



Cumulus Consultants Ltd  
in association with  
Land Use Consultants & Royal Agricultural College

## **The Future of Farming and Forestry in the Cotswolds AONB**

What do climate change and globalisation  
mean for farming and forestry in the  
Cotswolds AONB?

### **Executive Summary**

For the  
**Cotswolds Conservation Board**

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## **EXECUTIVE SUMMARY**

The Cotswold Conservation Board recognises that climate change and globalisation are two of the key forces for change that will impact significantly on the Cotswolds AONB over the years and decades ahead. This study focuses on the impacts of these forces on farming and forestry, which between them account for 96% of land area of the AONB and support many of the special features which make the Cotswold landscape so unique.

The overall aim of the study is to understand better the impacts of climate change and globalisation on farming and forestry in the Cotswolds AONB. Specific objectives are:

- To update the 2003 Cotswold Farming Study, and identify significant changes and trends;
- To assess the current position of forestry within the Cotswolds AONB;
- To provide an overview of the forces for change;
- To identify various scenarios on the possible impacts of these forces on farming and forestry;
- To propose policies and actions to promote and guide change in farming and forestry in line with the objectives of the Cotswolds AONB;
- To align the conclusions of the study to the Cotswolds AONB Management Plan.

The methodology used in the study included: data collation and analysis; a literature review; internal and external workshops (involving farmers, foresters, advisers, statutory body staff and Conservation Board members); scenario development and analysis; and reporting.

### **Current state and trends in farming and forestry in the Cotswolds**

There has largely been a continuation of the farming trends identified in the 2003 study despite significant policy and market changes. Land use trends include a reduction in the area of crops and fallow and an increase in the area of grassland and woodland on farm holdings. However, following the recent abolition of set-aside, there has been a noticeable expansion in the area of cropped land in the AONB. The total number of farm holdings has increased since 1990, although the number of dairy and mixed holdings has fallen. There has been a general reduction in livestock numbers, although the number of beef cattle and sheep has increased since 2002. The agricultural labour force has also continued to fall with a significant 45% fewer farm workers in 2007 compared to 1990. More positively, it is estimated that around 65% of the total agricultural area is now under some form of agri-environment scheme and at least 10% of the area is in organic production or organic conversion. The total farmgate income is estimated to be around £106 million, a significant contribution to the economy of the AONB.

Data on forestry is more limited. The total area of woodland in the Cotswolds is estimated to be 20,657ha (10.1% of the AONB area). 65% of this woodland is broadleaf, and just under half is ancient semi-natural woodland or plantations on ancient woodland sites. This includes beech woodland which is a distinctive feature of the AONB, located on the scarp and along incised valleys. The total area of woodland in the Cotswolds has increased since 1990, mainly on farmland, although there is anecdotal evidence to suggest that this trend has slowed over the past five years.

### **Future pressures on farming and forestry in the Cotswolds**

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In the future, farming and forestry in the AONB will be influenced by a number of pressures including: climate change; increasingly global markets for food and timber, with associated price volatility; changes in support payments; energy issues, including rising fossil fuel prices and policies supporting renewable energy; the delivery of ecosystem services; and leisure and amenity use. Minor pressures include demand for land for development, minerals and waste. Land ownership and landowner objectives, and the availability of skilled labour, will continue to play a major role in the nature and degree of change experienced on the ground.

### **Scenarios**

In order to assess the impacts of climate change on farming and forestry, future scenarios have been developed and analysed using two key parameters: climate change (temperature and precipitation); and responses to climate change (from government, businesses and individuals). The 'most likely' scenario is based on the best available information from the UK Climate Impacts Programme (UKCP09) which suggests, by 2030, temperature increases of 1.6°C in summer and 1.3°C in winter, and precipitation decreases of 7% in summer and increases of 7% in winter<sup>1</sup>. This scenario also assumes a reasonably positive response to the challenge of climate change from government, businesses and individuals.

The 'best case' scenario assumes a low degree of climate change (based on the UKCP09 low emissions scenario) and a high response from government, businesses and individuals. Conversely, the 'worst case' scenario is based on a high degree of climate change (based on the UKCP09 high emissions scenario) and a low response.

### **Impacts**

Under the most likely scenario, a range of impacts on farming and forestry in the Cotswolds can be expected.

#### *Farming*

Crop and grass yields are likely to increase, but there is also likely to be greater variability in crop yield and quality, including crop failure, resulting from more, unpredictable, extreme events. The area of winter wheat and oil seed rape is not expected to change markedly from present, although there are likely to be different crop varieties and management methods reflecting future warmer, drier conditions. The area of bio-energy, novel crops (e.g. durum wheat, sunflowers, soya and grapes) and forage maize is likely to increase. The area of grassland is not expected to change significantly although the management of much of this area may become more extensive to reflect more droughty conditions in the summer.

