



**Cotswolds AONB
Natural Capital Assessment**

Report for

Cotswolds Conservation Board

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1 Introduction

An introduction to the Natural Capital of the Cotswolds AONB

- 1.1 This report identifies and analyses the natural capital of the Cotswolds Area of Outstanding Natural Beauty (AONB), to understand why these natural assets are important, what they provide us with, and their importance for the economy and society as a whole.
- 1.2 The Cotswolds AONB stands out for its wealth of natural capital assets, including:
- The underlying geology that generated this landscape, the Jurassic limestone aquifer, the Cotswolds stone, the lime-rich (calcareous) soils, and the plant life that thrives upon it
 - Farmland; arable land for producing crops and grassland for grazing livestock
 - Woodlands; iconic beech woodlands, ancient woodlands, rich in biodiversity
 - A principle aquifer which provides a high level of water storage, and supports water supply and river base flow on a strategic scale¹
 - A system of streams and rivers, including the origin of the River Thames
 - Clean air and an equable climate
 - A wealth of plant biodiversity, including important species of birds, bats, butterflies and other fauna and flora
 - A cultural-historic landscape that tells the story of thousands of years of man interacting with its natural environment
 - A beautiful place for recreation, relaxation, learning and inspiration
- 1.3 This report starts with an explanation of what ‘natural capital’ actually means, and how it delivers so-called ‘ecosystem services’. It clarifies the role natural capital and ecosystem services play in our economy, and their importance for society. This is followed by six ‘stories’ about the natural capital assets of the Cotswolds and the ecosystem services they provide, highlighting relevant issues and trends, to help inform the Cotswolds AONB Management Plan. The final chapter draws conclusions and makes recommendations for the consideration of the Cotswolds Conservation Board (CCB) and its partners.

What are natural capital and ecosystem services?

- 1.4 Natural Capital can be defined as the stock of renewable and non-renewable natural resources (e.g. geology, minerals, soils, water, air, plants, animals, habitats, ecosystems) that combine to yield a flow of ‘ecosystem services’. Ecosystem services are the “benefits provided by ecosystems that contribute to making human life both possible and worth living”. They are supported by a myriad of processes which underpin all life, such as the water cycle, soil fertility processes and photosynthesis and pollination of plants. People obtain tangible and intangible benefits from these ecosystem services, such as food, timber, energy, clean air and water, regulation of risks (preventing floods, droughts, erosion), and recreation.

How does natural capital fit with the economy and society?

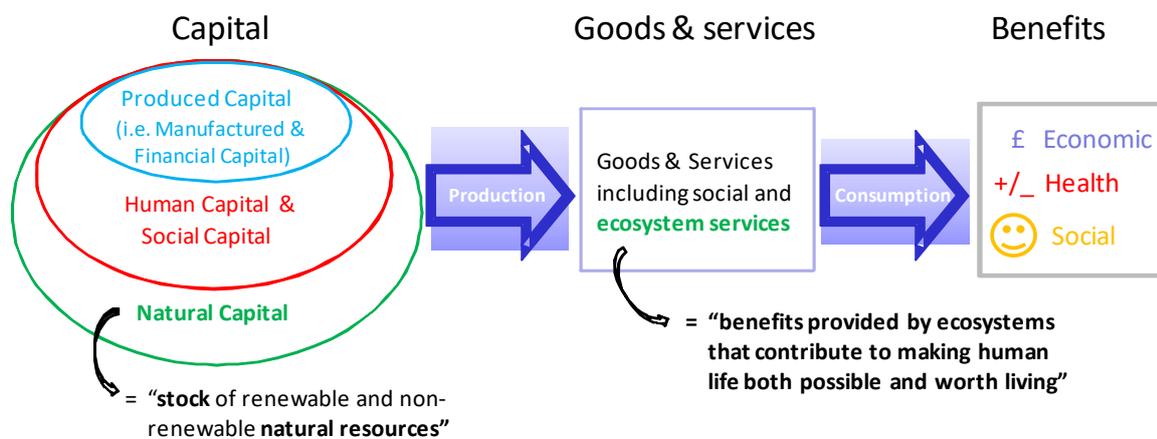
- 1.5 Figure 1-1 shows how natural capital, combined with other types of capital, underpins the economy and society in general, and delivers economic, social and (physical and

mental) health benefits. The wider economy uses the natural capital of the Cotswolds AONB, combined with:

