

Green Renewal – The Economics of Enhancing the Natural Environment

A WPI Economics report for Green Alliance

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06/05/2021

About this report

This report demonstrates the clear role of nature-based solutions in driving economic, social and environmental recovery as we emerge from the Covid-19 pandemic. It shows that these interventions can boost wellbeing and living standards right across the UK, and particularly in some of the areas that need it most. Looking at just three types of enhancement (woodland creation, peatland restoration and urban green infrastructure) we find that an expanded programme of nature-restoration could create at least 16,050 jobs in the 20% of constituencies likely to face the most significant employment challenges. We present place-based analysis of the labour market and nature-based solutions, which can also be found on an interactive webpage here: https://wpi-economics.github.io/Green_alliance_maps/

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About Green Alliance

Green Alliance is an independent think tank and charity focused on ambitious leadership for the environment. Since 1979, Green Alliance has been working with the most influential leaders in business, NGOs and politics to accelerate political action and create transformative policy for a green and prosperous UK.

About the Authors

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EXECUTIVE SUMMARY

“Our economies, livelihoods and well-being all depend on our most precious asset: Nature.”

The Dasgupta Review on the Economics of Biodiversity¹

As the country considers the economic and social recovery from the pandemic, this report demonstrates the clear role of nature-based solutions in driving economic, social and environmental recovery. It shows that these interventions can boost wellbeing and living standards right across the UK, and particularly in some of the areas that need it most. Looking at just three types of enhancement (woodland creation, peatland restoration and urban green infrastructure) we find that an expanded programme of nature-restoration could create at least 16,050 jobs in the 20% of constituencies likely to face the most significant employment challenges.

The economic benefits of natural environment enhancement

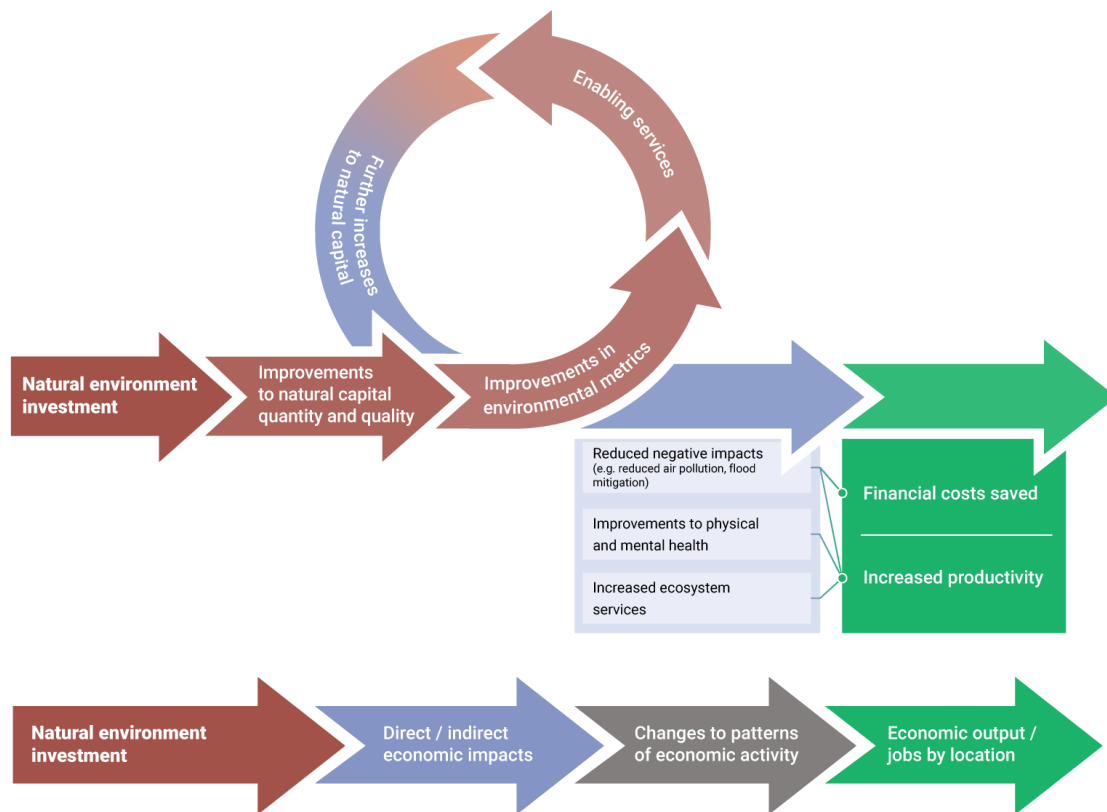
It is well established that well-designed nature-based solutions – including planting woodland, restoring peatland, seagrass restoration and habitat protection – can bring substantial environmental and social benefits. However, they also have significant economic impacts, for example they can:

- **Increase economic productivity:** Direct impacts include supporting economic activity such as tourism or sustainable fishing. Indirect impacts include urban cooling provided by green space and water that increases productivity; improved air quality, reducing sickness absence from work; or increased physical and mental health from green space, reducing staff turnover.
- **Reduce economic and social damage:** Nature-based solutions can reduce the impact of climate change and events such as floods – for example, through forest cover or through ‘blue infrastructure’ such as reconnecting floodplains to their rivers.
- **Contribute to shaping the future economy:** Natural environment enhancement generates activity both directly in sectors involved in environmental conservation and also boosts economic activity in sectors that benefit from a healthy natural environment.

In all of these areas, existing local examples have shown the potentially significant impacts. This report shows how these can be leveraged to play a central role in the recovery from the pandemic.

A study of Dorset’s economy found that incorporating linkages between the environment and the broader economy into a simulation of land use change suggested that there are substantial benefits to ecological restoration. Standard economic modelling suggested that expanding agricultural land-use would bring the largest (though small) economic benefits compared to expanding the creation of natural habitats. However, once environmental linkages were modelled explicitly, the study found that creating habitats with high conservation value in 41% of agricultural land by 2050 could create more than 25,000 jobs in sectors such as fishing, food and beverage manufacturing and travel and tourism.

Figure 1: Potential economic impacts of natural environment enhancement



Source: WPI Economics

In particular, the report argues that the recovery from the pandemic provides a significant opportunity to reshape local economies across the country. In this respect, we can learn from green investments during the Global Financial Crisis of 2008/09, which have been found to be successful at moving the economy towards green sectors.

More generally, with the Government supporting the economy with a significant fiscal stimulus, it is essential that the most is made of this spending. Here we see that many green and blue (water-based) stimulus measures have the potential to create more jobs than alternative measures that are not environmentally positive.

Analysing where and how nature-based solutions can support the creation of sustainable jobs

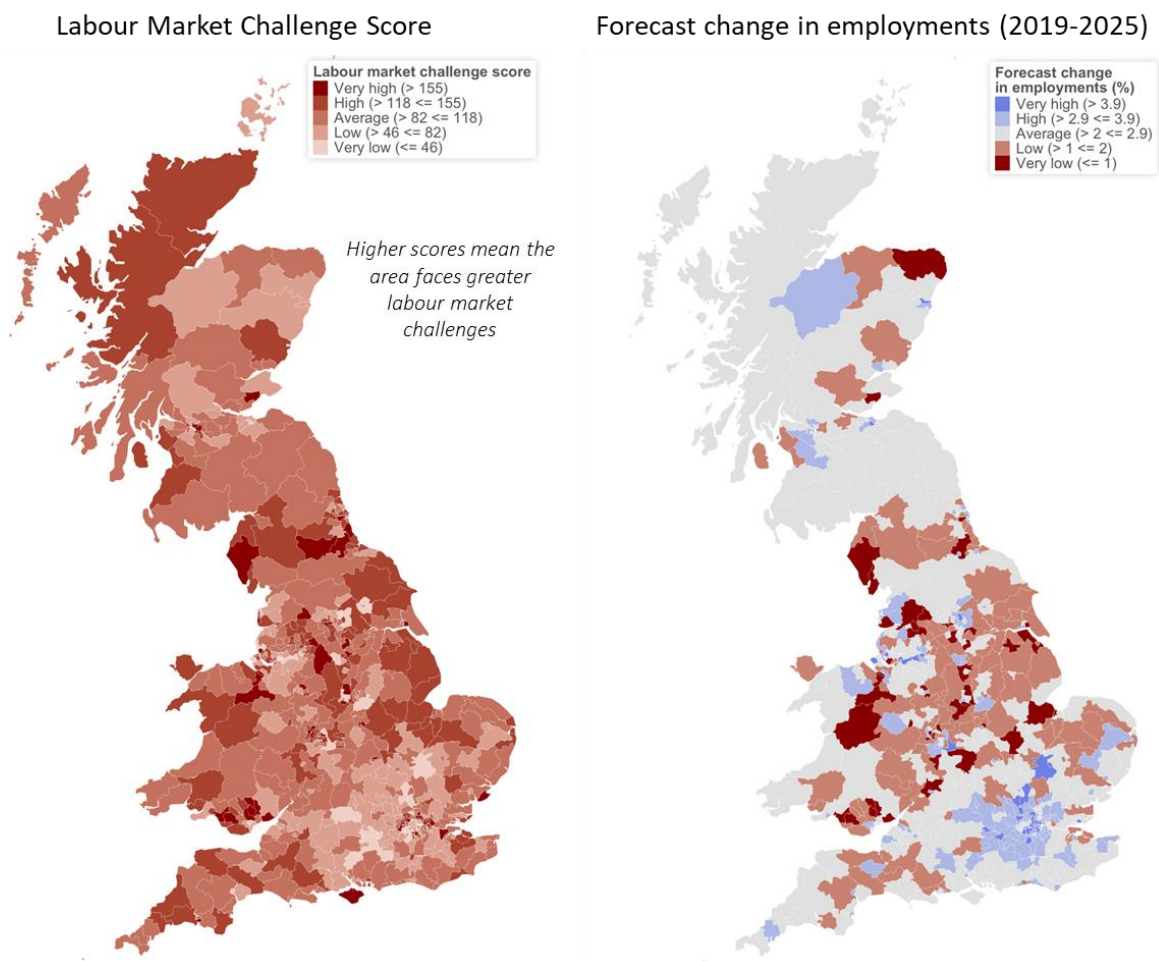
It not just the focus of the stimulus that matters. It is also the location. There is no doubt that the pandemic has had an economic impact right across Britain. However, these impacts have been felt hardest in certain areas. In turn, this comes with a risk that unemployment could rise further as Government schemes like furlough are unwound and these impacts could lead to persistently high unemployment and underemployment, particularly in areas that were already struggling economically before the pandemic.