Livestock numbers are expected to reduce overall, continuing recent trends. The main reductions, in percentage terms, are likely to be with dairy cattle and pigs. The number of beef cattle and sheep is expected to reduce more gradually. Livestock fertility, lactation and growth rates are expected to reduce and/or become more variable due to heat stress. In response to higher temperatures, new types and breeds of livestock are likely to be introduced.

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<sup>1</sup> These estimates take the central estimate (50% probability) of the UKCP09 medium emissions scenario for the SW region.

More generally, farmers should expect more and different types of pest and disease with warmer weather and milder winters. Greater importance is likely to be placed on soil and nutrient management, water conservation, energy efficiency and on-farm renewable energy production. More mixed farming and/or co-operation between farms in terms of the efficient use of manure, slurry and straw should be expected, as well as different crop rotations. In terms of farm business planning, there is likely to be greater emphasis on long term planning and spreading risks, and for some, this may mean more diversified enterprises.

#### *Forestry*

The impacts on forestry are likely to be more subtle than farming given the nature of the sector including the longer crop rotation. Increased timber and biomass yields can be expected, but timber quality may be adversely affected due to drought and other factors. Certain species (e.g. oak, sweet chestnut) are likely to fare better than others (e.g. beech) in terms of yield and survival. More damage to trees and woodland will result from wind, pests, disease and fire.

Foresters may seek to adapt planting regimes by using mixes of species and provenance, and higher stocking rates, in order to provide greater genetic diversity. New planting may also be used to buffer and connect existing woodlands. Foresters can be expected to adjust rotation length and the timing of thinnings to reduce the risk of wind throw.

Overall, the current trend of more broadleaved woodland and less coniferous woodland is likely to continue. More wood is expected to go to the woodfuel market and a growth in the woodfuel / biomass energy sector is likely.

#### *Landscape, habitat, historic environment and rural economy*

The impacts of these changes on landscape, habitat, historic environment and rural economy in the AONB are varied.

Landscape impacts may include a more diverse crop mosaic, more droughty landscape in summer and an increase in the number of reservoirs, energy generation schemes and composting sites.

Limestone grassland will become drier and more prone to fire. A reduction in water quality and quantity will adversely affect aquatic and wetland habitats and species. The range of native and non-native species of plants and animals is likely to change.

There may be an increased risk of damage to parkland and grazed historic sites from poaching in winter and overgrazing/fire in summer. Some monuments may be adversely affected by lower water tables.

Rural economy impacts may include increased domestic tourism, increased opportunities for diversified enterprises and pressure on rural skills and experience to manage change / events.

#### *Environmental services*

A range of environmental services are currently provided by or affected by farming and forestry in the AONB. The impacts of climate change under the most likely scenario on these

services include a potential increase in agricultural output but a decline in quality of these products, particularly timber. Water will come under particular pressure with likely reductions in water quality and water resource availability, and an increase in the frequency and intensity of flooding; changes in land use and management could be very important in helping to minimise negative impacts. There is also potential for farming and forestry to improve carbon storage and decrease greenhouse gas emissions to help mitigate climate change. The provision of landscape, biodiversity and public recreation services will also be affected, as indicated above.

#### *Best and worst case scenarios*

The best case and worst case scenarios illustrate the spectrum of potential opportunities and challenges ahead.

Under the best case scenario, which assumes a smaller degree of climate change, rapidly evolving markets and a more positive response from government and businesses, in comparison with the most likely scenario, the changes will be subtle compared to the present. The main impacts will come from measures taken by farmers and foresters to adapt to and mitigate climate change rather than climate change *per se*, for example the growth of biofuel and biomass crops and the development of the woodfuel sector.

In contrast, under the worst case scenario, with a high degree of climate change, relatively unresponsive markets, weak leadership by government and resistance to change from businesses, there will be more significant changes arising from rising temperatures, dry summers and wetter winters, for example more frequent/extensive crop failures and woodland die-back. These will be exacerbated by a general failure of farming and forestry to adapt to and mitigate climate change.

#### **Issues**

In assessing the impacts of climate change and globalisation on farming and forestry in the future, and discussing potential changes with workshop participants, this study has identified a number of key issues which need to be understood and addressed by the Conservation Board and its partners.