- Manufactured capital; i.e. built infrastructure, buildings, machinery
- Human capital; for example, people with their skills, education and experience
- Social capital; including our institutions (e.g. local and national government)
- Financial Capital; i.e. financial resources (e.g. banking system)

We need to maintain and invest in all these types of capital, in order to sustain our lives and our communities in the long term.

Figure 1-1: The role natural capital plays in the economy and society



- 1.6 Natural capital supports all of the other forms of capital and underpins thriving societies and prosperous economies. For example, the production of food requires natural capital (including soil, minerals, water, seeds), human capital (farmers and food producers with their skills and experience), manufactured capital (e.g. tractors, food processing facilities), and financial capital (e.g. finance infrastructure), so that we can all enjoy eating food and keep healthy. All these different capitals are interconnected, and deterioration of one can lead to a reduction in the other.
- 1.7 Some of the ecosystem goods and services such as food and timber are traded 'in the market' at a 'market price', and these transactions are reflected in 'GDP' (Gross Domestic Product). The nation's economy is measured in GDP; this is based on GVA (Gross Value Added), defined as the sum of all wages, profits plus taxes minus subsidies of all market transactions. Economic growth is the increase in GVA of all market transactions.
- 1.8 It is important to realise, that many goods and services delivered by nature are not valued in the market, whether it be the provision of clean water (we 'only' pay for the cost of purification and distribution of water), the potential for flood mitigation, or the enjoyment that people get from a healthy natural environment. These are the so-called 'positive externalities', i.e. all the benefits we get from nature for free. A study of the market and non-market values of industry sectors in a Scottish National Park showed that more than half of the value did not go 'through the market'. The provision of clean water, health benefits, enjoyment of nature are examples of such 'public goods'.²

- 1.9 The problem is that whilst some of the benefits of nature can be measured and are clear to see (for example, timber has a market price), most are difficult to quantify and are often invisible in our day-to-day lives. This results in natural capital not being properly accounted for in decisions about what to produce and consume; the risk being that we fail to manage it sustainably.
- 1.10 There are so-called 'negative externalities' where the costs of our actions that have a negative impact on the environment, are not factored into the market, for example, water and air pollution, soil erosion, etc. Or sometimes we fail to price the benefits appropriately, for example if people are charged a flat rate for water regardless of how much they use or what they use it for. If such costs are not factored in, then this can lead to a mis-allocation of resources. If we keep taking more from our natural capital, than is sustainable, it degrades over time, and the 'flow' will be less in future years/generations, and can affect our long term prosperity.
- 1.11 To illustrate, the ground water resources of the Cotswolds aquifer provide clean drinking water which is used by people and industries across the South East of England, and is therefore vital for the region's health and economic prosperity. This is a precious asset, and it is essential that it is not contaminated with pollutants, that water use is monitored and metered, so this resource is not over-abstracted, and a level of sustainable use is ensured.
- 1.12 If properly measured and managed, the living aspects of natural capital, at least, can continue to provide these ecosystem services and benefits indefinitely. That is why the Cotswolds AONB Management Plan endeavours to encourage its partners to manage the natural capital of the Cotswolds AONB sustainably.

2 Natural capital and ecosystem services of the Cotswolds AONB

2.1 In Appendices 1 and 2 is an inventory of the natural capital assets of the Cotswolds AONB and an extensive list of the ecosystem services these assets provide. This summary report aims to tell the 'stories' of these natural assets and ecosystem services, including why they are so vital in underpinning the health of the economy and society, way beyond the borders of the Cotswolds AONB. Each 'theme' has a summary of the natural capital assets involved, the ecosystem services that are provided and those who enjoy the benefits delivered by nature. Each section also highlights some key issues, and refers to the objectives of the AONB and the AONB management plan.

