

Environmental Evidence for the Future

Regional Workshop Consultation

Report from the Wales Workshop
12th September 2017

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1. Introduction

The Environmental Evidence for the Future (EEF) initiative has been set up by NERC to

- pave the way to addressing crucial challenges and opportunities for our environment presented by the UK leaving the EU. These include optimising sustainable environmental management, ensuring the resilience of our ecosystems and the quality of our environment
- define, prioritise and address the knowledge gaps in the environmental science evidence base to inform policy and practice in the medium- to long-term (+5, +10, +20 years)
- focus on areas which have the scope to be addressed in the main via the NERC community and NERC's investments

EEF is an independent, co-developed initiative that is designed to complement, not duplicate, parallel initiatives. The project is focused on identifying cross-cutting challenges that address multiple needs across organisations and departments from a position of building on and strengthening the longer-term environmental science evidence base. It will not answer overly specific or short-term/current evidence needs and it will not be prescriptive in how prioritised environmental evidence needs are or should be addressed.

To help achieve these aims, NERC is holding four regional meetings around the UK in August and September 2017 in which participants from government, NDPBs and academia identify, describe and prioritise future environmental policy challenges and opportunities in the context of the UK's exit from EU Environmental Frameworks.

This report documents the workshop process and outputs from the Cardiff workshop held on 12 September at the Park Inn Hotel. There are seven main sections:

- **Section 1** is the introduction to the report
- **Section 2** sets out the workshop methodology
- **Section 3** provides an overview of the prioritised policy areas
- **Section 4** sets out the priority policy challenges for food, farming, timber and forests
- **Section 5** sets out the priority policy challenges for water, fisheries and marine
- **Section 6** sets out the priority policy challenges for the environment, conservation and wildlife
- **Section 7** sets out the priority policy challenges for climate change, air quality and energy

2. Workshop methodology

Introduction

The workshop was designed around a 5-step process in which participants:

1. Reviewed and discussed a series of drivers that may shape the UK environment over the next 25 years
2. Mapped the drivers according to whether they perceived them
 - To be more or less important for the UK environmental policy in the future
 - To have a certain or an uncertain outcome
3. Identified a series of priority drivers that are
 - More important and have a certain outcome
 - More important and have an uncertain outcome
4. Explored how priority drivers might play out over the next 25 years and, in particular
 - Whether drivers are more likely to create opportunities or threats to the UK environment in a post Brexit world
 - What evidence policy makers will need to capture those opportunities and mitigate the threats
5. Described a number of 100 word challenges that reflect these conversations

The detailed workshop programme is set out in Annex 1. The participant list is set out in Annex 2.

The drivers

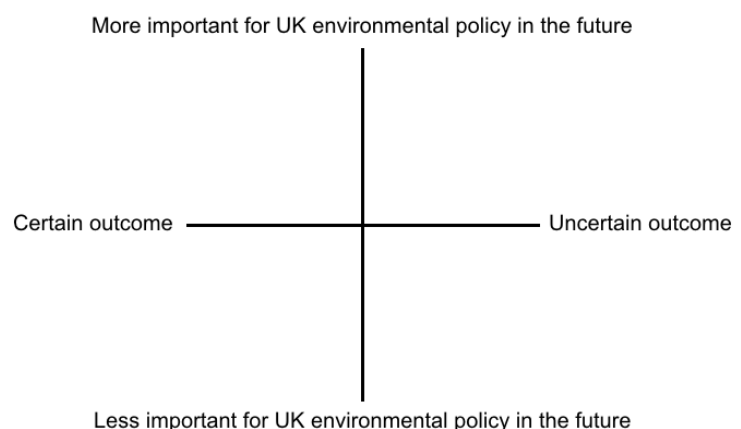
The drivers were drawn from the UK National Ecosystem Assessment Technical Report (published in 2011) and updated to reflect more recent geopolitical developments. During the course of the discussion, participants had the opportunity to add to the list of drivers if they felt there were any obvious gaps.

The full list of (amended) drivers is set out in Annex 3.

Mapping and prioritising the drivers

Participants split into four groups (Annex 2), each of which focussed on one thematic area. Each group reviewed and added to the list of drivers if they noted any specific gaps.

Each group then mapped the full set of drivers on the importance and certainty matrix and identified the priority drivers in the top right and top left quadrants.



Exploring how the priority drivers might play out

Groups discussed the priority drivers in both the top left and top right quadrants.

Drivers that mapped in the top left quadrant are **more important for UK environmental policy in the future and have a certain outcome**. For these drivers, participants explored

- What the outcome is and why it is important
- Whether the outcome offers an opportunity or a threat for the UK post Brexit
- What the impact will be in 2030 and in 2042
- What evidence policy makers will need to consider the policy response
- What links/dependencies exist to wider policy areas

Drivers that mapped in the top right quadrant are **more important for UK environmental policy in the future and have an uncertain outcome**. For these drivers, participants explored

- What the might outcome be post Brexit
- The possible threats and opportunities for the UK environment in 2030 and in 2042
- What evidence policy makers will need to develop an effective response
- What links/dependencies exist to wider policy areas

Given the constraints of time in the workshop, groups did not discuss all the priority drivers.

The 100 word challenges

For each priority driver that they discussed, groups identified a 100 word challenge to encapsulate the issues and research need.

3. Overview of the workshop outputs

Introduction

The tables on pages 5-8 provide an overview of the priority issues.

The prioritised drivers from all four group discussions are listed in the tables and then assigned a colour code according to whether groups believed the driver to be

- an opportunity for the future (green)
- a mixture of opportunity and threat (orange)
- a threat (red)

Drivers that were prioritised but not discussed are coded grey.

The detailed analysis and discussions of the issues are set out in sections 4-7.

More important for UK environmental policy in the future and with a certain outcome

	Food Farming Timber Forests	Water Fisheries Marine	Env't Conserv'n Wildlife	Climate change Air quality Energy
1. Agricultural support payments are increasing, focussed on public goods				●
2. Circular economy practices will become more widely used and change what society values	●			
3. Citizen engagement is likely to become increasingly important across a range of policy areas			●	●
4. Climate change will continue to cause increased temperature and increased occurrence of extreme weather and seasonal events	●	●		●
7. Data analytics will enable sophisticated mapping of demand and supply	●			
8. Decarbonisation will significantly impact on policy formulation and implementation				●
11. Food security and water security will become significant challenges; perhaps even sources of conflict				●
21. Lowland/upland land capability and use will face increasing and competing demands			●	
26. Pests and diseases will be more widely dispersed			●	
27. Planning needs to be future proofed and more embedded			●	●
30. Technology is likely to play an increasing role in regulation, both in monitoring and compliance	●			
32. The continued decline in vertebrate species populations is part of a complex biodiversity picture creating winners and losers			●	
33. The contribution that natural capital makes to UK growth will become more important	●			
34. Poverty and social injustice is creating a disconnection between people and the environment		●	●	
36. The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy	●			
37. The internet of things will change production processes and practices profoundly	●			

40. The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality	●		●	
44. The value of the UK's ecotourism markets is likely to increase	●			
47. Waste will continue to increase and is likely to cause significant environmental challenges	●			
Antibiotic resistance + pollution x provenance		●		
The cultural importance of farmers as land custodians increases	●			

More important for UK environmental policy in the future with an uncertain outcome