Firstly, change in the character of the Cotswolds landscape is inevitable and to some extent desirable if farmers and foresters are to play their part in adapting to and mitigating climate change and respond to other challenges. However this change will need to be managed in order to ameliorate potentially adverse impacts.

Farmers and foresters have a high level of awareness of the existence of climate change, but there is less understanding of the impacts and actions required at farm or estate level. This is in part due to the complexity, uncertainty and long term nature of the changes.

Local authorities and other policy makers need to understand the challenges and opportunities presented by climate change in the land-based sector. These bodies should show leadership in certain areas (e.g. woodfuel/biomass energy), support appropriate initiatives, and adapt their own programmes. Research will also be required to understand the impacts of climate change on the special features and species of the Cotswolds and inform the development of appropriate strategies

Finally, climate change presents an opportunity to improve the resilience of local communities by developing closer connections between farmers, foresters and local people (e.g. local food, renewable energy and flood management).

### Recommendations

A number of recommendations to address the impacts and issues arising are made for the consideration of the Conservation Board. Each recommendation is categorised according to whether it is likely to be delivered internally or externally and its linkage to the AONB Management Plan. The recommendations have been designed to build upon the current tasks set out in the AONB Management Plan and to help inform the development of a Climate Change Action Plan.

#### A) Research and Monitoring

Understanding ongoing impacts, reviewing responses and monitoring change over time will be crucial to successful AONB strategy development and management.

#	Recommendation	Internal External	Management Plan
A1	Develop the recommended set of farming and forestry change indicators and implement a robust monitoring and reporting system. A long term commitment will be required.	Internal with external support	CCA1 CCT1 and 2 LA3 LT4
A2	Harness the knowledge of local groups and specialists, e.g. those interested in fungi, to help monitor ecosystem change..	Internal with external support	CCA1 CCT1 and 2
A3	Support research relating to the effect on and the future management of key AONB special features such as species rich limestone grassland, thin brashy soils and veteran beech trees, and disseminate targeted information to local stakeholders.	Internal with external support	CCA5 RLMA3 and 4 RLMT4 and 7
A4	Support research and dissemination of information relating to suitable woodland design, tree species choice and provenance to landowners and nurseries.	Internal with external support	RLMA6 RLMT9

#### B) Policy and Planning

Climate change will bring about new policy and planning challenges. There will be an increasing need for new policies and strategies to reflect changing priorities. Planning issues will include pressure for new farm buildings, building adaptation, energy generation schemes, composting and tourism development.

#	Recommendation	Internal External	Management Plan
B1	Climate change proof all AONB policies.	Internal  and external	CCA2 and 5 CCT3 and 10
B2	Develop a Climate Change Action Plan to help guide internal and stakeholder strategy and actions.	Internal	CCA2 and 5 CCT3 and 10
B3	Develop pro-active AONB specific guidance for landowners and rural businesses on key climate change planning and development issues to support decision making and raise awareness.	Internal	PPA1 PPT2
B4	Encourage and facilitate more joined up climate change action across the Cotswolds by engaging with and leading local fora particularly as regards waste management, composting, planning, local food supply chains, transport and energy generation/efficiency.	Internal  and external	CCA1, 3 and 4 CCT1, 4 and 7
B5	Encourage government and local authorities to take a positive approach, within the constraints of the Cotswolds landscape, to new and improved farm and forestry infrastructure where it helps business and communities adapt to climate change.	External	PPA1 PPT1 and 3
B6	Engage and work with the local authorities' climate change working groups and encourage good practice development.	External	PPA1 PPT1 and 3
B7	Influence RDPE policy, targeting and delivery, particularly the EWGS and ESS, to optimise access to financial support in the AONB for climate change mitigation and adaptation.	External	RLMA1 RLMT2

### **C) Awareness, Skills and Training**

Successful adaptation and mitigation will require new skills and understanding. The Conservation Board could play a key role in raising the skills base and awareness in the farming, forestry and rural business community.

#	Recommendation	Internal External	Management Plan
C1	Develop and disseminate suitable AONB specific cost/benefit case studies on key climate change issues and management approaches.	Internal	New
C2	Assess skills and training needs within the farming and forestry sector. For example, is there a need for training in soil and nutrient management, risk management, novel crops etc.	Internal and external	RLMA7 RLMT10
C3	Develop a programme of AONB specific farm, forestry and business walks, talks, training events and workshops on key climate change issues and management approaches.	Internal	AAA3 AAT4
C4	Target tomorrow's land managers via events and literature aimed at Fresh Start groups, Young Farmer Clubs, local colleges etc.	Internal	New

#### D) Diversification and Business Support

Rural businesses will have to change and diversify to manage future risks successfully and make the most of new opportunities. Financial support will be required. The Conservation Board could help co-ordinate and support this activity.

