They will seek to ensure a focus on local priorities set within a national framework.**
- ✘ **Led by the Agriculture and Horticulture Development Board, and working with the National Farmers Union as well as other interested parties, the industry will also consider where effort is needed to achieve higher levels of coordination, integration and enhancement of existing activities (such as demonstration farms) as well as identifying places where more investment is needed to fill the gaps that exist in capacity or expertise.**
- ✘ **The Government will work closely with farming and environmental organisations to maximise the opportunities that the European Innovation Partnership on Agricultural Productivity and Sustainability offers.**

## Future workforce

- 4.17 If we are to get to grips with the challenges facing us in food, farming and the environment, then we need to ensure that the right numbers and calibre of young people are entering these fields, with the determination to meet those challenges and the skills to do it well. This means not only young farmers, but also a range of scientists, economists, environmental and land managers, business managers and technical experts who can apply their knowledge and skills in the agri-food and land management fields and have the inclination to do so.
- 4.18 Between 2007 and 2017, the UK food and drink manufacturing industry will need to replace 137,000 people, of which 45% are managerial and professional roles due to employees entering retirement or leaving the industry.<sup>26</sup> In particular, food and drink manufacturers are facing significant skills shortages in technical disciplines such as food science and technology and engineering. Collective action is being undertaken by industry to attract the best talent, through an efficient pipeline delivering employment-ready individuals, and to develop the workforce so that the food and drink industry can deliver sustainable growth. Examples of this are shown in the case study.
- 4.19 In farming specifically, there are large numbers of students applying to agricultural colleges, indicating a high level of interest in agriculture as a career, and there are opportunities for new entrants across the agriculture sector as a whole. However, young farmers' groups highlight a number of obstacles that restrict their ability to create a successful farming business specifically in the early years; notably difficulties in securing investment or land.

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<sup>26</sup> Sustainable Growth in the Food and Drink Manufacturing Industry, FDF, 2011

- 4.20 The proposals for the next Common Agricultural Policy contain measures intended to provide additional support to attract and support new entrant young farmers. The current proposals, if adopted, include the ability to provide young farmers with additional direct payments for five years as well as specific business start up aid and higher levels of investment support under the Rural Development Regulation. Defra will examine how it can best use any additional resources available as part of the process of implementing the Common Agricultural Policy.
- 4.21 There are a number of initiatives already looking at careers and skills related issues, for example the Government led Green Economy Council<sup>27</sup> and the work of the sector skills councils. However, looking ahead at the timeframe of the Green Food Project (i.e. the period up to 2050), it is important to forecast and address the likely problem areas, to ensure we have the capacity to deal with any of the challenges set out in this report.
- 4.22 The farming industry including the Agriculture and Horticulture Development Board, National Farmers Union, National Federation of Young Farmers Clubs and the sector skills council Lantra, currently work jointly with other organisations through the Agri-Skills Forum<sup>28</sup>, which seeks to stimulate development, provision and uptake of training and skills development. The forum seeks to enable greater transferability of acquired skills and career opportunities for those employed in agriculture. This includes work to continue championing agriculture and food sectors as careers opportunities, working with initiatives such as 'Careers in Farming and Food Supply'<sup>29</sup> and with the IGD.

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<sup>27</sup> <http://news.bis.gov.uk/content/detail.aspx?NewsAreaId=2&ReleaseID=418063&SubjectId=2>

<sup>28</sup> Further information can be found at <http://www.agriskillsforum.co.uk/>.

<sup>29</sup> <http://www.face-online.org.uk/face-news/careers-in-farming-and-food-supply>



## Case study - Getting the right young people into the food industry



The Food and Drink Federation (FDF) have recently developed three new initiatives:

- The FDF has pledged to double the number of apprenticeship opportunities in the industry from 1700 to 3400 by the end of 2012.
- 'Taste Success – A Future in Food' - gives young people information about the food industry and what the options for a career may be. The initiative works with schools and colleges to promote the opportunities available, for instance in product development, engineering to produce new factories and the design field, coming up with the latest packaging options. Why not take a look at [www.tastesuccess.co.uk](http://www.tastesuccess.co.uk)
- 'Graduate Excellence programme' - the FDF, National Skills Academy and UK Commission for Employment and Skills are joining together to produce the first food engineering degree course. This course will start in September 2014.