This report provides tools to assess where the most substantial jobs challenges in the country are likely to be and where the opportunities for natural capital investment coincide.

Using official labour market statistics, we characterise the labour market challenges for each constituency in Great Britain as the economic impacts of Covid emerge. This is based on pre-pandemic underemployment (**resilience**), the change in underemployment since the start of the pandemic (**direction of travel**), the numbers of people on furlough (**at risk**) and a forecast change in employment to 2025 (**future outlook**).

Using these four elements we construct a labour market challenge score where 100 reflects the average constituency and places that are likely to have greater labour market challenges have higher scores, shown in figure 2.

Figure 2: Labour Market challenge score and forecast change in employments 2019-2025 by constituency – Great Britain



Source: WPI Economics

Notes: The groups for the labour market challenge score reflect standard deviations from the mean. Very High contains constituencies more than 1.5 times above the mean, High contains constituencies between 0.5 and 1.5 times above the mean, Average contains constituencies less than 0.5 times above or below the mean, Low contains constituencies between 0.5 and 1.5 times below the mean, and Very Low contains constituencies greater than 1.5 times below the mean.

Our analysis suggests:

- That the greatest combination of issues are likely to be seen in large and medium-sized towns within conurbations, non-core cities and small towns,

- Although London has been hit hardest during the pandemic, it has higher forecast increases in jobs,
- Constituencies where the majority of the population live in medium and large towns outside conurbations tended to have lower underemployment pre-pandemic and a lower increase during the pandemic.

Place matters: the location of nature-based solutions and jobs

Our labour market characterisation can be used as a tool to understand the impact of the likely locations of nature-based solutions.

New woodland

Using recently released RSPB analysis we have overlayed a dataset on best locations for new woodland in the country. We find that:

- Almost two-thirds of the most suitable land for tree planting in Great Britain is in constituencies with greater than average labour market challenges (3,260 hectares on average versus 1,890 hectares elsewhere).
- A total of 112,000 hectares of the most suitable land lies within the so called ‘Red Wall’ constituencies, and 125,000 hectares of the most suitable land is in the 10% of constituencies with the greatest labour market challenges.
- If the Government raised its ambition from 30,000 hectares of planting per year to 50,000 hectares targeted at areas with greater challenges, then around an extra 5,000 jobs could be created in these places.

Urban green infrastructure

Using a dataset compiled by the National Trust we have overlayed data on which neighbourhoods in England have a green deficit, taking into account the quality of green space that people have access to. We find that:

- Places in England that have the greatest labour market challenges tend to have poorer access to green space too: The 20% of constituencies with the greatest labour market challenges contain 27% of the population that live in neighbourhoods that have a green deficit.
- Targeting urban green infrastructure improvements to green deficit neighbourhoods could rapidly create 11,000 jobs in the fifth of constituencies with the worst labour market challenges.

