



## Healthy trees, healthy places

Investing in a vibrant and thriving natural environment is critical to key services, and a powerful tool in regenerating and reinvigorating the local economy

**Report from the Woodland Trust  
July 2013**

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# Contents

<b>Introduction</b> .....	3
Benefits of tree cover .....	4
<b>Economic benefits</b> .....	5
Trees or turf? .....	6
Comparing costs .....	6
<b>Healthy towns</b> .....	7
Clean air .....	7
Urban heat islands .....	8
Green space and healthy lifestyles .....	9
Mental health .....	9
Healthy trees .....	9
<b>Water management</b> .....	10
Flooding .....	10
Water quality .....	11
<b>What councils can do</b> .....	12
<b>What can individuals do?</b> .....	12
<b>References</b> .....	13

# Introduction

These are testing times. We are in a prolonged period of economic difficulties. Budgets are, at best, squeezed. Resources to maintain, let alone increase public services are tough to find.

Severe weather has become a more frequent feature particularly extremes of hot, dry weather contrasted by prolonged and often violent rainfall. The cost of the damage and lost business from flooding is a growing problem, as well of course as the human misery it causes. Climate change brings the prospects of greater unpredictability in weather as well as a long term trend to hotter drier, summers.

An ageing population is putting pressure on health and care services. An increasing proportion of the population is obese, most worryingly particularly amongst the young. Creating opportunities for healthier lifestyles is critical to managing long term health costs. At the same time there is a high expectation of what can be delivered through existing health services. Deciding where to put money to best effect in public health is a challenge.

Many urban areas have been in economic decline; most obviously perhaps, the changing face to the high street, with businesses under pressure and closing. To reinvigorate local business and create jobs it is necessary to attract inward investment – to provide a sense renewal and optimism.

It would be trite to suggest there are simple answers to these problems. They require a range of approaches and solutions from central government, local government, businesses, non-governmental organisations, and communities.

It is often the case, perhaps not surprisingly, that in times of economic pressure the natural environment suffers. It is too easy for it to be seen as something which is less of a priority than primary health care, or maintaining roads or buildings, less important than a range of public services and facilities.

In fact as well as being important for wildlife, investing in a vibrant and thriving natural environment is a powerful tool in regenerating and reinvigorating the local economy, and critical to supporting key services. More than that, it can often reduce costs leading to overall savings.

Dieter Helm, Chairman of the Independent ‘Natural Capital Committee’, set up by Government in 2012 made it clear in his introduction to their first annual review: *“Our economic prosperity and the wise use of our natural resources are not mutually exclusive. In fact, the latter is a precondition of the former, in both the short, medium and long-term. Economic growth must be sustainable – otherwise it will not be sustained”*<sup>1</sup>.

Towns and cities of the future will be characterised by a vibrant and thriving natural environment with well-maintained tree cover helping to create adapted and resilient places in which we live and work.



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## Benefits of tree cover

- Urban tree cover provides economic advantages – a report to the Mersey Forest showed that for every £1 invested in the Forest's programme, £10.20 was generated in increased Gross Value Added (GVA), social cost savings and other benefits.
- Trees and urban green space improves the environment and encourages healthy lifestyles, improving public health.
- Mitigation of the urban heat island effect – trees provide shade from direct solar radiation and reduce ambient air temperature through evaporative cooling.
- Well-designed tree planting can improve air quality. Researchers found asthma rates among children aged four and five fell by a quarter for every additional 343 trees per square kilometre.
- Trees in rural and urban areas can help in reducing the risk of flooding – preliminary results from Manchester University indicate that tree canopies can reduce surface water runoff by as much as 80% compared to asphalt.
- Trees and green spaces can help in improving water quality.
- Woodland can prove a cheaper land use to maintain than amenity grassland.



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## Economic benefits

Trees and woodland are an effective way to rehabilitate derelict land and to stimulate regeneration of communities facing poor social and environmental conditions.