Water

2.2 The underlying geology of the Cotswolds AONB holds an aquifer (permeable rock which stores groundwater), which is of great importance for the supply of water. It is a 'Principal Aquifer', as defined by the Environment Agency, meaning that it provides a high level of water storage, and supports water supply and river base flow on a strategic scale.³ The river Thames originates from the springs in the limestone of the Cotswold Hills.⁴ The quality of water is generally good, but hard with calcium and bicarbonate ions predominating.⁵

2.3 Four water companies abstract water from the Cotswolds AONB. Thames Water is the largest, providing drinking water to the population of London and surrounding areas. It is estimated that "the Cotswolds AONB supplies Thames Water with 500 million litres of water a day - equivalent to 3.2 St Paul's Cathedrals."⁶ The total quantity of water licenced for abstraction from the Cotswold AONB itself is 136,120 Megalitres per year⁷.

2.4 It is crucial that we look after these sources and ensure that our water is completely safe to drink. Therefore, a range of pollution prevention measures have been set up in areas at risk, including Source Protection Zones⁸, joint projects between the Environment Agency and the AONB to improve the ecological condition of the rivers, and Catchment Management Plans (CMP) for actions needed to achieve good ecological condition of rivers and streams.⁹

2.5 Key issues related to water include:

- Leaching of nitrate and pesticides to groundwater from poor agricultural practices¹⁰
- Abstractions need to be very carefully monitored during the summer months to ensure their impact on stream flows is minimised. This abstraction also reduces peak winter flows, by decreasing groundwater discharge and making the streams less 'flashy'.¹¹ Streams and rivers provide a diverse range of habitats, including a vital corridor for the migration of wildlife. These habitats all have their own particular flow and level requirements that need to be protected.
- Looking ahead, a key challenge will be to ensure an adequate water supply for the future needs of an increasing population, within the challenges being experienced through climate change.

2.6 The AONB Management Plan 2013-18 shows how the CCB works with partners to ensure that water resources are conserved and their quality enhanced, by appropriate management and use, in order to both secure aquifer recharge and reduce low flows and flooding (Policy NRP5).

Table 2-1: Summary – Water

Natural Capital Assets	Ecosystem services	Beneficiaries
Climate	Water abstracted for: <ul style="list-style-type: none"> • public drinking water • agriculture • aquaculture • other industries 	<ul style="list-style-type: none"> • Households in the South East and South of England • Industry / businesses using water, in the South East and South of England • Water companies treating and distributing water, and billing customers (Thames Water is by far the largest. Others are Severn Trent, Bristol Water and Wessex Water).
Geology		
Aquifer		
Rivers, streams, lakes		
Soils		
Habitats (vegetation)		
Biodiversity		