Coastal habitat restoration

Overlaying 52 priority opportunities for new coastal habitat identified by the RSPB, we find that constituencies with at least one priority opportunity for new coastal habitat face slightly greater than average labour market challenges (score of 103 vs the average of 100). However, what is notable is that these constituencies face greater future risks; 18% of their working age population is on furlough (compared to 16% for other constituencies) and growth in employments is forecast to be 2.1% compared to 2.5% elsewhere.

Seagrass restoration

We have overlaid the locations of known past and current seagrass meadows with our labour market analysis to characterise the types of locations that may be appropriate for seagrass restoration. We find that constituencies known to have, or have had, seagrass have greater labour market challenges than others, with an average labour market challenge score of 107. This is driven by a higher proportion of people on furlough (17% vs 16%) and a lower increase in expected employments (2.2% vs 2.4%).

Peatland restoration

Approximately 76% of the peatland in the country is degraded, but there is no comprehensive publicly available dataset of peatland opportunity in the country. However, as an indication of the types of areas where peatland restoration is likely to be needed, we have analysed the ‘Great North Bog’ proposal, an ambitious peatland restoration initiative to restore nearly 7,000 square kilometres of upland peat in the Protected Landscapes of northern England over 20 years. Overlaying the constituencies that fall within 20 miles of this initiative with our labour market analysis we find that:

- Constituencies close to the Great North Bog initiative are likely to face substantially greater labour market challenges, with an average labour market challenge score of 111.
- Constituencies close to the Great North Bog initiative have a poorer outlook for forecast increases in employment; a 1.8% growth in employments to 2025, versus 2.5% elsewhere.

Overall impacts of nature-based solutions

Given the potential focus of benefits on areas most in need of economic stimulus, the obvious question is how large these impacts might be. Here, the available evidence suggests that nature-based solutions can come with a significant number of jobs. For example:

- **Woodland restoration / creation:** Between 22-114 jobs per 100 hectare, with most rigorous / applicable estimates clustering around the lower end of that range. For example, 20,000 new hectares of planting per year (moving from the Government’s current ambition to the Committee on Climate Change’s high ambition scenario) would generate around 5,000 jobs.
- **Peatland restoration:** Between 1-4 jobs per 100 hectares of restoration, with the higher end of the range reflecting indirectly created jobs. For example, the Committee on Climate Change’s recommendation to restore 55% of peatland to ‘good’ status by 2050 implies around 50,000 hectares restored per year. This would imply between 500-2,000 jobs.
- **Coastal restoration:** Between 30-56 jobs per 100 hectares of habitat restored. The RSPB have identified priority locations for 13,550 hectares of new coastal habitat – this could create around 400-750 jobs if this was carried out over a 10 year period.

Of course, some nature-based solutions may have an opportunity cost, and in some cases this can mean the loss of jobs associated with activities that had been carried out on the land used for nature-based solutions. However, a range of evidence suggests that in many cases they can deliver a net increase in jobs and can also diversify sources of income to ensure a more resilient economy. The Institute for European Environment Policy reports that “Nature-based Solutions projects...have the potential to produce many more jobs per investment than traditional infrastructure projects such as in coal, gas and nuclear power generation.”

A recent detailed study of 23 rewilding sites in Britain found that full-time equivalent jobs increased from 151 to 222 as a result of re-wilding – a 47% increase. The sources of income also diversified with new activities included nature-based tourism, monitoring, restoration activities, informal recreation and education.

It is also important to consider the types of jobs associated with nature-based solutions. Here, this report shows that:

- **Nature-based solutions generate a rich range of jobs in a wide range of sectors:** Nature-based jobs are wide-ranging in the type of work and the skill and/or qualification levels needed. Many jobs are in agriculture, forestry or fishing but beyond that there are a wide range of other sectors involved including education (including academia), tourism and recreation. There is also increasing demand for higher level digital and technology skills as remote sensing, robotics and the use of data analytics becomes more prevalent.
- **Nature-based solutions deliver low-skill entry level to high-skill jobs, with training and progression opportunities:** The skill and qualification levels of jobs in natural environment enhancement vary widely. We have found that nature-based solutions offer both entry level jobs with an opportunity to acquire transferable certifications and jobs which require either high-level academic qualifications or professional accreditation that takes time to build up. However, nature-based jobs are not all about academic qualifications. There are many specific licences, in particular for protected species such as bats and dormice, that require gaining experience in the field over a number of years.
- **Nature-based solutions offer an opportunity to focus policy support on specific demographic groups:** Data from HMRC shows that 63% of the fall in payrolled employees over the last year were under 25 years old. Friends of the Earth's recent report found that to deliver afforestation, environmental restoration (e.g. peatlands, seagrass meadows) and decarbonised agriculture an expanded workforce will be needed across jobs such as nursery staff, countryside rangers, farm workers, forestry workers and managers and environmental and conservation professionals. Upskilling will also be needed for many areas. Friends of the Earth identify these as major opportunities for young people to enter green jobs in the coming years.