#	Recommendation	Internal External	Management Plan
D1	Develop a project officer role tasked with promoting and co-ordinating rural business assessment and change management through diversification. This role would have a specific focus on developing diversification activities which contribute to AONB preferred measures and policies such local food projects, organic farming, low impact energy generation, wood-fuel production, habitat restoration/expansion, green tourism etc.	Internal	RLMA2 RLMT4
D2	Develop a project officer role tasked with helping to optimise financial support for climate change adaptation and mitigation in the AONB area through the RDPE grant system.	Internal	RLMA2 RLMT4
D3	Develop a dedicated grant scheme to help fund priority and innovative climate change adaptation and mitigation projects at rural community level.	Internal	New

### E) Soil and Water Management

Good soil and water management is crucial to climate change mitigation and adaptation. Although considerable information and advice is available at regional/national level, there is a need for Cotswold specific information and advice. The Conservation Board could help co-ordinate and support this activity.

#	Recommendation	Internal External	Management Plan
E1	Collate and disseminate Cotswold specific soil management information to farmers, landowners and advisers. This should focus on reducing erosion and wash, improving nutrient management and increasing organic matter content on local soil types e.g. thin limestone soils, Fullers Earth etc, taking into account local management practices and land use.	Internal	NRA5 NRT5
E2	Promote and help co-ordinate soil improvement and resilience projects such as composting, straw incorporation, green manures and arable reversion to grassland.	Internal and external	NRA5 NRT5

### F) Emissions

Increasing regulation and mitigation measures aimed at controlling the emissions of carbon dioxide, methane and nitrous oxide from farming and forestry will have both negative and positive impacts on rural businesses and communities.

#	Recommendation	Internal External	Management Plan
F1	Promote emission accounting (use of carbon calculators, energy audits etc) and lead by example.	Internal	CCA3 CCT6
F2	Promote and facilitate emission reduction measures such as methane capture, alternatives to fossil fuel, nutrient management and energy efficiency techniques etc.	Internal	New
F3	Co-ordinate an AONB led wood-fuel project and support development of the local supply chain.	Internal	RLMA5 RLMT8

### G) Landscape

The Cotswold landscape will change over the coming years. To help manage this change in line with the objectives of the Cotswolds AONB, the Conservation Board should consider the following actions.

#	Recommendation	Internal External	Management Plan
G1	Climate change proof and refine as appropriate the Board's landscape strategy and guidelines and position statements.	Internal	CCA2 and 5
G2	Work with Natural England and the Forestry Commission to adapt EWGS and ESS prescriptions to suit changing landscape and biodiversity needs and trends in the AONB e.g. tree planting plans, hay making dates, species indicators etc.	Internal and external	RLMA1 RLMT2
G3	Encourage sustainable woodland management and new planting programmes working directly with landowners where possible.	Internal and external	RLMA6 RLMT9
G4	Promote good woodland design practice e.g. wind firm edges.	Internal	RLMA6 RLMT9
G5	Promote the benefits of mixed farming (single farm or multi-farm) in relation to mitigation of the range of climate change impacts and reduced business risk.	Internal	New
G6	Promote and facilitate key AONB habitat and feature protection and expansion in light of known climate change impacts.	Internal	RLMA3 RLMT4

## H) Rural Communities

Farming and forestry have many of the solutions to mitigating and adapting to climate change. Individual business must, however, work together and with their local communities to link demand and supply, landscapes and knowledge. To help nurture local solutions the Conservation Board should consider the following actions.

#	Recommendation	Internal External	Management Plan
H1	Encourage and facilitate climate proofing of Parish/Community Plans.	Internal with external	AAA5 AAT6
H2	Develop and co-ordinate local/community focused supply chains (food, fuel, nutrients, organic matter)	Internal with external	AAA4 AAT5
H3	Support community led projects and innovation through grant facilitation and advice. This may include habitat works, composting projects, energy and water conservation, and learning initiatives.	Internal with external	New

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A range of indicators to monitor change over time and the effectiveness of AONB policies and actions are proposed. These include baseline indicators which use external data covering land use, special features and natural resources and additional indicators which cover areas such as training, awareness, community involvement, soil health, animal health and attitudes.

### **Conclusions**

Farming and forestry have a critical role to play in the future, maintaining the special features of the Cotswolds and helping to address climate change. We very much hope that the findings and recommendations of this report will help farmers and foresters as they undertake this task, and guide the Conservation Board and its partners in terms of the support they can provide.