	Food Farming Timber Forests	Water Fisheries Marine	Env't Conserv'n Wildlife	Climate change Air quality Energy
1. Agricultural support payments are increasing, focussed on public goods	●	●	●	
3. Citizen engagement is likely to become increasingly important across a range of policy areas	●			
5. Consumption is likely to increase steadily				●
10. Demand for greater regional and local autonomy will continue			●	
12. Global population is likely to exceed 8.5 billion by 2030	●			
13. Global resource shortages (metals, nutrients for example) will begin to bite	●			
14. GM crops and animals are likely to become culturally accepted in the UK			●	
16. Governments will seek to achieve a global free trade agreement	●			
17. Improvements in farming techniques and technology will boost productivity and food security	●			
21. Lowland/upland land capability and use will face increasing and competing demands	●			●
22. More than one quarter of the world's population will live with water scarcity on a daily basis by 2040	●			
24. Patterns of land and marine use will need to change to meet the UK's food and energy needs	●			
33. The contribution that natural capital makes to UK growth will become more important			●	●
35. The economic centre of gravity will continue to move away from the west towards China and the east	●			
36. The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy			●	●
40. The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality				●
45. The world economy will double in size by 2045	●		●	
47. Waste will continue to increase and is likely to cause significant environmental challenges		●		●

Water security will become significant challenge	●			
Human health will increase in importance	●			

4. Food, Farming, Timber and Forests

Stats

- **17 drivers** mapped as more important for UK environmental policy in the future and having a certain outcome
 - The group prioritised 11 and discussed 7 in detail
- **30 drivers** mapped as more important for UK environmental policy in the future and having an uncertain outcome
 - The group prioritised 16 and discussed 7 in detail
- **3 drivers** mapped as being less important for UK environmental policy in the future and having a certain outcome. These drivers can be **parked**.
- **1 driver** mapped as being less important for UK environmental policy in the future and having an uncertain outcome. It may be worth **monitoring** these drivers to determine whether – as the outcome becomes clearer – they become more important for UK environmental policy in the future.
- The group identified **4 additional drivers**:
 - *The cultural importance of farmers as land custodians increases*
 - *Water security will become significant challenge*
 - *Fundamental changes in UK farming sector product profile which will impact our focal and global footprint*
 - *Human health will increase in importance*

Drivers that are MORE IMPORTANT for UK environmental policy and have a CERTAIN OUTCOME	Challenge	Priority	Not ranked
2. Circular economy practices will become more widely used and change what society values	●		
4. Climate change will continue to cause increased temperature and increased occurrence of extreme weather and seasonal events		●	
5. Consumption is likely to increase steadily			●
7. Data analytics will enable sophisticated mapping of demand and supply	●		
8. Decarbonisation will significantly impact on policy formulation and implementation			●
20. London and other major UK cities will continue to grow in size and population			●
27. Planning needs to be future proofed and more embedded			●
29. Smart cities and autonomous vehicles will change how we live and travel			●
30. Technology is likely to play an increasing role in regulation, both in monitoring and compliance	●		
33. The contribution that natural capital makes to UK growth will become more important		●	
36. The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process		●	
37. The internet of things will change production processes and practices profoundly	●		
40. The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality		●	
43. The UK's reputation as a migrant unfriendly country will have an impact on jobs and wealth creation			●
44. The value of the UK's ecotourism markets is likely to increase	●		
47. Waste will continue to increase and is likely to cause significant environmental challenges	●		
The cultural importance of farmers as land custodians increases	●		

Drivers that are MORE IMPORTANT for UK environmental policy and have an UNCERTAIN OUTCOME	Challenge	Priority	Not ranked
1. Agricultural support payments are increasing, focussed on public goods	●		
3. Citizen engagement is likely to become increasingly important across a range of policy areas		●	
6. Cyber security will be a continuing threat to international security			●
9. Demand for energy will continue to increase			●
10. Demand for greater regional and local autonomy will continue			●
11. Food security and water security will become significant challenges; perhaps even sources of conflict			●
12. Global population is likely to exceed 8.5 billion by 2030	●		
13. Global resource shortages (metals, nutrients for example) will begin to bite		●	
15. Governments will continue to collaborate to address Climate Change and Sustainable Development			●
16. Governments will seek to achieve a global free trade agreement		●	
17. Improvements in farming techniques and technology will boost productivity and food security	●		
18. International investment in the UK will increase			●
21. Lowland/upland land capability and use will face increasing and competing demands	●		
22. More than one quarter of the world's population will live with water scarcity on a daily basis by 2040		●	
23. New technology will continue have an impact on the natural environment	●		
24. Patterns of land and marine use will need to change to meet the UK's food and energy needs	●		
25. People will have increased mobility and job flexibility			●
26. Pests and diseases will be more widely dispersed			●
28. Retailer power will drive farming systems			●
31. The average age of the UK population will be 42.9 years in 2045. 1 in 12 will be over 80			●
32. The continued decline in vertebrate species populations is part of a complex biodiversity picture creating winners and losers			●
34. Poverty and social injustice is creating a disconnection between people and the environment		●	
35. The economic centre of gravity will continue to move away from the west towards China and the east		●	
38. The risk of interstate conflict will continue to rise		●	

39. The sale of petrol and diesel vehicles will be banned in 2040			●
41. The UK will agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit			●
45. The world economy will double in size by 2045		●	
Water security will become significant challenge		●	
Fundamental changes in UK farming sector product profile which will impact our focal and global footprint			●
Human health will increase in importance	●		

Drivers that are MORE IMPORTANT for UK environmental policy in the future and that have a CERTAIN outcome

The Driver	<p>2. Circular economy practices will become more widely used and change what society values</p> <p>47. Waste will continue to increase and is likely to cause significant environmental challenges</p>
The Challenge	<p>The impact of waste at all stages of our farming, food, forestry and timber sectors has a massive environmental impact. There is an urgent need to embed the principles of the circular economy model in order to ensure sustainable development and lean economic growth which safeguards our natural capital and resources for future generations. Research is needed to identify opportunities and policy levers required to deliver the step changes and interconnectivity across the sectors, in particular in the areas of food and timber supply chain waste, water reuse and recycling, heat recovery and recirculation.</p> <p>94 words</p>

Outcome of this driver	<ul style="list-style-type: none"> • Zero waste-No food waste <ul style="list-style-type: none"> -Consumer goods built to last -Energy & water valued – recirculation/heat recovery - Use of sustainable materials - More efficient use of resources - Economic benefit e.g. year round protected cropping opportunities from heat recovery/colocation of ag with industry.
Why the outcome is important	<ul style="list-style-type: none"> • Safeguarding of non-renewables • Understating of circular economy – embedded in day to day life • Improved self-sufficiency in UK & Sustainable production • Jobs, economic growth, prosperity, encouraging innovation, improved quality of life, wellbeing, health, reduced pollution
Opportunity or threat?	<ul style="list-style-type: none"> • Big Opportunity • But initially there may be costs to sectors/public purse (good investment though!)
Impact of the driver	<ul style="list-style-type: none"> • See outcome above
Evidence needs	<ul style="list-style-type: none"> • Baseline data for waste – where, who, how much? • Understand how to get behavioural change! • Quantify benefits of changes –economic, health & wellbeing, culture etc. • Appropriate monitoring and evaluation for ‘adaptive management!
Connections to other policy areas	<ul style="list-style-type: none"> • Energy, health/nutrition/obesity, education, waste, environment, poverty, trade, innovation, agriculture, economy, Food!