- ✘ Defra will support and participate in an industry led review of the opportunities available to and barriers faced by new entrants and young people, in the farming industry as a whole. The review will look at issues such as how new entrants access capital within farming, how they can better identify the types of skills and job opportunities needed in the sector and options available for succession for those approaching retirement.
- ✘ The National Farmers Union and National Federation of Young Farmers Clubs will work together with the wider farming and food industry to promote apprenticeship opportunities that are available and provide more joined up information about those opportunities.
- ✘ The food industry, led by the Food and Drink Federation, will build on steps already taken to ensure that new entrants into the engineering and technology fields have sufficient ability to apply their expertise within the food sector.
- ✘ The National Farmers Union and the Agriculture and Horticulture Development Board will work through the Agri-Skills Forum to create an industry wide commitment to the recording and recognition of skills development. This will underpin the professionalism of the industry,

**equip people with valuable and value adding lifetime skills and enhance career opportunities.**

- ✘ **The British Hospitality Association will convene a forum of leading members from across the hospitality and food service sector, working with the sector colleges, to develop an approach to promote skills and professionalism in sustainable consumption.**

## Investment

4.23 Investment in both physical and human capital was identified by several of the subgroups as critical for our ability to make improvements within the food system, and if effectively targeted can deliver both environmental and economic benefits. For example, investment in new larger and more efficient grain drying facilities can reduce the environmental impacts of drying harvested wheat to meet quality specifications, modern refrigeration bulk tanks can both increase capacity and reduce energy use on farms, and new building designs can reduce the incidence of environmental mastitis in dairy and beef cattle whilst also acting as a better platform to site solar panels.

4.24 Some investment is already being made, but it is inevitable that significant financial investment will be needed by all parts of the supply chain over coming decades in order to upgrade facilities, ensure that businesses can adapt to climate change, increase productivity, have a real effect on environmental improvement and meet regulatory requirements and demands from the food chain. Investment will also be critical to ensuring that England continues to be competitive, and that we don't lag behind some of our EU competitors who themselves will boost investment. We also need to understand the barriers to this kind of progress. For example, investment decisions tend to be driven by businesses themselves and the need to improve economic performance and do not always take account of environmental consequences. Government can play a key role in influencing these decisions through the way in which it structures key programmes and policy interventions.

- ✘ **The National Farmers Union, working with Defra and others where appropriate, will conduct an assessment of what data tells us about the competitiveness and resilience of the farming industry and how it could be improved.**

- ✘ **Defra will consider how to support competitiveness and investment, as well as securing environmental improvement, through the design of the future Rural Development Programme.**

## Effective structures

4.25 To achieve a truly sustainable food system, which improves on its economic outputs and environmental outcomes, a more joined up and collaborative whole supply chain

is needed; both vertically between farmers and those they are selling produce on to, and horizontally between retailers, the food service sector or between farm businesses themselves. A more coordinated approach can facilitate better market-focused production, more efficient use of resources, improved risk management, the use of more sustainably produced ingredients and lead to increased competitiveness across the food and farming sector as a whole.