The planting of trees and woods is effective in both the remediation of derelict and neglected land and the regeneration of urban communities facing poor social and environmental conditions. Trees and woods can make a rapid and significant change to an urban landscape, creating an urban space that is more attractive for businesses and people.

Woodland creation has been an important element in the work of the Land Restoration Trust partnership (comprising the Forestry Commission, English Partnerships, Groundwork and the Environment Agency) which aims to deliver community led regeneration of previously derelict or underused land.

An evaluation of a Capital Modernisation Fund investment on part-brown field, part agricultural land in three community forest areas<sup>2</sup> indicated that despite the costs to set up the project in difficult social and physical conditions the anticipated annual public benefit significantly outweighed the costs involved.

A report by Forest Research into the benefits of Green Infrastructure<sup>3</sup> with good tree cover highlighted amongst other findings the following economic benefits:

- Improving the aesthetics of the local landscape increases people's enjoyment of an area, and attracts businesses, which in turn can attract customers, employees and further services.
- A study of the Mersey Forest estimated that for every £1 invested in the Merseyside Objective One programme (European Union funding), £2.30 will be generated in increased Gross Value Added (GVA) over the lifetime (50 years) of the investment.
- The creation of the National Forest increased the number of local jobs by 4.1% and local regeneration using green infrastructure attracted £96 million of investment.
- Due to landscape quality and security improvements at a 57 ha industrial estate at Langthwaite Grange, Wakefield, West Yorkshire, crimes such as vandalism fell by 70% in 12 months.



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## Trees or turf?

The Woodland Trust has produced a review of the costs of maintenance of urban woodland, as compared to management of amenity grassland. The review was based on a study undertaken by Land Use Consultants.

A number of different woodland establishment approaches were compared to a series of mowing regimes. The findings demonstrate that, in addition to the potential budget savings, trees and woodland provide a wide range of key benefits for quality of life in urban and suburban areas.



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## Comparing costs

Nine regimes were chosen applicable to urban or suburban areas; five mowing treatments and four woodland types, based on a one hectare site with a path running through the middle, simulating accessible open space.

Maintenance costs were broken down into three successive phases:

- Years 1-4: Establishment phase
- Years 5-9: Post establishment phase
- Years 10-50: Long term management phase

The results of the study revealed that:

- Naturally colonising woodland and pioneer style woodland can be considerably cheaper to maintain than all types of grassland.
- Maintenance costs of managing woodland in managed green spaces are more expensive during the establishment phase than informal woodland but are still less than the maintenance of amenity grassland.
- Complex mixed woodland planting is the most expensive of the woodland types to establish but costs are still less than the cost of maintaining amenity grassland. However, the long term cost of managing complex woodland does rise above that of amenity grassland.

Careful consideration of tree species and siting can mean that the benefits of woodland in the urban environment are far reaching, with potential budget savings representing just one of many motives for establishing trees.

## Healthy towns

When people are asked what they feel is the most important determinant of wellbeing, the response most often given is health<sup>4</sup>. There are clear advantages to improving public health, both in the provision of local health care services, reduction in lost time due to illness and lowering the burden on social security payments.

It makes sense that the state of the natural environment in the places where we live and work must be important. The Clean Air Acts of the early 20th century, the removal of lead from petrol, and legislation relating to the handling of waste and sewage are palpable examples of attempts to improve the environment and protect public health.

It may be less obvious in the 21st century, but the natural environment continues to play a critical role in determining public health – both physical and mental health. It is a vital part not just of living longer but crucially, living longer healthier lives.

Not only does it intuitively make sense, but evidence supports the part the environment plays in maintaining and improving our health. Part of that is the condition of the houses, offices, transport system and other man-made infrastructure and artefacts. But absolutely central to good health is the state and condition of the natural environment – our parks, street trees and avenues, urban woods and grass areas, school and hospital grounds, work places and sports grounds, allotments and gardens.