The Driver	<p>44. The value of the UK's ecotourism markets is likely to increase and "the cultural importance of agriculture/how food is produced"</p> <p>New driver: The cultural importance of farmers as land custodians increases</p>
<p>The Challenge</p> <p>? words</p>	Hand writing unreadable

Outcome of this driver	<ul style="list-style-type: none"> • People value the environment & countryside more • People buy into sustainable food, farming and forestry practices more and reflect that through their buying behaviours • Supporting the rural economy, cultural heritage retained • UK has enhanced reputation for environmental protection • Greater biodiversity
Why the outcome is important	<ul style="list-style-type: none"> • Currently suffering biodiversity loss, and loss of language & culture (extremely important in Wales) through deterioration of rural economies – further development and tourism/food tourism can be a catalyst to support this area. • UK food & farming can't compete on price, it needs the important credentials of sustainability, culture, provenance, supporting biodiversity and landscape to secure the premium it deserves and needs over lower quality imported products • Over the decades, people have lost awareness/understanding/connection with food, farming environment, rural culture, traditions – there is a need to reignite those links – to bridge the rural-urban divide.
Opportunity or threat?	<ul style="list-style-type: none"> • Obvious opportunity • Demand for greater public access is a potential threat/point of conflict
Impact of the driver	<ul style="list-style-type: none"> • Flourishing food, farming, forestry sector & rural economy • Growth in more traditional, environmentally friendly/sustainable models of production • Improved awareness of rural issues – urban UK will have greater say in management of countryside, improved public access?
Evidence needs	<ul style="list-style-type: none"> • Baseline stats – existing visitor numbers/spend, etc. • Market research to identify scope for growth/opportunities in market place

	<ul style="list-style-type: none"> • Consumer insight into existing provision to identify needs, barriers, opportunities
Connections to other policy areas	<ul style="list-style-type: none"> • Economy, Rural Economic Development, Tourism, Environment, Agriculture, Animal Health, Food, Culture and language

The Driver	<p>7. Data analytics will enable sophisticated mapping of demand and supply</p> <p>30. Technology is likely to play an increasing role in regulation, both in monitoring and compliance</p> <p>37. The internet of things will change production processes and practices profoundly</p>
The Challenge	Not completed
? words	

Outcome of this driver	<p>More effective decision making, planning, better more efficient targeting of precious resources:</p> <ul style="list-style-type: none"> • Less Waste • Just in time approach • Technology allowing automated monitoring/compliance – less cost, less red tape, less interference on the ground. • Production efficiencies often associated with job losses, but opportunity for upskilling of staff • Internet of things in home: <ul style="list-style-type: none"> • less food waste • Healthier food choices • Less energy/heating • More efficient travel/use of time • Better quality of life!
Why the outcome is important	<ul style="list-style-type: none"> • Better use of resources/time • Safeguarding non-renewable resources • Healthier lifestyles/better quality of life • Matching supply more closely with demand – avoiding waste! • Communicating changing consumer needs quickly back down the supply chain = respond quickly to market needs
Opportunity or threat?	<ul style="list-style-type: none"> • Good opportunity for above reasons • Threat:

	<ul style="list-style-type: none"> • for reasons of system vulnerability/cyber-resilience • Automation in food production/processing equals potential job losses
Impact of the driver	<ul style="list-style-type: none"> • As above
Evidence needs	<ul style="list-style-type: none"> • Evidence of cost effectiveness of technology, opportunities, threats and barriers to implementing/encouraging take up. • Use by other countries – successes/failures/case studies e.g. vertical farming systems well established in South East Asia, Japan in particular – tried and tested!
Connections to other policy areas	<ul style="list-style-type: none"> • Relevant to all policy areas

Drivers that are MORE IMPORTANT for UK environmental policy in the future and that have an UNCERTAIN outcome

The Driver	12. Global population is likely to exceed 8.5 billion by 2030
The Challenge	Global population will increase with a shift in economic centre of gravity to the east. Resource shortages will lead to increased inter-state conflict (possible shift in global free trade agreement). Threats include increased drive for economic growth at the expense of non-market environmental goods and benefit and increased disparity in access to limited / critical resources. Our response needs to highlight the opportunities of collective solutions to meet UNSDGS (co sustainable development) reviewing what works / where, and why, and trailing new innovative solutions which increase circular economies and reduce global footprints. NERC will need to work cross research councils to achieve this.
103 words	

Possible outcomes	<ul style="list-style-type: none"> Global resource shortages (metals, nutrients for example) will begin to bite; the risk of interstate conflict will continue to rise which may lead to government seeking a global free trade agreement
Possible threats	<ul style="list-style-type: none"> GDP & economy dives everything, and environmental policy is side-lined Increasing regional disparity Access to critical limiting resources is restricted
Possible opportunities	<ul style="list-style-type: none"> Realisation that the problem are so complicated that an integrated approach around the environment is the only opportunity to deliver all three fronts (sustainable development, environment, society, economic) UN 17SDGs are increasingly important to draw in more countries to multilateral agreements. Increased drive towards the circular economy Reduced global footprint.
Evidence needs	<ul style="list-style-type: none"> Review of what works, doesn't work to deliver Sustainable development Trails of innovative actions to deliver sustainable development Therefore NERC needs major cross RC collaboration
Connections to other policy areas	<ul style="list-style-type: none"> Affects whole of policy and approach to government including budgetary control

The Driver	New Driver: Human health, and its links to environment will increase in importance
The Challenge	Rising cost of health care is unsustainable. We want to understand the links or prevent pushes to increase GDP which may cause a decline in environmental quality and health. There needs to be more understanding of the opportunities the natural environment presents for health (e.g. linking payments to agriculture with diet and environmental impacts). In general we need better evidence of links between physical, mental health and natural resources (air quality & lung health, green space & mental health, water pathogens & diseases). Better understanding of links to other policies in education, health and recreation.
95 words	

Possible outcomes	<ul style="list-style-type: none"> • More focus on prevention due to economic drivers (we can't afford the damage costs)
Possible threats	<ul style="list-style-type: none"> • Misunderstand the links • Push to increase GDP causes a decline in natural environment and human health
Possible opportunities	<ul style="list-style-type: none"> • More understanding of opportunity for "self-medication" via the natural environment • Links the payment to agri-sector with diet and environmental impacts e.g. meat / GHG / Water and human health
Evidence needs	<ul style="list-style-type: none"> • Better evidence for links between physical and mental health and natural resources. E.g., air quality and links for green space and mental health. Water / vegetables pathogens and disease.
Connections to other policy areas	<ul style="list-style-type: none"> • Health • Education e.g. diet • Sport and recreation

The Driver	1. Agricultural support payments are increasing, focussed on public goods
The Challenge	<p>Farmers and foresters manage their land to deliver economic products and public goods and services. However, pressures on land-use, changing market demands, and changes to cap funding post-Brexit may have unintended consequences on behaviour, practice and land use. Through better understanding of socio-economic drivers of behaviour and implications on land management practice, and the ecological and environmental interactions we can realise the opportunities to rebalance land use between sectors, i.e. agriculture, forestry, recreation and conservation, realise savings and benefits to other sectors (health, energy, tourism) and improve water and air quality, whilst also providing food and forest products.</p> <p>98 words</p>