Conclusion

Investment in enhancing the natural environment comes with large social and environmental benefits. It also comes with significant economic benefits. This report has shown that, with the right approach, these benefits could be focused on the areas of Britain that are in most in need of a boost to their labour market. They could also provide much needed support to young people who have struggled throughout the course of the pandemic. As such, investment in the natural environment could play an important role in the Government's agenda to build back better, and level up the country following the pandemic.

1. Introduction

Nature-based solutions – environmental activities such as planting woodland, restoring peatland, seagrass restoration and habitat protection – can enhance the environment in myriad ways. Conservation and restoration projects can reduce carbon in the atmosphere, improve water quality, increase biodiversity and deliver a range of other environmental benefits.

However, their impact goes beyond the environmental. Our economy depends on the natural world, and activities that protect and enhance it can increase economic productivity and reduce economic and social damage from events such as floods. The Dasgupta Review on the Economics of Biodiversity states this succinctly: “Our economies, livelihoods and well-being all depend on our most precious asset: Nature.”²

Environmental enhancement can involve use of land that could have been used for other economic activity. In the context of the extraordinary economic challenge raised by Covid, it would be easy to put off major environmental enhancement. However, this report explores the wide range of short and long-term jobs that nature-based solutions generate – and highlights how well-designed projects often deliver a net jobs gain.

- In the short-term, there are likely to be areas of significant underemployment in the country. Focusing investment on nature-based solutions can act as an **economic stimulus at the same time as delivering on environmental goals**. We have characterised the challenges labour markets across the country are likely to face in the coming years, and where and how nature-based solutions could play a key role in ensuring a strong, green recovery.
- **And to ensure future prosperity, our economy needs to move towards one that does not degrade our natural capital over time.** This means that the rich range of nature-based jobs we explore in the report have a strong future, and can form a key part of delivering good jobs in the post-pandemic world.

We note below the importance of careful planning for nature-based solutions; the wrong type of intervention can damage the environment. So, this is not about creating new policy in a hurry but ensuring that existing policy frameworks fully meet their potential and that public and private organisations across the country recognise the potential that nature-based solutions hold for both the environment and the economy.

*This report is part of the Green Renewal coalition, led by Green Alliance, that seeks to ensure a green recovery from the pandemic. The Green Renewal project works across the economic policy agenda to ensure green measures, including private finance and public infrastructure, deliver strong economic growth and high-quality jobs across the UK. This report focuses on the **economic case for investing in the natural environment**.*

Well-designed nature-based solutions deliver across a wide range of environmental goals

Contribution to a wide range of environmental goals

Nature-based solutions can deliver a wide range of environmental benefits in a resource-efficient way. The European Commission defines nature-based solutions as *“Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions”*.³

Examples include:

- Restoring **natural forests** in river catchment areas can protect communities downstream from flooding, remove carbon from the atmosphere and protect biodiversity. Planting trees and increasing green space in cities can similarly mitigate flooding, reduce urban temperatures, store carbon emissions, reduce air pollution, and provide health benefits.⁴
- **Peatlands** are the planet’s largest natural terrestrial carbon store. Peatlands cover only 3% of the Earth’s surface but sequester 370 million tonnes of carbon dioxide a year; storing more carbon than all other vegetation types in the world combined.⁵ However, degraded peatland instead emits carbon. Peatland restoration avoids carbon emissions in the future and begins to store carbon, and can also improve local water quality and biodiversity.⁶ The UK is one of the world’s top ten countries in terms of total peatland area, and contains 13% of the world’s blanket bogs which are globally threatened.⁷
- Restoring **coastal salt marsh** can reduce flood risks by storing floodwater, improve biodiversity, improve water quality and store carbon. Nature reserves can also improve physical and mental health through recreation opportunities.⁸
- **Seagrass restoration**: Seagrass is a flowering marine plant that captures carbon from the environment up to 35 times faster than tropical rainforests,⁹ provides nursery habitats for juvenile fish supporting fisheries and can help manage coastal flooding through stabilisation of the sea floor.¹⁰
- **Urban green (and blue) infrastructure** includes all the elements of the natural environment in urban areas that provide social, economic and environmental services. This includes open spaces such as parks and playing fields but also features such as green roofs and street trees, and water assets such as ponds, rivers and canals as well as sustainable urban drainage systems that aim to align modern drainage systems with natural water processes.¹¹

Box 1: Nature-based solutions in an urban setting – Millbay Boulevard

Millbay Boulevard in Plymouth is an example of nature-based solutions being located in urban settings and providing significant benefits. The development is an urban regeneration project integrating a number of nature-based solutions – particularly sustainable drainage systems and tree planting – to support the local environment as well as the local economy and community. The environmental benefits include reducing the city’s carbon output and increasing its resilience to the impacts of climate change.