Soil and farmland

- 2.7 The underlying limestone geology (Jurassic limestone and clay) results in calcareous (lime-rich) soils, of a 'loamy texture' which are generally free-draining. The top soil carbon content is low to medium. These lime-rich soils have produced habitats such as species-rich calcareous grassland (as well as beech and other lime-rich woodlands). 82.7% of the agricultural land in the AONB is Grade 3 (good to moderate quality agricultural land), which is suitable for arable and grassland enterprises. 6.4% of the agricultural land in the AONB is Grade 4 (poor quality agricultural land)¹², suitable only for more extensive grassland management.
- 2.8 Crops and bare fallow account for 86,438ha (49% of all agricultural land); this is the single biggest land use in the AONB. Crops and fallows have increased from 41% in 2007, largely due to the removal of the set-aside requirement. Cereals, general cropping and horticulture farms account for 37% of all commercial farms, but a larger area of land use. The main crops grown in the AONB are winter wheat, oilseed rape and spring barley. There has been a reduction in wheat and winter barley since 2007, and an increase in spring barley and oil seed rape, as well as oats, linseed and maize. Cropped area is likely to increase, while livestock numbers are expected to continue to reduce¹³.
- 2.9 Permanent grass, temporary grass and rough grazing – which underpin grazing livestock enterprises (alongside forage crops such as maize and cereals/crops grown for animal feed) - account for 76,566ha (43% of all agricultural land in the AONB). Temporary grassland has increased slightly since 2007, and permanent grass and rough grazing has decreased. Dairy (4%, 63 farms), grazing livestock (beef cattle and sheep) (45%) and mixed (10%) farms account for 59% of all commercial farms in the AONB. There has been a decrease in most types of livestock since 2007, especially dairy cows and pigs, and an increase in poultry¹³.
- 2.10 Key issues related to soils and farmland include:
- Loss of soil organic matter. Soils with less organic content are more prone to drought, and are less resilient. Soil organic matter is important for soil quality through increased retention of water and nutrients, resulting in greater productivity of plants. It improves soil structure and reduces erosion, leading to improved water

quality in groundwater and surface waters, and ultimately to increased resilience of food production and other ecosystem services.

- Soils are vulnerable to leaching of nitrate and pesticides to groundwater; surface capping and erosion of soils on steeper slopes is linked with eutrophication and silting of streams and their gravel spawning beds.¹⁴
- Reduced participation in agri-environment schemes given the limited Countryside Stewardship budget, and hence less agri-environmental management.

2.11 In the future, cost pressures may drive further uptake of precision farming, minimum tillage etc, resulting in lower use of inorganic fertilisers and pesticides, and improved soil management. There could potentially be an increase in livestock (sheep) on cereal farms to improve productivity and resilience. Brexit means uncertainty in terms of trade and support; there will be impacts in terms of crop selection, livestock numbers, management practices and systems etc. There will be threats, but also opportunities.

2.12 The AONB Management Plan 2013-18 shows how the CCB works with the farming community and other partners to ensure that soils are managed in a more sustainable way in accordance with best practice to minimise erosion and water pollution and maximise resilience to drought (Policy NRP4).

Table 2-2: Summary – Soils and farmland

Natural Capital Assets	Ecosystem services	Beneficiaries
Soil	<ul style="list-style-type: none"> • Crop production (arable, horticulture) • Livestock production for dairy and meat 	Food supply chain of food producers, food processors, packers, wholesalers, retailers and consumers
Fresh water		
Climate		
Farmland		
Semi-natural grassland (livestock grazing only)		

Woodland

2.13 The lime-rich soils of the Cotswolds support beech, ash and other woodlands. There is an estimated 26,370ha of woodland in the AONB (13% of all land in the AONB). Broadleaved woodland predominates, accounting for 19,558ha or 74% of all woodland. Conifers account for 2,969 or 11%, with the balance being mixed woodland, young trees etc. Ash and beech are the predominant broadleaved species, accounting for around 60% of broadleaved species¹³. Of this total woodland, 61% is actively managed and 39% unmanaged. Only 241 ha are in Forestry Commission ownership (0.1% of AONB area)⁹.

2.14 Ancient woodlands total 9,485ha (36% of the total woodland area), including 6,192ha ancient semi-natural woodland and 3,292ha Plantations on Ancient Woodland Sites. Ancient woodland, especially beech, is a distinctive feature of the Cotswolds – being prominent on the scarp and incised valleys. Mixed oak, ash, sycamore and maple tend to be concentrated on the lower slopes. In addition, there are areas of lowland wood pasture and parkland, associated with large estates, and some large blocks of conifer plantation.

2.15 Most new tree planting undertaken over the last 20 years has taken place on farms and has been in the form of new mixed broadleaved woodland. This has been stimulated by grant schemes, shooting and a desire for screening.