- 4.26 There are large variations in the performance levels of food and farming businesses. Improved collaboration and cooperation across the food chain may enable best practices to be driven forward across all sectors, driving up performance through the adoption of the good practices that for example food processing sectors, retailers and consumers require or demand. This was particularly highlighted by the dairy subgroup, which showed the potential of improving the farming sector's overall productivity, without using more resources or increasing environmental impact by bringing up the performance of all farmers to the average.
- 4.27 It is clear that to take this forward, organisations across the supply chain will need to work together to really understand what is needed to achieve this approach and the barriers to take up. This could include ensuring better communication and clarity of market signals, along with current and projected future demand across the supply chain, which could influence levels of production. This is critical to ensure that the right market environment is created in which sustainable and competitive farming practices can be fostered.
- 4.28 Consideration should also be given by the industry as to the potential need for infrastructure or structural changes across all or some farming sectors. For example, there are potential benefits from the co-location of specialist arable and livestock farms and integration of mixed enterprises on farm. If this is done in an economically viable and environmentally sustainable way, it could increase the efficiency of the whole farm system, for example through better management of on-farm nutrients and integrating nutrient streams such as anaerobic digestion.
- 4.29 Consolidation of farming businesses sometimes also offers benefits, along with collaborative approaches such as co-operatives, producer organisations or contract farming. A shift from short-term approaches to supply chain contracts and relationships to a more long-term and integrated approach will foster a climate of greater predictability and certainty. This will help farmers, food manufactures and processors to make the necessary investments, to improve their economic and environmental performance.
- 4.30 Delivering an effective structure in the farming and food sectors is linked with improving knowledge exchange, particularly in the potential for transferring best practice and knowledge to other sectors or other parts of the supply chain, and further investment in both physical and human capital. The bread subgroup, for example, highlighted that communicating the steps taken by the bread supply chain to achieve greater efficiency could be shared and highlighted with others as an example. In developing and pushing for a more economically, environmentally and socially sustainable food system, engagement with the wider public is needed to ensure consumer acceptability of approaches taken. Here retailers have a key role to play in engaging with consumers, for example, through the promotion of sustainable choices and products and through visible commitments to sustainable sourcing of global commodities such as palm oil, soy and fish.

- ✘ **The Agriculture and Horticulture Development Board, together with other interested parties, will analyse the potential economic and environmental risks and benefits of encouraging specific structural change in the farming industry and supply chains. This will build on Defra’s existing evidence base<sup>30</sup> regarding technical efficiency at farm level, and could include, for example, looking at the potential for better integration and interconnectivity across different farming systems as well as the benefits of greater specialisation.**
- ✘ **The project steering group will review the characteristics of farming and food businesses with the highest levels of productivity and best environmental practice (while accepting there is no one ‘correct’ approach) and how these standards could be implemented by the rest of the industry.**

## Valuing ecosystem services

4.31 Ecosystem services are things that the natural environment does that benefit people. “Provisioning services” allow us to produce things that we can use, like food, water, energy, timber and pharmaceuticals. “Regulating and supporting services” naturally regulate the environment, for example the cycling of nutrients and water, detoxification of pollutants, the formation of good soil structure, and natural disease, pest and flood control. “Cultural Services” include the ways that our personal interaction with the land and nature leads to increased mental and physical health and wellbeing, recreation, education and tourism opportunities. Ecosystem services are closely associated with biodiversity, which depends upon and underpins functioning ecosystems, as well as being valued in its own right.

4.32 Throughout Green Food Project discussions it was felt there is a pressing need to consider how we can measure and value the range of ecosystem services to support policy making, to enable farmers and food producers to make the right decisions and to facilitate the right kind of incentive schemes. The first step towards valuing ecosystem services is an improved understanding of the location and quality of existing ecosystem services and how this might change in the future, particularly with respect to climate change. For example, land may be increasingly valued for its flood protection or carbon storage role. Valuation of ecosystem services can help in a variety of decisions and lead to a number of more integrated responses to land management issues.

*“Historically, only ecosystem services that are bought and sold in markets at a price, such as food and timber, have been managed to maximise their provision. By recognising the value of ecosystem services not valued by markets, such as flood and climate regulation, we are better able to account for them in decision making.”*  
UK National Ecosystem Assessment<sup>31</sup>.

<sup>30</sup> <http://archive.defra.gov.uk/evidence/economics/foodfarm/reports/documents/farmefferciency.pdf>.