Trees are an essential part of this mix. Their size and structure make them important aesthetically, defining spaces and making them a key visual component of urban areas. But they also have distinct properties and characteristics which have clear health benefits.

## Clean air

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Local authorities have statutory duties for managing local air quality<sup>5</sup>. Although the last 20 years has seen considerable improvements in pollution emissions in the UK, poor air quality remains a stubborn problem in many places. The main pollutants of concern are particulate matter (PM), oxides of nitrogen, and ground-

level ozone. Road transport and the burning of fossil fuels, for instance in large fuel-burning plants such as power stations, are the biggest sources of these pollutants.

The UK is failing to meet EU targets for ambient concentrations of particulate matter (PM10) and nitrogen dioxide (NO<sub>2</sub>), with the air quality below target for overall emissions reductions<sup>6</sup>. Many roadside sites in particular are either not improving or getting worse. Those living near busy roads, pedestrians and cyclists are especially vulnerable to the impacts of poor air quality as a result of vehicle emissions.

According to the Department of the Environment, Food and Rural Affairs, the economic cost from the impacts of air pollution in the UK is estimated at £9-19 billion every year. Air pollution causes irritation of the lungs and can worsen lung conditions, including asthma. A report by the British Heart Foundation showed how poor air quality increases the risk of heart disease, especially when combined with high summer temperatures. Estimates indicate that air pollution reduces life expectancy in the UK by seven to eight months.

Trees remove large amounts of air pollution and improve urban air quality<sup>7</sup>. Columbia University researchers found asthma rates among children aged four and five was significantly lower in areas with more street trees<sup>8</sup>. The UK has one of the world's highest rates of childhood asthma. Around 5.4 million people in the UK are currently receiving treatment for asthma<sup>9</sup>.

Although some trees produce pollen which can affect a proportion of hay fever sufferers, the overall benefits of trees to air quality and respiratory health are overwhelmingly positive. According to the British Lung Foundation one in every seven people in the UK is affected by lung disease — almost 8 million people<sup>10</sup>.

Research in recent years has begun to identify how urban greening, and tree planting in particular, might be tailored to achieve air quality goals whilst still fulfilling many of the other beneficial functions of urban green space. Not all vegetation positioning yields an equal pollutant removal potential. Local airflows and pollutant concentrations will significantly affect the efficiency with which vegetation can remove pollution.

Where improving air quality outcomes is the primary objective, planting in areas of high pollution, for instance 'hotspots' such as traffic junctions and where traffic queues during busy periods, will yield proportionately greater rates of pollutant removal.

## Urban heat islands

The urban heat island effect is when concrete and other hard surfaces such as roads absorb heat during the day and release it at night – acting like storage heaters. As a result towns and cities can be much hotter than the surrounding suburbs and countryside.

The impact is two-fold. Firstly, higher temperatures exacerbate poor air quality and can increase ground-level ozone, aggravating chronic lung conditions. Secondly, prolonged high temperature can bring on heart or respiratory failure or dehydration, particularly amongst the elderly, very young or chronically ill<sup>11</sup>.

According to a report on the impacts of climate on health, heat-related mortality currently leads to around 2,000 premature deaths per year in the UK, and is projected to increase steeply throughout the 21st century, from around a 70% increase in the 2020s to around 540% in the 2080s. This is in addition to the impact on morbidity - more people in doctor's surgeries and hospital wards.

Green space – trees in particular – provides both direct cooling from shade and reduces the ambient temperature through the cooling effect of evaporation of water from the soil and through plant leaves.



Research at the University of Manchester using computer modelling has shown how increasing urban green space can mitigate urban heat island effect. Without any increase in green space, by 2050 the temperature in Manchester is projected to rise by 3°C. However if the amount of green space increases by just 10% then the temperature rise in the city could potentially eliminate the effects of climate change on increasing surface temperatures. However, reducing tree cover by the same percentage could lead to an increase of 8.2°C under some scenarios<sup>12</sup>.