- 2.16 The total estimated potential yield of woodland in the Cotswolds AONB, based on Forestry Commission 2015 data¹⁵, is 117,365m³ per year. This includes 11,243m³ of conifer sawlogs and 5,797m³ of broadleaved sawlogs. The total also includes 61,126m³ of wood fuel, with an estimated energy value of 130,895 MWhr/year, the equivalent of 13.09 million litres of heating oil. Improved timber and firewood prices in have stimulated management activity in woodlands, in terms of felling, thinning etc. in recent years.
- 2.17 Woodlands are important for carbon storage and carbon sequestration (for more detail on carbon, see 2.20-2.24 below). Woodlands, particularly broadleaved and ancient woodlands, contain much biodiversity; this can be compatible with sustainable woodland management, as some woodland species (e.g. certain plants, butterflies) need open areas, which let in light, such as wide tracks, clearings and recently felled areas.
- 2.18 Key issues related to woodland include:
- Smaller woodlands, particularly those with poor/difficult access, generally remain uneconomic to manage.
 - There is likely to be limited tree planting/woodland creation over the next five years or so due to uncertainties regarding future agricultural policy and prospects, the grant system which is perceived to be complex, and continued pressure from and costs associated with deer.
 - Pests and diseases are expected to have an adverse impact on woodlands and timber production/quality. *Chalara fraxinea* ('Ash die back') poses a particular threat to the Cotswolds AONB due to a high percentage of ash trees in the area.
 - Climate change can be expected to influence woodlands in terms of wind/storm damage, risks associated with warmer/drier summers and a range of pests and diseases.
- 2.19 The AONB Management Plan 2013-18 shows how the CCB works with partners to ensure that sustainable farming and forestry remain the primary means by which the distinctive landscapes of the Cotswolds are managed (Policy CEO2).

Table 2-3: Summary – Woodland

Natural Capital Assets	Ecosystem services	Beneficiaries
Soil	<ul style="list-style-type: none"> • Timber production • Wood fuel / renewable energy • Flood mitigation • Recreation • Carbon sequestration 	<ul style="list-style-type: none"> • Foresters, wood processors, retailers and consumers • Households/businesses living downstream • Visitors • Global population
Fresh water		
Mixed woodland		
Hedges		
Biodiversity (plants and animals)		

Climate regulation and carbon storage

- 2.20 Plants influence climate both locally and globally. Woodlands are important for carbon sequestration (the removal of CO₂ from the atmosphere through photosynthesis, and storing the carbon in the trees and soil), and therefore play a role in mitigating greenhouse gas emissions. There is no detailed data on soil carbon for the Cotswolds

AONB. National research data on carbon stock in vegetation shows woodlands contain an estimated 70tC/ha, while farmland only 1tC/ha.¹⁶

2.21 Below is an estimate of the amount of carbon sequestered in the Cotswolds AONB per year.

Table 2-4: Carbon sequestered in Cotswolds AONB – estimated, per year

Habitat	Hectares	tCO ₂ /ha/yr	tC/ha/yr	Total tC/yr
Woodland – broadleaved	19,558	4.970	1.355	26,501
Woodland - coniferous	2,969	12.660	3.453	10,252
Farmland – arable	86,438	0.107	0.029	2,507
Farmland – grassland	76,566	0.397	0.108	8,269
Total	185,531			47,529
Value tC/year				£65 tC/year
Total value £/year				3,068,065

2.22 It is estimated that 47,529 tonnes of carbon are sequestered per year in the AONB, with an estimated value of over £3million. The carbon sequestration figures were based on Christie et al.¹⁷ The value of this service was estimated based on the non-traded DECC carbon values for 2016 which are calculated based on the abatement cost per tonne of carbon.¹⁸ All figures were converted to £2016 using the latest HM Treasury GDP Deflator series.^{19,20}

2.23 Key issues related to climate regulation and carbon storage include:

- There are many factors determining levels of carbon sequestration (biological, environmental, economic, political and legal).
- There are conflicting demands on the land (e.g. food production, recreation, biodiversity, carbon sequestration) and an array of different land management practices which will either increase or decrease the sequestration of CO₂.
- It is therefore difficult for the CCB to develop a coherent strategy on carbon sequestration, especially as most of the land is owned privately.