600 square metres of coastal grasses and flowering plants will be planted to establish an effective drainage system that can hold 250 cubic metres of rainwater. This measure protects 1.7 square kilometres of the local area from flooding and creates links for a future new storm water sewer system. In addition, pine trees will be planted along the boulevard, further boosting the environmental benefits of the regeneration.

The new Millbay Boulevard marks a positive change to the way in which the area is used; prior to the project, the site was occupied by a walkway, some small-scale offices and businesses, temporary car parking and a lift tower which was out of use. As well as the benefits described above, the development will also establish more sustainable transport links in the city with a focus on cycling and walking.

Alongside the environmental benefits brought by the programme, it is anticipated to have supported 22 direct construction jobs over 16 months, as well as a multi-disciplinary team of engineers and landscape architects to oversee the development. The hotel, offices and other businesses will also support future jobs on the site.

Sources: Plymouth City Council^{12,13}

One size does not fit all: policy consistency is crucial

However, nature-based solutions must be carefully designed and tailored closely to their environment. The Natural Capital Committee highlight the risks of even the relatively straightforward example of tree planting. Increased tree planting without careful planning can lead to the loss of other habitats and land uses including species rich grasslands, heathlands and peatlands.¹⁴

Furthermore, nature-based solutions must themselves be resilient to future changes in climate. If climate mitigation policy encourages large afforestation schemes with a single type of tree, then this can result in low resilience to changes in climate and greater vulnerability to disease and pests due to the low biodiversity value.¹⁵ This has been recognised through the latest UK Forestry Standard, published in 2017, that pushes woodlands towards diversity rather than monoculture.¹⁶

Policy in this area must therefore focus on ensuring stable long-term frameworks that allow for high quality planning and delivery. This includes both clarity on the Government’s long-term environment plans and targets and long-term funding commitments.

Valuing the benefits of nature

Nature underpins our economies. ‘Natural capital’ provides services directly (e.g. food, water and raw materials), helps to regulate damaging risks (e.g. flood risk or diseases) and provides cultural and recreational benefits. Furthermore, a healthy environment supports more of these services, increasing productivity.

This report focuses on the impacts on economic activity of nature-based solutions, by which we mean impacts on productivity, financial costs and the location and type of jobs. However, it is important to set this in context of the Government’s Natural Capital Approach for accounting and cost-benefit appraisal. The approach uses the concept of ecosystem services to identify the economic, social and environmental consequences of changes to nature capital due to policies and public expenditure. When used for Government appraisal it is used to assess the impact on overall societal welfare of public policy decisions, and goes further than economic activity – including for example the enjoyment people get from access to nature. This may lead to economic impacts through improved mental health, but it is those economic impacts the remainder of this report focuses on, not the valuation of the enjoyment itself.

However, it is worth noting examples of cost-benefit analysis results for nature-based solutions. RSPB and Cambridge Econometrics (2021) conducted a cost-benefit analysis of three widespread nature-based solutions for the UK; restoration of peatland, salt marshes and woodland. Table 1 shows that on average these three nature-based solutions can deliver greater benefits than costs; substantially better in the case of peatland restoration and reforestation.

Table 1: Summary cost benefit analysis results for restoration of three important habitat types in Britain – net present values over a period of 100 years from restoration

	Peatland	Salt Marsh	Woodland
Benefits (£ per hectare of restored area, net present value)			
Carbon sequestration	£18,179	£14,048	£29,279
Recreation	£2,622		£32,936
Air pollution removal			£13,442
Non-monetised benefits	Improved water quality, reduced flood risk, enhanced biodiversity, preservation of ecological and archaeological sites	Improved water quality, fish nursery areas, enhanced biodiversity and reduced flood risk	Improved water quality, noise mitigation, temperature regulation, reduced flood risk and enhanced biodiversity
Total value of benefits	£20,801	£14,048	£75,657
Costs (£ per hectare of restored area, net present value)			
Capital costs	£1,473	£10,726 (low scenario)	£11,505
Operational costs	£3,025		£2,877
Opportunity costs			£12,715
Total value of costs	£4,498	£10,726	£27,097
Benefit-cost ratio	4.6	1.3	2.8