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## Green space and healthy lifestyles

One third of all deaths in the UK are due to diseases which could be at least partly reduced by increased physical activity. The estimated annual direct cost to the NHS as a result of morbidity and mortality resulting from physical inactivity is £1.06 billion<sup>13</sup>. There is a relationship between the proximity of green space to peoples' homes and the

increased likelihood of the residents walking<sup>14</sup>. Trees, woods and other green space can play an important role in encouraging physical activity.

## Mental health

The natural environment is important not only for the benefits to physical health, but also mental health.

Trees and woods can have a restorative and therapeutic effect on the mind<sup>15</sup>. Classic studies of hospital patients found that they recovered more quickly with a view of trees and nature from their windows<sup>16</sup>. More recent research has found that trees enhance mood, improve self-esteem and lower blood pressure. Research in the Netherlands and Japan indicated that people were more likely to walk or cycle to work if the streets were lined with trees. They are also likely to live longer and feel better as a result<sup>17</sup>.

Around 80% of people live in urban areas, but less than 10% of the population have access to local woodland within 500m of their home<sup>18</sup>. Creating access to more trees, woods and green space could provide a critical link to help people lead healthier lives and live longer.

## Healthy trees

Ash dieback – *Chalara fraxinea* – has raised serious concerns about the health of our trees and woodland. A combination of climate change, world trade in plant materials, accidental and deliberate introduction of non-native species all pose a threat to the UK's trees and woodland through increased incidence of pests and diseases.

This makes it even more important to manage existing tree stock and plant new trees that will increase the resilience and robustness of woodland and green space. Local Authorities should review their current inventory of trees and woods and identify where these may be under threat now or in the future.

Ensuring a diverse range of species and ages of trees helps to increase their resilience both to attack by pests and diseases and to future climate change. Advice is available on suitable species for projected climate change in your area.

**Now more than ever trees need our help.**

# Water management

## Flooding

Winter rainfall has increased throughout the UK over the last 40 years with greater frequency of very heavy rainfall, including summer storms. According to a 2012 report from the Committee for Climate Change, the Government's independent advisors



on climate change, flood risk in England is expected to rise fourfold in the next twenty years, unless further action taken<sup>19</sup>.

In the countryside, changing agricultural practice can mean that soils are exposed and rainfall runs rapidly from field to drains and rivers, leading to surges in river levels. In towns the increase in hard surfaces, unable to absorb rainfall, often mean drains are overwhelmed and water quickly collects on the surface rushing down streets and over paved areas. The Pitt Review identified around two thirds of all the flooding in 2007 was as a result of surface water.

The insurance cost of the 2007 floods was thought to have been around £3 billion<sup>20</sup>, but the Environment Agency expect the regular annual cost of damage to property alone to be in excess of £1 billion. When the cost of further disruption, damage to infrastructure and loss of business is added this increases to £2.5 billion and could rise to £4 billion by 2035<sup>21</sup>.

However the costs do not quantify the misery and stress caused by flooding and its impact on people's health and wellbeing.

Trees and woods have a particular role to play in reducing the risk of flooding decreasing the rate at which rainfall reaches the ground and runs into streams, rivers and drains. In both urban and rural areas, this allows more time for the natural and man-made drainage system to take the water away reducing the likelihood or severity of rivers flooding or surface water inundating homes.

The Environment Agency recognises the role which woodland might play in reducing flood generation and increasing flood attenuation<sup>22</sup>. Targeted woodland creation may have a marked impact on flood flows at a local level<sup>23</sup>, particularly in the UK which has less than 12 per cent woodland cover.

Scientific models show that woodland located on floodplains can mitigate large floods by absorbing and delaying the progress downstream. This suggests creating strategically-placed floodplain woodland could significantly alleviate major floods downstream<sup>24</sup>.