Possible outcomes	<ul style="list-style-type: none"> • Target outcome point break will be farmers and foresters managing their land to deliver more public goods (e.g. cleaner air, water, recreation, amenity and social benefits, environmental benefits etc.)
Possible threats	<ul style="list-style-type: none"> • No funding to deliver benefits • Unintended level use / management charges or insufficient charge due to lack of understanding of behaviour drivers. Don't get what we pay for (social and economic drivers of behaviour) • Other land use pressures and market demands undermine payments for 'positive' land management
Possible opportunities	<ul style="list-style-type: none"> • Savings and benefits to other sections such as reduced health, energy costs etc. • The focus of payments for land management in terms of benefits for all e.g. water / air quality. • Rebalance between land use sections, such as agricultural, forestry, tourism and other land use, water security. • Integrated land management payments • Rejuvenating all sectors / industries to be more innovative drawing in new skills and people.
Evidence needs	<ul style="list-style-type: none"> • Better understanding of social and economic drivers of behaviour in terms of land use, water (??) use, change & management, and the ecological and environmental interactions of this.
Connections to other policy areas	<ul style="list-style-type: none"> • Social science • Economics • Modelling and scenario forecasting / predictive modelling • Measuring and modelling land management benefits using new technology

The Driver	<p>21. Lowland/upland land capability and use will face increasing and competing demands</p> <p>24. Patterns of land and marine use will need to change to meet the UK's food and energy needs</p>
<p>The Challenge</p> <p>100 words</p>	<p>Land use is predicted to change in order to meet future food and energy needs. There is a risk that increasing pressures for food and energy results in negative environmental impacts. High level spatial planning with spatially explicit projections of future scenarios can help develop robust policies and support land use change, avoiding land abandonment and damage from higher intensity land management, and the marine and fresh water environments. More research in green energy capacity is needed along with the social and economic impacts and drivers of land use change. A more collective understanding of cross-landscape interactions is needed</p>

Possible outcomes	<ul style="list-style-type: none"> • Either; land use is carefully balanced between food & energy needs with careful consideration of the environment through spatial planning, or market forces drive land use change and management to the expense of the environment.
Possible threats	<ul style="list-style-type: none"> • Negative impacts on fresh water and marine environment as a result of intensive agriculture. • Uplands abandoned as not commercially viable. • Market forces drive land use change and management at the expense of the environment.
Possible opportunities	<ul style="list-style-type: none"> • A more co-ordinated and rehearsed (?) approach and spatial planning is developed and ??? • Woodland expansion, ??? and green energy supported. • A new collective understanding of the cross-??? And cross-landscape interactions.
Evidence needs	<ul style="list-style-type: none"> • Social and economic consequences of land use change (as well as environmental) • Spatial explicit models and scenario projecting • Potential productivity of land use under climate change, biodiversity niches for sectors, water capacity
Connections to other policy areas	<ul style="list-style-type: none"> • Energy / green energy • Social and economic drivers of land use change.

The Driver	<p>17. Improvements in farming techniques and technology will boost productivity and food security</p> <p>23. New technology will continue have an impact on the natural environment</p>
<p>The Challenge</p> <p>90 words</p>	<p>New technology is having an impact on the natural environment and may boost productivity generally and food and fibre and fuel security. New technology creates markets in particular new producers, diversifying landscapes and species leading to environmental and industrial resilience. However, technology may also push productivity at the expense of the natural environment. To mitigate this threat and realise the opportunity we need to know more about the environmental impacts of the new technologies, their development and the impacts the technologies have on existing markets and supply chains.</p>

Possible outcomes	<ul style="list-style-type: none"> • Necessity is the
Possible threats	<ul style="list-style-type: none"> • Technology pushes production at the expense of the environment
Possible opportunities	<ul style="list-style-type: none"> • New technology will create more markets & producers, and diverse landscapes and species increasing ???? resilience in both the environment and industry??
Evidence needs	<ul style="list-style-type: none"> • Markets • Delivery • Innovation • Supply chain • Environmental impacts of technologies • (All of the above) leads to business case for the technology to be developed
Connections to other policy areas	<ul style="list-style-type: none"> • Construction/infrastructure • Horticulture • Food retail sectors •

5. Water, Fisheries and Marine

Stats

- **26 drivers** mapped as more important for UK environmental policy in the future and having a certain outcome
 - The group prioritised 3 and discussed 3 in detail
- **13 drivers** mapped as more important for UK environmental policy in the future and having an uncertain outcome
 - The group prioritised 2 and discussed 2 in detail
- **5 drivers** mapped as being less important for UK environmental policy in the future and having a certain outcome. These drivers can be **parked**.
- **4 drivers** mapped as being less important for UK environmental policy in the future and having an uncertain outcome. It may be worth **monitoring** these drivers to determine whether – as the outcome becomes clearer – they become more important for UK environmental policy in the future.
- The group identified **1 additional driver**:
 - *Antibiotic resistance + pollution x provenance*

Drivers that are MORE IMPORTANT for UK environmental policy and have a CERTAIN OUTCOME	Challenge	Priority	Not ranked
2. Circular economy practices will become more widely used and change what society values			●
3. Citizen engagement is likely to become increasingly important across a range of policy areas			●
4. Climate change will continue to cause increased temperature and increased occurrence of extreme weather and seasonal events.	●		
7. Data analytics will enable sophisticated mapping of demand and supply			●
11. Food security and water security will become significant challenges; perhaps even sources of conflict			●
15. Governments will continue to collaborate to address Climate Change and Sustainable Development			●
16. Governments will seek to achieve a global free trade agreement			●
19. Local economic performance around the UK will be uneven, leading to increased regional disparity			●
20. London and other major UK cities will continue to grow in size and population			●
21. Lowland/upland land capability and use will face increasing and competing demands			●
22. More than one quarter of the world's population will live with water scarcity on a daily basis by 2040			●
23. New technology will continue have an impact on the natural environment			●
24. Patterns of land and marine use will need to change to meet the UK's food and energy needs			●
26. Pests and diseases will be more widely dispersed			●
27. Planning needs to be future proofed and more embedded			●
28. Retailer power will drive farming systems			●
30. Technology is likely to play an increasing role in regulation, both in monitoring and compliance			●
31. The average age of the UK population will be 42.9 years in 2045. 1 in 12 will be over 80			●
33. The contribution that natural capital makes to UK growth will become more important			●
34. Poverty and social injustice is creating a disconnection between people and the environment	●		

36. The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process			●
39. The sale of petrol and diesel vehicles will be banned in 2040			●
40. The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality			●
44. The value of the UK's ecotourism markets is likely to increase			●
Antibiotic resistance + pollution x provenance	●		

Drivers that are MORE IMPORTANT for UK environmental policy and have an UNCERTAIN OUTCOME	Challenge	Priority	Not ranked
1. Agricultural support payments are increasing, focussed on public goods	●		
5. Consumption is likely to increase steadily			●
8. Decarbonisation will significantly impact on policy formulation and implementation			●
9. Demand for energy will continue to increase			●
10. Demand for greater regional and local autonomy will continue			●
14. GM crops and animals are likely to become culturally accepted in the UK			●
17. Improvements in farming techniques and technology will boost productivity and food security			●
18. International investment in the UK will increase			●
29. Smart cities and autonomous vehicles will change how we live and travel			●
32. The continued decline in vertebrate species populations is part of a complex biodiversity picture creating winners and losers			●
41. The UK will agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit			●
42. The UK will not retain exclusive fishing rights of the 200 mile exclusive economic zone post Brexit			●
47. Waste will continue to increase and is likely to cause significant environmental challenges	●		