Source: RSPB / Cambridge Econometrics (2021)¹⁷

Furthermore, a recent study looked at 62 examples of nature conservation sites from around the world, such as wetlands and woodlands. Taking full account of the value of ecosystem services delivered by these nature-rich sites, the study found that in 70% of cases sites that were conserved or restored were worth more in net economic benefits than if they were changed to alternative uses. Notably all forested sites were found to be more valuable when they were conserved.¹⁸

The argument for a green economic stimulus

A once in a hundred-year shock will generate long lasting economic impacts

The magnitude of the recession caused by the pandemic is unprecedented in modern times. GDP declined by 9.9% in 2020, the steepest drop since consistent records began in 1948.¹⁹ Although there are reasons to expect the economy to recover relatively quickly once the main pandemic restrictions are lifted, there is likely to be economic ‘scarring’ caused by factors such as people losing skills during

a period of unemployment or furlough. The latest Office for Budget Responsibility forecast continues to assume that output in the medium-term will be 3% lower relative to its pre-pandemic path.²⁰

Furthermore, the health, social and economic impacts of the pandemic have all served to intensify many of the inequalities that were already present in the UK. For example, increases in the proportion of people claiming unemployment benefits have been highest in those neighbourhoods who had the highest rates of unemployment prior to the Covid-19 pandemic.²¹

In this situation there is a substantial risk of increased persistent unemployment (those actively seeking work) and also underemployment. Underemployment can be people who have part-time work and want full-time work or people who are not actively seeking work (perhaps because they have become discouraged) but say they would like to work. Erosion of skills, detachment from the workplace and a mismatch between the location of jobs and where people live can lead to a persistent high level of underemployment.²²

This can be one of the most damaging impacts of recession. At a societal level increased persistent unemployment damages the country's economy and can cause social issues. At an individual level unemployment has been found to have a greater impact on people's wellbeing than divorce.²³

Increased public spending can boost economic activity, but this must not be an unsustainable recovery

Increased public spending, or fiscal stimulus, can boost economic output and hence employment in situations where the economy is below full employment. Hepburn et al. (2020) report that the economic success of such stimulus is strongly affected by the speed at which the stimulus delivers real-world impact and the amount that the spending feeds through to the wider economy – the economic multiplier.²⁴

However, this cannot be a return to an economy based on unsustainable models of growth. The recent Dasgupta review shows that produced capital (roads, buildings and factories) per person doubled between 1992 and 2014 whilst natural capital declined by nearly 40%.²⁵ The Government's *Ten Point Plan for a Green Industrial Revolution*²⁶ recognises that we must protect future generations from climate change and the remorseless destruction of habitats.

Hepburn et al. (2020) state that high-productivity economies of the future will be those that make the most of artificial intelligence and the technologies of the fourth industrial revolution while also protecting and enhancing natural capital, such as ecosystems, biodiverse habitats, clean air and water, productive soils, and a stable climate.²⁷ In a survey of 231 economic experts from G20 countries comparing 25 major fiscal recovery options, the paper finds that natural capital investment is one of the five priorities that performs highly on both economic multiplier effects and positive climate impact.

There is also a substantial opportunity to reshape local economies across the country. A recent United States study finds that green investments during the Global Financial Crisis of 2008/09 were successful at reshaping the economy towards green sectors by increasing the local demand for green skills, particularly in communities which had workers with skills in relevant activities.²⁸

The UK has a relatively green stimulus package, but more can be done

The Greenness of Stimulus Index developed by Vivid Economics / Finance for Biodiversity Initiative examines 30 economies across the world to assess the environmental orientation of their stimulus

funding.²⁹ The UK is ranked as one of Europe’s best performers in large part due to the measures put in place by the Ten Point Plan. For example:

- A second round of the Green Recovery Challenge Fund was launched, with £40 million funding available for nature conservation and restoration projects, nature-based solutions and for projects that connect people with nature;³⁰
- Establishing ten Landscape Recovery projects that will pilot land use change to restore wilder landscapes in England.³¹

However, there is substantial scope to further green the stimulus package and delivery is key. The Government has also undertaken negative measures such as committing to further infrastructure spend on, for example, road building and support of environmentally-intensive industries such as aviation without green conditions attached. The funding available for the Green Homes Grant has been significantly reduced after it suffered substantial delivery problems.³² The Environmental Audit Committee stated that it has been laden with lengthy bureaucracy leading to reports of businesses laying off staff to cover loss of income rather than creating green jobs.³³

Box 2: Creating incentives to improve the environment – new policies

The Government are in the process of establishing several new policies and schemes and extending others that will allow landowners to generate revenue from actions that improve the environment.