Interception by trees in urban areas can be critical in reducing the pressure on the drainage system<sup>25</sup> and lowering the risk of surface water flooding. Preliminary research by the University of Manchester has shown that trees can reduce run-off by as much as 80% compared to asphalt.

However, in many places although tree numbers have been maintained, there has been a decline in the numbers of older trees with large spreading crowns able to intercept more rain, replaced with smaller alternatives. These smaller crowned trees have a reduced capacity to intercept rain<sup>26</sup>.

Recent years have also seen a decline in the numbers of trees planted in urban areas which, combined with a loss of trees planted during the Victorian era, should send a warning signal about the future for urban tree cover<sup>27</sup>.

When combined with other measures as part of sustainable urban drainage schemes, trees have a major role to play in both developments of green infrastructure and through mitigation of flood risk relating to new development. Investment in tree cover is likely to be a small amount compared to the cost of cleanup or the construction of ever more elaborate sewers and flood defenses. Action is needed now to ensure current tree cover is maintained but also that more tree planting is done to increase tree cover where it can help attenuate flooding.



## Water quality

Water quality is affected by the type and quantity of pollutants entering water bodies. Pollution in urban areas comes from a range of sources; pollutants from cars and transport in exhaust emissions, leaking oil, rubber and metal from tyres and brakes, and the soaps and grease from cleaning vehicles; chemicals and fertilisers used in parks and gardens; silt and soil washed from vegetation, bare areas of gardens and the landscape of towns; discarded food waste and refuse; animal faeces, for example from dogs and birds, all contribute to urban pollution.

Any of these can end up entering drainage water, adding to the costs of treatment, or being carried into water bodies. Where water is able to infiltrate into soil directly or through porous surfaces, plants and microbes are able to filter and break down many common pollutants found in storm water<sup>28</sup>.

Interception by trees in urban areas can be critical to increasing the volume of water that infiltrates into soils, and giving the drains time to carry rain away. Slowing the flow of rainwater to drains by allowing it to infiltrate into soils or be stored, helps reduce the risk of surface water flooding and of pollutants entering water bodies and harming water quality.

## What councils can do

Investing in a vibrant and thriving natural environment is critical to supporting and delivering key services, and a powerful tool in regenerating and reinvigorating the local economy. The importance of the natural environment is increasingly recognised by economists as key to sustainable economic growth and wellbeing<sup>29</sup>. This requires a strategic approach to maintaining and increasing tree cover as part of green infrastructure.

- Take an ambitious strategic approach – The protection and development of tree cover and green space requires a strategic approach which identifies where tree cover can contribute to economic regeneration, improved public health, reduction of flood risk and support for biodiversity. Redevelopment and new development can create positive opportunities for green space which links to communities and forms part of a green infrastructure, through urban areas and into the wider countryside.
- Adoption of access standards to ensure everyone has access to green space – No person should live more than 500m from at least one area of accessible woodland of no less than 2 hectares in size. In addition, there should also be at least one area of accessible woodland of no less than 20 hectares within 4 km of people's homes.
- Encourage participation – Government at all levels should support active involvement in the planning and management of trees, woods and other open green space. This should include the opportunity for active participation in strategic spatial planning and major developments. Active citizen participation in land use planning can validate the importance of green space, generate opportunities for community care for nature and give proper regard to local community interests.

## What can individuals do?

We all have an impact on the environment. How we behave can have both positive and negative impacts – individual actions can make a difference.

- Taking an active interest in the development of local plans/strategies in the planning process. Through making their voices heard in planning decisions, people can play an important role in shaping where they live.
- Protect local trees and woodland – if trees or woodland are under threat from development, people can join with others in protecting those landscapes which are important to them.
- Plant more trees – people can take a role individually or collectively to increase woodland cover; through active involvement in community woodland and tree planting or even through planting trees and shrubs in their gardens.
- Get in touch with your local councillor and tell them about the importance of trees and woodland to you and your community.

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