<sup>31</sup> UK NEA, Chapter 27, page 1422

- 4.33 There is a huge effort nationally and internationally to understand and use these values, through the follow up to the National Ecosystem Assessment, the Economics of Ecosystems and Biodiversity study (TEEB)<sup>32</sup> and the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES)<sup>33</sup>. In England, the importance of improving the measurement and valuation of ecosystem services will underpin the work of the Natural Capital Committee<sup>34</sup> who will be advising government on the state of English natural capital.
- 4.34 The recognition of these values may lead to more market solutions or potentially better targeted incentives and regulation which drives up the value of what society is getting from land in any one place. However, as the National Ecosystem Assessment (NEA) points out, it remains “a major challenge to develop systems to capture the values of non-market ecosystem services to land managers”<sup>35</sup>. Rewarding environmental outcomes that farmers provide, for example through markets for ecosystem services or price premiums, would increase the desirability and demand for delivering a wider range of ecosystem services which in turn might increase the demand for integrated environmental or productivity advice. However, the development of markets for ecosystem services may not always be possible, and even where it is, it will not always be possible to internalise the costs and benefits into the food system. A cost effective approach to capturing the value of ecosystem services therefore must include a strong regulatory baseline. In considering the value of ecosystem services it is important to recognise that some decisions made in the UK can have environmental effects in other parts of the world: for example, embedded water in imports, or the Greenhouse Gas emission consequences of food produced overseas.
- 4.35 In the UK, markets are already emerging for some non-food ecosystem services, such as the regulation of water quality. However currently maintaining or investing in many other ecosystem services such as the cultural benefits from biodiversity are generally not rewarded by conventional market structures. This inevitably means farmers’ decisions lean towards the production of goods and services that are rewarded by the market e.g. food. There is likely to continue to be a need for public funding to secure public goods for which it is not currently practical to develop a market, such as through agri-environment and other schemes designed to maintain biodiversity, cultural heritage and improve the health and wellbeing of the population.
- 4.36 In a limited number of cases, market mechanisms such as price premiums and food labelling can be used to generate market returns to farmers who are providing ecosystem services as part of food production systems. Existing examples include the LEAF marque, Soil Association certification and local schemes such as Vyrnwy organic lamb. More broadly, the Ecosystem Markets Taskforce is looking at a range of new possible markets for ecosystem services, to report back to Government by March 2013. Their work may highlight opportunities for the food and farming sector, which will complement the work of the Green Food Project and the Natural Capital Committee<sup>36</sup>.

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<sup>32</sup> <http://www.teebweb.org/>

<sup>33</sup> <http://www.ipbes.net/>

<sup>34</sup> <http://www.defra.gov.uk/naturalcapitalcommittee/>

<sup>35</sup> National Ecosystem, Synthesis of Key Findings, 2011, p42

<sup>36</sup> The EMTF published the results of a joint research project with the Valuing Nature Network on business opportunities that value and protect nature which will feed into the developing thinking of the task force. See <http://www.defra.gov.uk/ecosystem-markets/> for more detail.

## Case Study - Nant-yr-Efail Farm: How change has benefited biodiversity and business



Nant-yr-Efail is a relatively small family farm situated in the hills just inland from the North Wales coast. Farmed by Richard Owen and his son Gethin, it has been in the family for 5 generations since 1903.

Over the last 5 years the farm has converted from a typical lowland all-grass beef and sheep farm, to a mixed farming system, by implementing a more agro-ecological, sustainable approach.

With funding from the Tir gofal scheme (the Welsh higher-level agri-environment scheme) and the organic farming scheme, the changes have enabled the Owens to eliminate a large part of their input costs grow more of their own feed and bedding, and are helping to restore the farm's landscape and environmental features.

Following the changes Nant-yr-Efail is more profitable, beneficial to biodiversity and better prepared to meet the growing demands of population growth and climate change.

- ✘ **Analysis of future scenarios analysis undertaken as part of the Green Food Project and the work on the Geographic subgroup will be fed into the National Ecosystem Assessment Follow On Project as it examines the value of our natural capital and ecosystem services to society now and in the future. Several partners of the Green Food Project, including the National Farmers Union and the Royal Society for the Protection of Birds, will be actively involved in the ongoing research and communication of its findings.**
- ✘ **Government is committed to encouraging pilots of Payments for Ecosystem Services schemes. An action plan setting out the challenges, barriers and next steps for expanding Payments for Ecosystem Services schemes will be published towards the end of 2012.**
- ✘ **The steering group members of the Green Food Project (led by the Royal Society for the Protection of Birds) will engage with ongoing and new pilot Payments for Ecosystem Services, exploring partnerships which can develop and take up new opportunities such as schemes that value water or carbon.**