Drivers that are MORE IMPORTANT for UK environmental policy in the future and that have a CERTAIN outcome

The Driver	4. Climate change will continue to cause increased temperature and increased occurrence of extreme weather and seasonal events + ocean acidification is possible
The Challenge	<p>More episodic weather events are likely to lead to increased flooding, pollution and runoff, coastal erosion, changes in dynamics and changes in species range, distribution and diversity. In Wales a high proportion of the population lives in coastal areas. Supporting infrastructure is also concentrated in the coastal area and therefore Wales is especially vulnerable to these impacts.</p> <p>We need to have better forecasting, an understanding of the scale of impact and local responses. There is a policy need to understand the impact on social, environmental and economic resilience and to embed uncertainty and long term evidence into decision making and future planning processes.</p>
103 words	

Outcome of this driver	<ul style="list-style-type: none"> • Increased flooding • Increased pollution runoff • Coastal erosion • Changed dynamics for coastal habitats • Changes in availability of commercial fish • Changes in species range, distribution & diversity (including INNS) • Human movement away from coasts & flood prone areas
Why the outcome is important	<ul style="list-style-type: none"> • Human movement away from coasts & flood prone areas impact on jobs/livelihood/wellbeing/wealth • Changed phenology – fisheries • Economic + social cost • Difficulty in contingency planning because of uncertainty leading to lack of confidence
Opportunity or threat?	<ul style="list-style-type: none"> • Potential threat if focus becomes too localises losing sight of bigger picture and loses integration
Impact of the driver	<ul style="list-style-type: none"> • See outcome
Evidence needs	<ul style="list-style-type: none"> • Long term datasets • Improved modelling including uncertainty – at local and wider scales • What will cumulative impact be • How best to manage flood risk and decided on use of resources • Where to target action on INNS • How to adapt conservation & management to changes
Connections to other policy areas	<ul style="list-style-type: none"> • Depending on global policies • CO2 reduction policies • Poverty/ well-being agenda

The Driver	34. Poverty and social injustice is creating a disconnection between people and the environment
The Challenge	<p>Poverty and social injustice is creating a disconnection between people and the environment.</p> <p>Lack of awareness and appreciation of the natural environment leads to a society disenfranchised from environmental policy, feeding a vicious circle of reduced political emphasis upon nature. Economic downturn post-Brexit could increase poverty, which combined with lack of political will could lead to increasing environmental harm.</p> <p>To reconnect people of all social classes with the environment and the essential ecosystem services it provides we need to understand the barriers to access and appreciation of nature. Research should focus on public attitudes, understanding, awareness and valuation of the environment, to establish whether this disconnect is driven by time, resources or accessibility.</p> <p>Policy links are to health and wellbeing, community engagement and education policy</p>
125 words	

Outcome of this driver	<ul style="list-style-type: none"> • Lack of awareness • Lack of willingness to pay for / engage on environmental issues • Lack of votes → ↓ political importance 	
Why the outcome is important	<ul style="list-style-type: none"> • People drive policy • Disconnection from environment - ↓ lack of awareness of environmental issues, disempowerment • Loss of ecosystem services, biodiversity environ degradation 	
Opportunity or threat?	Threats Potential for economic disarray post-Brexit combined with lack of political commitment to environment could lead to ever-greater environmental harm	Opportunities <ul style="list-style-type: none"> •
Impact of the driver	<ul style="list-style-type: none"> • If not addressed – environmental harm 	
Evidence needs	<ul style="list-style-type: none"> • Greater accessibility • Increased education • Research in public attitudes, understanding & awareness / valuation of environment • What are barriers to access usage social/economic 	
Connections to other policy areas	<ul style="list-style-type: none"> • Health and wellbeing • Community engagement • Education policy 	

The Driver	New driver: Antibiotic resistance, pollution and provenance
The Challenge	<p>An increasing and ageing human population is driving increased risk of chemical contamination of the environment. The fate of these in the environment and their impact upon ecosystems is poorly understood. Impacts on human, wildlife and environmental health can be severe (e.g. antimicrobial resistance, cancers, mental health).</p> <p>To formulate appropriate policy, we need to understand sources, pathways and persistence in environmental systems, and links to human food security. Improved public health and wellbeing would reduce demand for pharmaceuticals. Costs of source control, reduction in demand and effective clean up, must be contrasted with the societal and economic losses associated with a contaminated environment.</p> <p>103 words</p>

Outcome of this driver	<ul style="list-style-type: none"> Contamination risk will increase 	
Why the outcome is important	<ul style="list-style-type: none"> Increasing and aging population will lead to increasing pharma human & agricultural health 	
Opportunity or threat?	Threats <ul style="list-style-type: none"> Not completed 	Opportunities <ul style="list-style-type: none"> Not completed
Impact of the driver	<ul style="list-style-type: none"> Increasing antibiotic efficiency Decreasing food production Increase in cancer, diabetes, mental health ... 	
Evidence needs	<ul style="list-style-type: none"> Link to health demonstrated Sources, routes & rates of pharma & micro-pollutants Clean up / source 	
Connections to other policy areas	<ul style="list-style-type: none"> Public health and wellbeing NHS 	

Drivers that are MORE IMPORTANT for UK environmental policy in the future and that have an UNCERTAIN outcome

The Driver	47. Waste will continue to increase and is likely to cause significant environmental challenges (links with environmental pollution)
The Challenge	Waste is defined as a risings, process inefficiencies and pollution (transient /persistent). Increased contamination will ultimately lead to health and wellbeing impacts. Potential threats post Brexit include reduction in effectiveness of regulatory framework, reduced funding to incentivise behavioural change. A lack of funding may lead to reactive action rather than a strategic focus on chronic system failures. Opportunities include increased flexibility to consider circular economy integrating waste, land management etc. To capitalise on the opportunities policy makers need to be aware of how to harness innovative technology, any lags in deployment and need targeted Information about source pathways and apportionment.
100 words	

Possible outcomes	<ul style="list-style-type: none"> • First define what we mean/include in waste; food, energy <ul style="list-style-type: none"> ○ inefficiencies ○ pollution – transient ○ persistent • Potential reduced effectiveness of regulating framework or vice-versa • Increased focus on waste as a traded commodity • Reduced funding to incentivise behavioural change associated with waste • Increased flexibility to consider circular economy, integrated waste management / and land-managementdifferent targets for different areas
Possible threats	<ul style="list-style-type: none"> • Increased contamination leading to health and well-being impacts • Sustainability targets reached • Local issues dominate funding on action, less focus on strategic approaches to action • Disproportionate issues associated with areas of deprivation
Possible opportunities	<ul style="list-style-type: none"> • Novel methods of engagement • Harnessing technology to see waste as a resource rather than problem - harnessing to energy ?? • Localised community engagement responsibilities • If develop novel technologies opportunities to build sector
Evidence needs	<ul style="list-style-type: none"> • Knowledge of source, pathways + apportionment • Knowledge of technological opportunities; time to realistic implementation
Connections to other policy areas	<ul style="list-style-type: none"> • Innovation, cross-fertilisation skills/ • Interactions with health and well-being • Links to land-use, developments • Community + local communities