2.24 The focus of the CCB/AONB is therefore primarily on reducing the amount of carbon emissions. The AONB Management Plan 2013-18 shows how the CCB works with partners to encourage people to use sustainable modes of transport such as walking, cycling and public transport as a key action to reducing carbon emissions (Policy DTP7). Furthermore, the CCB seeks to reduce carbon emissions by reducing energy consumption, applying energy conservation measures, encouraging more sustainable patterns of development, and utilising renewable energy generation technologies that are of an appropriate type and scale for their siting (Policy NRP2).

Table 2-5: Summary – Climate regulation and carbon storage

Natural Capital Assets	Ecosystem services	Beneficiaries
Soil	Carbon sequestration, i.e. absorbing CO ₂ and locking it up as carbon (C) in vegetation.	Reducing CO ₂ benefits the worldwide population. A reduction of CO ₂ is required to reduce global warming potential
Woodland		
Permanent grassland		
Semi-natural grassland		

Biodiversity and genetic resources

- 2.25 The Cotswolds AONB has rich and diverse habitats, which support a myriad of wildlife. This particular mix of wildlife is unique. The Cotswolds exhibits a significant degree of retention of important habitats and species which are in decline elsewhere. A large number of species, many of them rare and found only on limestone or calcareous soils, survive here. The Cotswolds AONB contains many sites designated for their biodiversity, including five Special Areas of Conservation, three National Nature Reserves, 89 Sites of Special Scientific Interest and a large number of local sites.
- 2.26 The Cotswolds AONB is home to important species of birds, bats, butterflies and orchids. With regards to birds, the Cotswolds AONB has several locally uncommon 'priority' species, such as Grey Partridge, Lapwing, Tree Sparrow and Corn Bunting. Skylarks are widespread and there are good numbers of Redstarts, Tree Pipits and Spotted Flycatchers, small pockets of Yellow Wagtails and Grasshopper Warblers and a few Curlews and Stonechats. The region supports a very high population of Buzzards, and there are a few Hobby, Peregrine and Goshawk nesting areas, and hopefully Red Kites will be proven to have bred here soon.²¹
- 2.27 The best sites for uncommon butterfly species in the area are mostly on unimproved grasslands. These are flower-rich grasslands which have not been treated with fertilisers; the Cotswolds AONB has 2,827ha of unimproved limestone grassland, including around 1,500ha Jurassic limestone grassland. Other important habitats include open woodlands, old industrial sites (old quarries, disused railway lines), and some of the lakeside habitat in the Cotswold Water Park (created by gravel extraction).²²
- 2.28 A number of indicator species are subject to long term monitoring. This provides evidence on the health of particular species and ecological health more generally.
- 2.29 Wild and cultivated species provide valuable genetic resources. Wild species include a number of priority species, as outlined above. Cultivated species include crops and livestock, the most famous example of which is the Cotswold Sheep, known as the Cotswold Lion, a native rare breed and an emblem of the area and its cultural identity. There is a lack of data on both wild and cultivated genetic resources within the AONB.
- 2.30 The Cotswold AONB has a responsibility to protect and promote its unique biological heritage for its own sake and the benefits they bring to society. The AONB Management Plan 2013-18 shows how the CCB works with its partners to ensure that there is no further net loss of characteristic habitats and species (Policy BP1), a landscape-scale approach is taken to the conservation and expansion of resilient ecological networks (Policy BP2), and targeted action is taken for the recovery of characteristic species and the enhancement of characteristic habitats (Policy BP4)