## Land management

- 4.37 To achieve all of our objectives for land management (which include food, fuel, water, biodiversity, carbon storage and many others), while operating within environmental limits and with the same amount of land we have now, we must find ways to derive more benefit from each piece of land. The subgroup reports acknowledged that different landscapes have different comparative advantages at enabling production of certain benefits to society, whether that be for food, non-food crops, particular ecosystem services or types of biodiversity. The subgroups explored the fact that exploiting these comparative advantages are essential for increasing the benefits we obtain from our limited amount of land.
- 4.38 This means in practice that we need to move away from policies that adopt a 'one size fits all approach' and instead lean towards the principal of the '**right management for the right place**'. This does not mean focusing on a single use in each area, but is about getting the most from each area taken as a whole multifunctional landscape. It makes sense to use the most valuable land (in either economic or environmental terms) for what it is best suited to, working within environmental limits, and ensuring that at an aggregate level we have the right balance between economic and environmental improvement. Given the effects of some decisions will persist far into the future, how the comparable advantage of land will alter over time as a result of climate change needs to be considered as part of the decision making process. The intention is not to be directive about what privately owned land should be used for and how it should be managed. Rather, we want to develop policies that support land-owners to manage their land in a way that delivers the greatest benefit to them and society at large.
- 4.39 Getting more from our land both in terms of production and environmental benefits will require taking a '**landscape-scale approach**'. It must be done in a way that holds the trust and understanding of those involved in farming and conservation. Developing these systems will be especially important where the benefit is a public good not provided by the market and has to be paid for by limited public funds, for example perhaps carbon sequestration or the provision of biodiversity.
- 4.40 The key funding mechanism by which to take forward this approach is the Rural Development Programme, which is overwhelmingly the largest public fund over which we have discretion to influence improved land management and food production and provides opportunities to fund activities that help protect and enhance ecosystem services. The implications of this approach are that, as existing agreements came to an end, we would, within any constraints set down by the reformed CAP, move towards greater targeting of scarce public resources to practices which deliver higher levels of competitiveness and environmental improvement. This links to the results of the Making Environmental Stewardship More Effective (MESME) project which aimed to improve the delivery of environmental outcomes from the Environmental Stewardship agri-environment scheme. An improved valuing of ecosystem services will enable us to do this much more clearly and ensure that schemes are broadly accessible to as wide a range of farming businesses as possible.
- 4.41 In order to assess effectively the comparative advantages of different areas of land we need to think in terms of a different scale of land management. At present many policy interventions operate at farm scale. Impact of on-farm actions will vary

between farming systems and regions. Sustainably increasing production at a national scale requires a broader assessment of where we have the capacity to increase production without breaching environmental and legal limits, and where this can be done alongside improvements in other ecosystem services. This does not however remove the vital role of local land managers who have expertise and knowledge of local resources; instead it is about capturing that and using it in collective action to decide how benefits can be derived across a landscape.

4.42 Future demands on land for energy production could have further impacts on food production. However, they could also generate opportunities for the food industry through, for example, driving investment in wheat research and development. The project steering group recognises that the demands on land for bioenergy cannot be considered in isolation from food production, and that England needs to exploit the opportunities that bioenergy production can provide for innovation, profitability and carbon reduction without compromising the country's capacity to continue to meet food production needs.

### Case study - Thorney Farmland Bird Friendly Zone



In Cambridgeshire 14 farmers are working together over 3,782 hectares using ELS (Entry Level Scheme) and HLS (High Level Scheme) funding on highly productive land to co-ordinate efforts to deliver results at a landscape scale.

The farmers are delivering enhanced and increased amounts of habitat for birds at the same time as maintaining production levels and running profitable business enterprises.

A number of new features have been added by the farmers including skylark plots, beetle banks and a grass mix that is designed specifically to encourage bird species.

This part of the country is traditionally associated solely with food production but this initiative has shown that small changes that do not reduce production levels can have big environmental benefits. Not only have farmland bird numbers increased, but other species have also benefited such as bees, grass snakes, great crested newts and water voles.