The Driver	1. Agricultural support payments are increasing, focussed on public goods
The Challenge	<p>The lack of certainty around future subsidies brings risk of agricultural collapse but also opportunities for improved ecosystem services. Risks might include farm abandonment, food security, human and animal welfare. Benefits might include water quality, carbon sequestration, flood mitigation etc. Biodiversity change is likely.</p> <p>To formulate appropriate policy, evidence of the true economic value of ecosystem services in a natural capital/resource accounting format is required. This would include estimation of avoidable costs of agricultural collapse (including societal), and comparison with potential long-term gains to society of using subsidies to support and develop ecosystem services.</p> <p>94 words</p>

Possible outcomes	<ul style="list-style-type: none"> • Not stated
Possible threats	<ul style="list-style-type: none"> • Not stated
Possible opportunities	<ul style="list-style-type: none"> • Not stated
Evidence needs	<ul style="list-style-type: none"> • Not stated
Connections to other policy areas	<ul style="list-style-type: none"> • Not stated

6. Environment, conservation and wildlife

Stats

- **22 Drivers** mapped as more important for UK environmental policy in the future and having a certain outcome
 - The group prioritised 6 and discussed 2 in detail
- **11 drivers** mapped as more important for UK environmental policy in the future and having an uncertain outcome
 - The group prioritised 6 and discussed 1 in detail
- **9 drivers** mapped as being less important for UK environmental policy in the future and having a certain outcome. These drivers can be **parked**.
- **5 drivers** mapped as being less important for UK environmental policy in the future and having an uncertain outcome. It may be worth **monitoring** these drivers to determine whether – as the outcome becomes clearer – they become more important for UK environmental policy in the future.

Drivers that are MORE IMPORTANT for UK environmental policy and have a CERTAIN OUTCOME	Challenge	Priority	Not ranked
3. Citizen engagement is likely to become increasingly important across a range of policy areas		●	
4. Climate change will continue to cause increased temperature and increased occurrence of extreme weather and seasonal events.			●
7. Data analytics will enable sophisticated mapping of demand and supply			●
8. Decarbonisation will significantly impact on policy formulation and implementation			●
9. Demand for energy will continue to increase			●
12. Global population is likely to exceed 8.5 billion by 2030			●
15. Governments will continue to collaborate to address Climate Change and Sustainable Development			●
17. Improvements in farming techniques and technology will boost productivity and food security			●
21. Lowland/upland land capability and use will face increasing and competing demands	●		
23. New technology will continue have an impact on the natural environment			●
24. Patterns of land and marine use will need to change to meet the UK's food and energy needs			●
26. Pests and diseases will be more widely dispersed		●	
27. Planning needs to be future proofed and more embedded	●		
30. Technology is likely to play an increasing role in regulation, both in monitoring and compliance			●
31. The average age of the UK population will be 42.9 years in 2045. 1 in 12 will be over 80			●
32. The continued decline in vertebrate species populations is part of a complex biodiversity picture creating winners and losers		●	
34. Poverty and social injustice is creating a disconnection between people and the environment			●
37. The internet of things will change production processes and practices profoundly			●
39. The sale of petrol and diesel vehicles will be banned in 2040			●
40. The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality		●	
44. The value of the UK's ecotourism markets is likely to increase			●

46. There will be no magic bullet that eases pressure on the natural environment to provide food and energy			●
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Drivers that are MORE IMPORTANT for UK environmental policy and have an UNCERTAIN OUTCOME	Challenge	Priority	Not ranked
1. Agricultural support payments are increasing, focussed on public goods		●	
10. Demand for greater regional and local autonomy will continue		●	
14. GM crops and animals are likely to become culturally accepted in the UK	●		
18. International investment in the UK will increase			●
19. Local economic performance around the UK will be uneven, leading to increased regional disparity			●
33. The contribution that natural capital makes to UK growth will become more important		●	
36. The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process		●	
41. The UK will agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit			●
42. The UK will not retain exclusive fishing rights of the 200 mile exclusive economic zone post Brexit			●
43. The UK's reputation as a migrant unfriendly country will have an impact on jobs and wealth creation			●
45. The world economy will double in size by 2045		●	

Drivers that are MORE IMPORTANT for UK environmental policy in the future and that have a CERTAIN outcome

The Driver	21. Lowland/upland land capability and use will face increasing and competing demands
The Challenge	Land use will be more politicised post-Brexit as new agricultural policy is created and a public money for public goods system implemented. If food production is prioritised above carbon capture, flooding resilience or nature conservation, then it may be difficult to ensure an ecosystem approach is taken forward. This will be affected by global trade, decarbonisation targets and internal UK markets. In 2042, an effective land use policy would centre on ecosystem services, ecotourism and conservation. Evidence will be needed on the most effective way the land can be managed that increases ecosystem resilience, as well as fits with socioeconomic policy, public health and industrial strategy. Decision making should be based on enhanced monitoring, observation and opportunity mapping.
118 words	

Outcome of this driver	<ul style="list-style-type: none"> • Multi-use landscapes, e.g. integrated land-use • Multi-benefits, e.g. transition of farmers to land managers • Win-win • More rational strategic decision-making • More rational land-use policy
Why the outcome is important	<ul style="list-style-type: none"> • Effects the whole future of the natural environment • Otherwise trade-offs/negative impacts e.g. biodiversity fails
Opportunity or threat?	<ul style="list-style-type: none"> • Opportunity
Impact of the driver	<ul style="list-style-type: none"> • Sustainable management of natural resources • Land managers/rural community security • Increased ecosystem resilience and wider social/economic resilience reverse of biodiversity decline
Evidence needs	<ul style="list-style-type: none"> • Better monitoring with earth observation • What works and what doesn't with multi-use landscape • Land-use decisions-making tool/opportunity mapping underpinned by ground truthing • How to measure ecosystem resilience • Baseline data regularly updated • Better understanding of the integration of ecosystem services
Connections to other policy areas	<ul style="list-style-type: none"> • Socio-economic e.g. tourism • Health • Food and farming • Energy • Flooding • Planning/housing

The Driver	27. Planning needs to be future proofed and more embedded
The Challenge	<p>Planning needs to be future proofed and more embedded (with green infrastructure like SUDS, carbon neutral housing, access to green space and renewable energy embedded in all urban policy)</p> <p>Planning needs to be based on environmental resilience, individual wellbeing and sustainable development. Integrated planning should reflect multiple benefits, e.g. tree planting and preservation is a cost effective method of increasing carbon capture, tackling air pollution and creating health benefits for local people. New housing developments could, theoretically, all be built from sustainable materials and be carbon neutral through renewable energy generation, as well as tackle fuel poverty. Policy development should focus on integrating marine planning, urban development and rural land usage. Evidence needs to quantify the multiple and integrated benefits and create good design tools for planners; in Wales, Area Statements and Wellbeing Plans are designed to aid this holistic approach.</p> <p>112 words</p>

Outcome of this driver	<ul style="list-style-type: none"> • To improve the life of people in Wales • To reverse the decline in biodiversity
Why the outcome is important	<ul style="list-style-type: none"> • Effects the whole future of the natural environment • Otherwise trade-offs/negative impacts e.g. biodiversity fails
Opportunity or threat?	<ul style="list-style-type: none"> • Opportunity
Impact of the driver	<ul style="list-style-type: none"> • Happier society • Improved well-being & health • Divergence in natural planning procedures across UK • Improved ecosystem resilience
Evidence needs	<ul style="list-style-type: none"> • Understanding & quantifying the benefits – green infrastructure, SUDS, noise/air pollution reduction • Developing good design tools
Connections to other policy areas	<ul style="list-style-type: none"> • Health • Economy • Flooding • Carbon/climate change • Biodiversity • Transport