Table 2-6: Summary – Biodiversity and genetic resources

Natural Capital Assets	Ecosystem services	Beneficiaries
Soil	<ul style="list-style-type: none"> • Wild species diversity • Cultivated species (including crops and livestock) 	(Other) farmers, industry, retailers, consumers, public
Habitats (e.g. woodland, semi-natural grassland, water)		
Plants and animals		

A cultural historic landscape for recreation, enjoyment, inspiration and learning

2.31 The cultural historic landscape of the Cotswolds AONB has many special qualities²³ :

- A wealth of beautiful towns and historic villages, historic buildings, parks, and archaeological sites. These places have a strong connection with the natural assets on which they were built, for example, through sheep farming, the wool trade, the wool cloth industry, and limestone quarrying.
- The visible presence of its limestone geology, from the natural outcrops, the rich plant and animal communities it supports, through to its use as a local building material, including the dry stone walls, give the AONB its essential character in many areas. Variations in the colour of the stone from one part of the AONB to another add a vital element of local distinctiveness.
- The Cotswold escarpment, and the high wolds - an elevated landscape with large open landscapes, commons, 'big' skies and long distance views.
- River valleys, the majority forming the headwaters of the Thames
- Internationally important flower-rich limestone grasslands, and ancient broadleaved woodland
- Tranquillity and dark skies
- Arable and livestock farms managed with consideration for biodiversity
- Local foods and crafts

2.32 The Cotswolds AONB is a beautiful place where people can be physically active and relax. The total number of visitors to the Cotswolds AONB was 23 million in 2003; and total visitor expenditure was estimated to be over £1 billion in 2015²⁴. Up to date figures could be higher. Either way, tourists and visitors make a very significant contribution to the local economy. There are other important non-material benefits which people obtain from visiting the AONB, through spiritual enrichment, reflection, recreation, aesthetic and inspirational experiences from the beauty, tranquillity and cultural heritage of this historic landscape. These benefits are often difficult to value, as these are mainly benefits that are not valued in the market (i.e. non-market values or so-called 'public goods').

2.33 Many of the beneficiaries live in the surrounding areas of the Cotswolds AONB and further afield. They live in urban centres of employment, with an increasing population, and significant development pressure. An estimated 2 million people live within 20-minute car drive of the AONB (e.g. Bath, Stroud, Cirencester, Gloucester and Cheltenham). The Cotswolds AONB provides important local 'green infrastructure', offering urban populations a place to relax and recuperate, in order to remain productive. In this way the Cotswolds AONB also contributes to the country's wider economic productivity (GDP).

2.34 Key issues related to the cultural historic landscape include:

- Visitor pressures in certain areas, such as traffic congestion and lack of parking (heavy reliance among visitors on the use of private cars), which need careful visitor management.
- High house prices. The main economic activities that the landscape of the Cotswolds depends upon are farming, tourism and quarrying. However, just 4%

of people living in the AONB work in agriculture and quarrying, while 12% of the working population are employed in tourism²⁵. Tourism is generally a relatively low-paid industry which, combined with a lack of affordable housing in the Cotswolds, means that people working within the industry cannot always afford to live in the area in which they work.²⁶

2.35 The Cotswold AONB has a statutory duty to “conserve and enhance the natural beauty of the AONB, and to increase the understanding and enjoyment of its special qualities”. Objectives across the AONB Management Plan 2013-18 include:

- An understanding and appreciation of the purposes of the designation, and the positive benefits of helping to conserve and enhance the AONB, is fostered in businesses, organisations, landowners and policymakers. (Policy AU2)
- The tourism sector is aware of and understands the benefits of conserving and enhancing the special qualities of the AONB and the need to communicate this to visitors and residents (Policy TOR1)
- The impacts and patterns of tourism across the Cotswolds are understood and sustainably addressed (Policy TOR3)

Table 2-7: Summary – Cultural historic landscape

Natural Capital Assets	Ecosystem services	Beneficiaries
Landscape	<ul style="list-style-type: none"> • Recreation • Tourism • Inspiration • Education and learning • Sense of place 	Tourism and recreation businesses, tourists, local visitors, general public (and also the businesses and organisations where visitors go back to work and lead productive lives)
Habitats: Woodlands		
Rivers and streams		
Semi-natural grassland		
Farmland		
Landscape features (e.g. escarpment, river valleys)		
Plants and animals		