✘ **The National Farmers Union, Country Land and Business Association, Royal Society for the Protection of Birds and Linking Environment And Farming, supported by the Defra family, commit to stimulating collaborative, location-based approaches to land management. Working within existing initiatives and fora, they will bring people together in specific geographic areas to discuss local challenges and develop ways to address them. Examples of existing location-based approaches include**



### **Nature Improvement Areas and the Environment Agency's catchment based approach.**

- ✘ **The National Farmers Union, Country Land and Business Association, Royal Society for the Protection of Birds and Linking Environment And Farming, supported by the Defra family will show leadership by promoting understanding of local environmental challenges which will help farmers and land managers' tailor their efforts, through joint partnership approaches such as the current Campaign for the Farmed Environment and Farm Assurance Schemes such as the Linking Environment And Farming marque.**
- ✘ **The Green Food Project steering group (led by Defra and WWF) will give their support to work to identify basic and additional measures to minimise any adverse impacts from agriculture on the water environment and to increase Water Framework Directive Compliance.**
- ✘ **In designing the new Rural Development Programme for England Defra will, within the framework laid down by the reformed Common Agricultural Policy, adopt the approach of the Green Food Project to move towards outcome focused geographically tailored solutions where that will enhance benefits and value for money.**
- ✘ **The Government should develop a more strategic approach to decisions about agricultural land use policies. This would enable different Departments to work more closely together to discuss issues such as the diversion of agricultural production from food to other uses. This should draw on the results of the Foresight Land Use Futures project and be compatible with the work of the Natural Capital Committee.**

## **Consumption and waste**

4.43 As well as looking at structural changes in the industry and the way in which we manage our landscape, it is imperative that we also look at the way we consume these goods to ensure that there is a sustainable balance in future demand and supply. Consumption is an important part of considering the sustainability of the food system overall because the demand for different food types influences production behaviour through price signals. As the global population increases and emerging developing nations potentially adopt a more western-style diet, the pressure on natural resources will accelerate. The Foresight Food and Farming Report stressed that the magnitude of the challenges facing the food system over the coming decades requires action on all fronts: on production, consumption, waste and governance.

4.44 What we eat is fundamental to our health and it's important that the food available to us meets our basic nutritional needs. But decisions about the future sustainability of food production also need to take into account the major public health challenges England faces in terms of tackling obesity and other diet related health issues. The

way in which we tackle these issues also has to be viewed against the wider social and economic issues associated with food, such as affordability and food poverty.

- 4.45 The Green Food Project steering group acknowledged that in the next stages of the project, a much more detailed discussion on consumption is needed. With this in mind the project steering group is calling for a wider, more sophisticated debate across the food chain and by civil society, about the role of diet and consumption in the sustainability of the food system, and the roles of different sectors (consumers, media, private sector, government) in addressing consumption patterns. To begin this process the project steering group will initiate a forum of key interested parties to fully consider the issues, which will report back with recommendations for action. We will draw on a considerable amount of work already underway in this area, for example the recently launched Product Sustainability Forum<sup>37</sup> which is considering the environmental impact of everyday products, and the European Sustainable Consumption and Production Action Plan<sup>38</sup>.
- 4.46 The project steering group recognises the need to provide consumers with the information and knowledge required to ensure they are connected to and knowledgeable about the food system and can make informed choices about the food they purchase. We also want to ensure that those choices reward producers for generating improvements to the environment, health and waste.
- 4.47 Within the Green Food Project discussions, the issues surrounding the sustainability of meat consumption and animal feed were ones where the project steering group members found it difficult to reach a consensus on. The project steering group does not, however, want to ignore these important issues. It will therefore be useful to have further discussion between environmental, welfare and consumer organisations, bodies representing producers and Government, about for example the need to move towards sustainable feedstuffs.
- 4.48 Food waste is a big part of this debate. While there has been good progress in tackling food waste – household food waste has fallen by 1.1mt<sup>39</sup> (13%) since 2006/07, there is more that can be done throughout the whole food chain to prevent food waste arising and reduce the amount of food that goes to landfill. This can be addressed through raising consumer awareness, redistribution of waste from retailers and recycling. It is important to acknowledge here the work of existing initiatives, such as the Love Food Hate Waste campaign<sup>40</sup>, the Courtauld Commitment<sup>41</sup> and the Hospitality and Food Service Agreement<sup>42</sup>, that are seeking to address this issue. For some food groups, notably fruit, vegetables and root crops, a significant proportion of the waste occurs before the food reaches the consumer and understanding and tackling the drivers behind this could have positive economic and environmental benefits.