Drivers that are MORE IMPORTANT for UK environmental policy in the future and that have an UNCERTAIN outcome

The Driver	14. GM crops and animals are likely to become culturally accepted in the UK
The Challenge	<p>Post-Brexit, international trade agreements will come attached with new and possibly lower standards. The risks to the UK of accepting GM crops are potential agricultural intensification; the loss of arable dependent species; and wider impacts for biodiversity and public health. However, with a good evidence base, genetically modified food can lead to opportunities for food security, such as increasing resilience of a plant to environmental stresses or moving to meat-free diets. If, by 2042, GM food is part of UK policy, it'll need to be based on robust safeguarding and regulatory conditions as the risks to living organisms are significant.</p>
100 words	

Possible outcomes	<ul style="list-style-type: none"> • Introduction and integration of GM products with uncertain outcomes • changes in international trade agreements
Possible threats	<ul style="list-style-type: none"> • Changes to genetic basis of biodiversity • Changes to agricultural practices <ul style="list-style-type: none"> ○ Increased intensification practices ○ Less 'weed' stock ○ Potentially loss of arable specialised species
Possible opportunities	<ul style="list-style-type: none"> • Less inputs agricultural practices • Lower water tolerances means less water needs • Less food waste • Potential for increased carbon capture
Impact of the driver	No comment from the group
Evidence needs	<ul style="list-style-type: none"> • Potential environmental impacts of GM organisms - what are the safeguards? • Better understanding of the risks of GM organisms <ul style="list-style-type: none"> ○ I→ biological (to native species) ○ I→ land practice changes • Monitoring and mechanisms to safeguard, limits risks and effectively identify potentially negative impacts
Connections to other policy areas	<ul style="list-style-type: none"> • Food • Agriculture • Water • Public health • Public perception

7. Climate change, air quality and energy

Stats

- **15 drivers** mapped as more important for UK environmental policy in the future and having a certain outcome
 - The group prioritised 6 and discussed 1 in detail
- **21 drivers** mapped as more important for UK environmental policy in the future and having an uncertain outcome
 - The group prioritised 6 and discussed 1 in detail
- **4 drivers** mapped as being less important for UK environmental policy in the future and having a certain outcome. These drivers can be **parked**.
- **7 drivers** mapped as being less important for UK environmental policy in the future and having an uncertain outcome. It may be worth **monitoring** these drivers to determine whether – as the outcome becomes clearer – they become more important for UK environmental policy in the future.

Drivers that are MORE IMPORTANT for UK environmental policy and have a CERTAIN OUTCOME	Challenge	Priority	Not ranked
1. Agricultural support payments are increasing, focussed on public goods		●	
2. Circular economy practices will become more widely used and change what society values			●
3. Citizen engagement is likely to become increasingly important across a range of policy areas		●	
4. Climate change will continue to cause increased temperature and increased occurrence of extreme weather and seasonal events.		●	
7. Data analytics will enable sophisticated mapping of demand and supply			●
8. Decarbonisation will significantly impact on policy formulation and implementation		●	
11. Food security and water security will become significant challenges; perhaps even sources of conflict		●	
13. Global resource shortages (metals, nutrients for example) will begin to bite			●
15. Governments will continue to collaborate to address Climate Change and Sustainable Development			●
17. Improvements in farming techniques and technology will boost productivity and food security			●
20. London and other major UK cities will continue to grow in size and population			●
27. Planning needs to be future proofed and more embedded	●		
35. The economic centre of gravity will continue to move away from the west towards China and the east			●
37. The internet of things will change production processes and practices profoundly			●
39. The sale of petrol and diesel vehicles will be banned in 2040			●

Drivers that are MORE IMPORTANT for UK environmental policy and have an UNCERTAIN OUTCOME	Challenge	Priority	Not ranked
5. Consumption is likely to increase steadily		●	
9. Demand for energy will continue to increase			●
10. Demand for greater regional and local autonomy will continue			●
12. Global population is likely to exceed 8.5 billion by 2030			●
14. GM crops and animals are likely to become culturally accepted in the UK			●
16. Governments will seek to achieve a global free trade agreement			●
21. Lowland/upland land capability and use will face increasing and competing demands		●	
23. New technology will continue have an impact on the natural environment			●
24. Patterns of land and marine use will need to change to meet the UK's food and energy needs			●
26. Pests and diseases will be more widely dispersed			●
28. Retailer power will drive farming systems			●
30. Technology is likely to play an increasing role in regulation, both in monitoring and compliance			●
33. The contribution that natural capital makes to UK growth will become more important		●	
34. Poverty and social injustice is creating a disconnection between people and the environment			●
36. The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process	●		
40. The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality		●	
41. The UK will agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit			●
44. The value of the UK's ecotourism markets is likely to increase			●
45. The world economy will double in size by 2045			●
46. There will be no magic bullet that eases pressure on the natural environment to provide food and energy			●
47. Waste will continue to increase and is likely to cause significant environmental challenges		●	

Drivers that are MORE IMPORTANT for UK environmental policy in the future and that have a CERTAIN outcome

The Driver	27. Planning needs to be future proofed and more embedded
The Challenge	<p>Planning must be future proofed and embedded to ensure an integrated approach: to deliver lower emissions to reduce climate change, protect the environment, improve air quality and ensure sustainable energy production. This will improve quality of life ensuring sustainable management of natural resources, ensure a resilient and protected environment with enhanced health and wellbeing which will improve prosperity and support the economy. To deliver this, policy makers will require a joined up monitoring and modelling assessment. This will provide evidence that supports the integrated planning approach incorporating and impacting on agriculture, land use, population, economics, transport, ecosystems and human health.</p>
100 words	

Outcome of this driver	<ul style="list-style-type: none"> • An integrated approach to deliver lower emissions to prevent climate change, improve air quality and ensure sustainable energy production and use (high level objective)
Why the outcome is important	<ul style="list-style-type: none"> • Improve quality of life and long term protection of the environment to ensure a sustainable management of natural resources.
Opportunity or threat?	<ul style="list-style-type: none"> • Opportunity: to improve the health and wellbeing of the nation through the Future Generations Act and the Environment Act.
Impact of the driver	<ul style="list-style-type: none"> • The nation with a resilient environmental quality with enhanced health and wellbeing to improve prosperity to will help build an improved economy.
Evidence needs	<ul style="list-style-type: none"> • Joined up monitoring and modelling system to provide policy makers with the evidence that the integrated planning tool is delivering an effective response.
Connections to other policy areas	<ul style="list-style-type: none"> • Agriculture, climate change, land use, population, energy consumption, economics, transport, ecosystems, human health.