3 Conclusions and recommendations

Conclusions

- 3.1 **The natural capital assets of the Cotswolds AONB are of national importance.** This study shows that the natural capital assets of the Cotswolds AONB are important environmental and economic assets for the country, and deliver vital 'goods and services' to the population and industry of the South East and South of England, particularly in terms of the supply of water, a landscape people love to visit, food production and biodiversity.
- 3.2 **There is a need to better understand and promote the public benefits provided.** Traditionally, the economic value of protected landscapes such as the Cotswolds AONB, was seen through the lens of their contribution to GDP, rather than through the lens of public (non-market) benefits. To illustrate, a study of a Scottish National Park showed that half of the value of the benefits generated by the park are non-market values (e.g. provision of clean water, recreation, health benefits).
- 3.3 **Most of the beneficiaries of the ecosystem services live outside the AONB boundary.** Much of the value generated from the natural assets of the Cotswolds AONB is enjoyed by beneficiaries who are based outside the boundaries of the AONB (e.g. the provision of water, food, recreation, carbon sequestration). An improved understanding is important so that the existing value and economic contribution of protected landscapes is appreciated, protected and optimised. It is recognised that with the present focus on economic growth and reducing the public sector deficit, protected landscapes are under pressure on a number of fronts, including challenges to the level of landscape protection provided through planning policy and legislation, and reductions in financial support in terms of grant-in-aid received from government.
- 3.4 **Gaps in the evidence may hide unsustainable use.** There are gaps in the evidence with regards to the quality of the asset, and its sustainable use, including:
- Soil; loss of soil and loss of organic matter, affecting resilience to drought, and therefore the potential for future food production.
 - Water; how the future demand for water (rising population) and climate change, may impact sustainable use of water resources.
 - Biodiversity; there is a lack of trend data for populations.

Recommendations

- 3.5 The following recommendations are made for the consideration of the CCB and its partners:
1. **Adapt the Cotswolds AONB Management Plan to incorporate a natural capital approach.** The AONB Management Plan should be restructured to demonstrate clear links between the natural capital assets of the Cotswolds AONB, and the ecosystem services it provides, and illustrate the market and non-market benefits that are being delivered to the wider population. Where there are issues regarding its sustainable use (e.g. groundwater pollution, loss of soil and

soil quality), these should be highlighted, and link with the actions of the AONB Management Plan.

- 2. Address the gaps in the evidence.** There are gaps in the evidence, particularly with regards to soil, water and biodiversity. Of particular priority are:
 - Soil structure and quality, including organic matter content
 - The total amount of water that can be abstracted sustainably versus the potential demand for water in the future
 - Trend data in biodiversity, both priority and other species
- 3. Develop a set of natural capital accounts.** This would build on the physical assessment to date, and allocate values to key natural assets and services. Natural capital accounts provide a means to capture and understand changes over time. This will, in turn, help with:
 - Determining priorities for investments in natural capital
 - Determining actions affecting natural capital to achieve target improvements, avoid deterioration, or compensate for losses
 - Determining overall progress with objectives to protect and improve natural capital
- 4. Use the opportunity provided by Brexit to design policy that stewards natural capital assets and rewards the provision of public goods.** As the UK is preparing to leave the EU, there is an opportunity to redefine agricultural and environmental policy. Such policies should focus on the protection and enhancement of natural resources, and public money should go towards those who protect and enhance the public goods that are being delivered. The CCB and its partners have an important role in influencing the design and delivery of future agri-environment schemes that deliver these vital public goods.

Appendices

Appendix 1: Cotswolds AONB Natural Capital Assets

Appendix 2: Cotswolds AONB Ecosystem Services

[See separate documents]

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