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<sup>37</sup> <http://www.wrap.org.uk/content/product-research-forum>

<sup>38</sup> [http://ec.europa.eu/environment/eussd/escp\\_en.htm](http://ec.europa.eu/environment/eussd/escp_en.htm)

<sup>39</sup> New estimates for household food and drink waste in the UK, WRAP, November 2011.

<sup>40</sup> <http://www.lovefoodhatewaste.com/>

<sup>41</sup> <http://www.wrap.org.uk/category/initiatives/courtauld-commitment>

<sup>42</sup> <http://www.wrap.org.uk/content/hospitality-and-food-service-agreement-3>

## Case study - Curry for 2050 – healthy and sustainable!



Having looked at the types of curry recipes that are currently available to the general public, Sodexo's head chef and head of nutrition and dietetics created a meat and vegetarian curry dish, based around the concepts of being lower in fat, saturated fat, salt and sugar,

whilst using local or sustainable ingredients, where possible. The aim was to also reduce meat content, while maintaining the taste and 'fullness' of the dish.

The chefs came up with two dishes (chicken dhansak and chickpea roti) which anyone can try for themselves. Full details can be found in the curry report.<sup>43</sup>

✘ **The project steering group partners will work together to facilitate a wider, more sophisticated debate across the whole food chain about the role diet and consumption play in the sustainability of the food system. This will begin with a scoping discussion that will take place within three months of this report being published, to maintain momentum. Within that debate the project steering group will examine issues such as (but not exclusively):**

**The information base required to support the debate and future change, including:**

- **information we have about what constitutes a healthy and a sustainable diet;**
- **scenarios for how we might expect the food system to change in the coming decades, bearing in mind the substantial changes we have seen in the last generation to the way in which people buy food, and the types of food they eat;**
- **information about how global diet changes will affect production in England, including the impact on exports and imports;**
- **information about the implications of potential changes in food prices and what this will mean for affordability of food in England, and how prices will affect the choices that producers, processors and consumers make.**

**The potential for behavioural change, across all sectors, including:**

- **in relation to consumer practice, a deeper understanding of what drives consumer purchasing and consumption decisions, who (including which trusted intermediaries or messengers) influences that behaviour and how they might be influenced to deliver 'public**

<sup>43</sup> Available on page 20 of Curry Subgroup Report.

**good', the levels of public acceptability of new products and technologies and how this might change, based on ongoing research;**

- **how far retailers might be able to influence sustainable consumption patterns going forward and barriers they may face in doing so;**
- **how far British producers are responding to the demands of consumers and might do so in the future;**
- **how we might seek to influence the way in which the next generation purchase and prepare food in order that they develop sustainable practices.**

**The potential for alternative approaches to consumption and waste, including:**

- **the potential for reformulation of products and substitution of high impact ingredients, drawing on evidence such as the work of the bread and curry subgroups;**
- **how we can ensure that livestock feed is sustainable;**
- **the potential for sustainable sources of fish, shellfish, algae and aquaculture generally to expand as a market for low impact protein;**
- **recognising the amount of work already being undertaken to address food waste, building on this by looking at post harvest food waste, particularly within horticulture, the potential for smarter regulation and also the potential for using food waste as feed.**

## 5. Next Steps

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- 5.1 In taking forward the Green Food Project conclusions and proposed actions, the project steering group considered that:
- the 'Green Food Project' has stimulated greater levels of awareness and interest from across the farming, food and environment sectors and that work in this area should continue under this banner, where appropriate;
  - the innovative, open policy making approach taken in this project has generated a positive collaborative approach, which should continue as the actions are taken forward;
  - in areas where the issues are complex and solutions could not be easily found, particularly due to the differing views involved, a more strategic and substantive discussions is needed;
  - in taking forward the conclusions and actions in this report, links will be made to ongoing related initiatives and we will build on existing good practices that are seen across the industry.
- 5.2 Working within this agreed framework, the project steering group intends to progress the actions in this report by continuing the Green Food Project steering group. This will give strategic oversight to the delivery of the conclusions and actions in this report. The steering group will identify a clear plan and timeframe for doing so, and will report on progress.