The Driver	36. The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process
The Challenge	[Completed by group but file corrupted and it was not possible to retrieve it]
Outcome of this driver	•
Why the outcome is important	•
Opportunity or threat?	•
Impact of the driver	•
Evidence needs	•
Connections to other policy areas	•

Annex 1: Attendees

- Alan Evans, National Oceanography Centre
- Alan Guwy, Sustainable Environment Research Centre
- Alister Wilson, Waverly Consultants (Facilitator)
- Angela Watkins, Welsh Government
- Angus Garbutt, The Centre for Ecology & Hydrology
- Bridget Emmett, The Centre for Ecology & Hydrology
- Charlotte Gibson, Welsh Government
- Chloe Edling, Wildlife Trust
- Chris Conolly, Ricardo
- Clive Walmsey, Natural Resources Wales
- David Thomas, Bangor University
- Dorian Davies, Welsh Government
- Elizabeth Chadwick, Cardiff University
- Hannah Lacey, The Centre for Ecology & Hydrology
- Heather Galliford, RSPB
- Jan Dick, The Centre for Ecology & Hydrology
- Jenny Hawley, Plantlife
- Jim Poole, Natural Resources Wales
- Kate Beauchamp, Forest Research
- Katherine Raymond, Welsh Government
- Kathryn Monk, Natural Resources Wales
- Liz Smith, Wales Environment Link
- Paul Henderson, Dwr Cymru
- Penny Gordon, Natural Environment Research Council
- Rachel Sharp, Wildlife Trust
- Sasha Leigh, Natural Environment Research Council
- Simon Bareham, Natural Resources Wales

Annex 2: The workshop programme

1000	Introduction, aims and objectives
1025	Thinking about the future
1045	Mapping the drivers of UK environmental policy post Brexit
1215	Review and discussion of emerging issues
1245	Lunch
1330	Identifying future policy challenges
1530	Tea
1550	Plenary review of group findings
1630	Close

Annex 3: The full set of drivers

The list of drivers presented to the workshop participants and the additional drivers created by the workshop participants

1. Agricultural support payments are increasing, focussed on public goods
2. Circular economy practices will become more widely used and change what society values
3. Citizen engagement is likely to become increasingly important across a range of policy areas
4. Climate change will continue to cause increased temperature and increased occurrence of extreme weather and seasonal events.
5. Consumption is likely to increase steadily
6. Cyber security will be a continuing threat to international security
7. Data analytics will enable sophisticated mapping of demand and supply
8. Decarbonisation will significantly impact on policy formulation and implementation
9. Demand for energy will continue to increase
10. Demand for greater regional and local autonomy will continue
11. Food security and water security will become significant challenges; perhaps even sources of conflict
12. Global population is likely to exceed 8.5 billion by 2030
13. Global resource shortages (metals, nutrients for example) will begin to bite
14. GM crops and animals are likely to become culturally accepted in the UK
15. Governments will continue to collaborate to address Climate Change and Sustainable Development
16. Governments will seek to achieve a global free trade agreement
17. Improvements in farming techniques and technology will boost productivity and food security
18. International investment in the UK will increase
19. Local economic performance around the UK will be uneven, leading to increased regional disparity
20. London and other major UK cities will continue to grow in size and population
21. Lowland/upland land capability and use will face increasing and competing demands
22. More than one quarter of the world's population will live with water scarcity on a daily basis by 2040
23. New technology will continue have an impact on the natural environment
24. Patterns of land and marine use will need to change to meet the UK's food and energy needs
25. People will have increased mobility and job flexibility
26. Pests and diseases will be more widely dispersed
27. Planning needs to be future proofed and more embedded
28. Retailer power will drive farming systems
29. Smart cities and autonomous vehicles will change how we live and travel
30. Technology is likely to play an increasing role in regulation, both in monitoring and compliance
31. The average age of the UK population will be 42.9 years in 2045. 1 in 12 will be over 80
32. The continued decline in vertebrate species populations is part of a complex biodiversity picture creating winners and losers
33. The contribution that natural capital makes to UK growth will become more important

34. Poverty and social injustice is creating a disconnection between people and the environment
35. The economic centre of gravity will continue to move away from the west towards China and the east
36. The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process
37. The internet of things will change production processes and practices profoundly
38. The risk of interstate conflict will continue to rise
39. The sale of petrol and diesel vehicles will be banned in 2040
40. The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality
41. The UK will agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit
42. The UK will not retain exclusive fishing rights of the 200 mile exclusive economic zone post Brexit
43. The UK's reputation as a migrant unfriendly country will have an impact on jobs and wealth creation
44. The value of the UK's ecotourism markets is likely to increase
45. The world economy will double in size by 2045
46. There will be no magic bullet that eases pressure on the natural environment to provide food and energy
47. Waste will continue to increase and is likely to cause significant environmental challenges

New drivers:

- Antibiotic resistance + pollution x provenance
- The cultural importance of farmers as land custodians increases
- Water security will become significant challenge (see Driver 11)
- Fundamental changes in UK farming sector product profile which will impact our local and global footprint
- Human health will increase in importance
- UK regional variation in approach (SMNR-Links) (see Driver 33)

Annex 4: Less important drivers

Less important and with an uncertain outcome

It is be worth monitoring drivers which map as less important for UK environmental policy in the future and having an uncertain outcome to determine whether they become more important for UK environmental policy in the future.

The table sets out the drivers mapped in this quadrant by each group.

	Food Farming Timber Forests	Water Fisheries Marine	Env't Conserv'n Wildlife	Climate change Air quality Energy
5. Consumption is likely to increase steadily			●	
6. Cyber security will be a continuing threat to international security				●
13. Global resource shortages (metals, nutrients for example) will begin to bite		●	●	
16. Governments will seek to achieve a global free trade agreement			●	
18. International investment in the UK will increase				●
19. Local economic performance around the UK will be uneven, leading to increased regional disparity	●			●
25. People will have increased mobility and job flexibility		●		
28. Retailer power will drive farming systems			●	
31. The average age of the UK population will be 42.9 years in 2045. 1 in 12 will be over 80				●
32. The continued decline in vertebrate species populations is part of a complex biodiversity picture creating winners and losers				●
37. The internet of things will change production processes and practices profoundly		●		
42. The UK will not retain exclusive fishing rights of the 200 mile exclusive economic zone post Brexit				●
43. The UK's reputation as a migrant unfriendly country will have an impact on jobs and wealth creation				●
45. The world economy will double in size by 2045		●		
47. Waste will continue to increase and is likely to cause significant environmental challenges			●	

Less important and with a certain outcome

Drivers which map as less important for UK environmental policy in the future and having a certain outcome - particularly if they map in more than one or two quadrants – are almost certainly not important for the project.

	Food Farming Timber Forests	Water Fisheries Marine	Env't Conserv'n Wildlife	Climate change Air quality Energy
2. Circular economy practices will become more widely used and change what society values			●	
6. Cyber security will be a continuing threat to international security		●	●	
11. Food security and water security will become significant challenges; perhaps even sources of conflict			●	
12. Global population is likely to exceed 8.5 billion by 2030		●		
14. GM crops and animals are likely to become culturally accepted in the UK	●			
20. London and other major UK cities will continue to grow in size and population			●	
22. More than one quarter of the world's population will live with water scarcity on a daily basis by 2040			●	●
25. People will have increased mobility and job flexibility			●	●
29. Smart cities and autonomous vehicles will change how we live and travel			●	●
35. The economic centre of gravity will continue to move away from the west towards China and the east		●	●	
38. The risk of interstate conflict will continue to rise		●	●	●
42. The UK will not retain exclusive fishing rights of the 200 mile exclusive economic zone post Brexit	●			
43. The UK's reputation as a migrant unfriendly country will have an impact on jobs and wealth creation		●		
46. There will be no magic bullet that eases pressure on the natural environment to provide food and energy	●			