Environmental Land Management Schemes (ELMS): The Government introduced three new schemes following the passage of the Agriculture Act 2020:

- **The Sustainable Farming Incentive:** This scheme will pay farmers for actions they take to manage their land in an environmentally sustainable way.
- **Local Nature Recovery:** This scheme will pay for actions that support local nature recovery such as creating, managing or restoring habitats and natural food management.
- **Landscape Recovery:** This scheme focuses on larger-scale, more fundamental changes to land use. This includes landscape-scale nature-based solutions such as large-scale tree planting, peatland and salt marsh restoration projects.

Market-based mechanisms: There are several existing and new ways that landowners can receive revenue for improving the environment:

- **Carbon credits:** Woodland creation and peatland projects can sell carbon credits to organisations looking to offset carbon emissions using the Woodland and Peatland codes
- **Biodiversity Net Gain:** Many planning authorities already have biodiversity net gain provisions, but legislative changes in the Environment Bill are expected to introduce a mandatory level of 10% for most new developments. Developers can achieve net gain through restoration actions on site or through paying for restoration projects off-site.
- **Catchment services:** Selling improvements such as improved water quality and natural flood management benefits) resulting from natural environment improvements.

The changes in this area are leading to the rapid growth of a new area of business in brokerage services to connect developers to landowners. Finally, the **natural environment investment readiness fund** provides grants that aim to stimulate private investment and market-based mechanisms that improve and safeguard our domestic natural environment.

Sources: Defra, House of Commons Library, RPS Group and Farm Business magazine

A wide range of policies can contribute to a truly green recovery

A more substantial and effective green economic stimulus package can be achieved through a wide range of policies. Green Alliance have identified a number of ways to go further including:

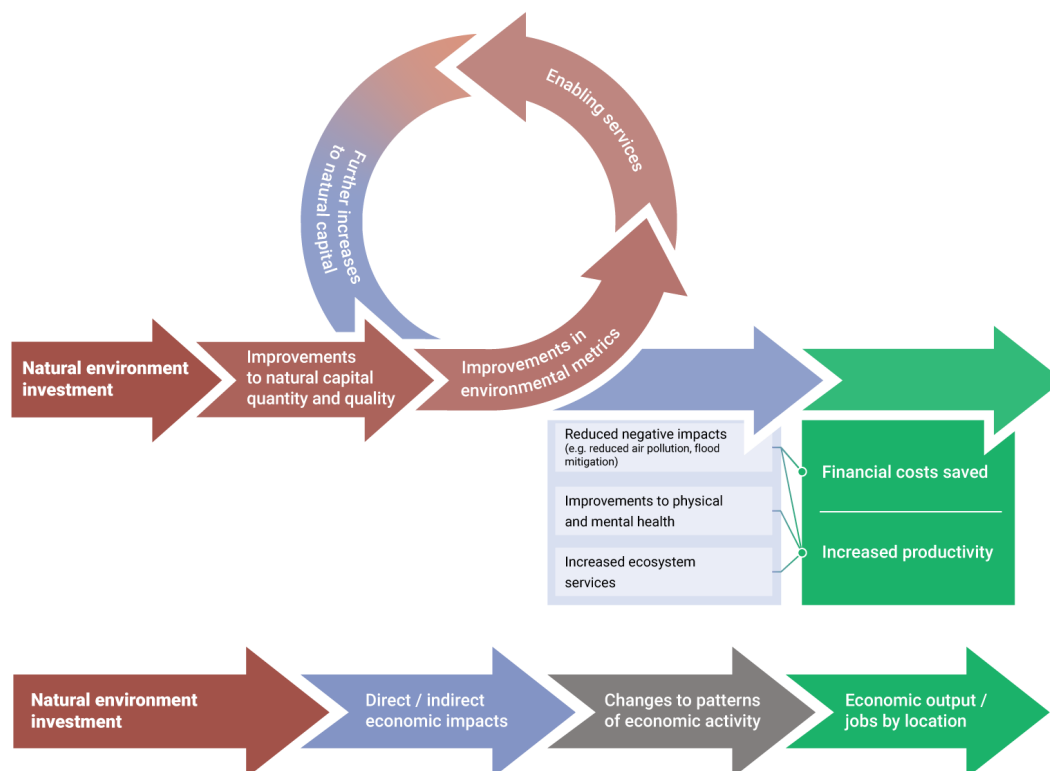
- Ensuring the National Infrastructure Bank has a ‘do no harm principle’ and that all investments are contributing towards net zero and or biodiversity goals,
- Align overall public spending and policy decisions with net zero, applying a net zero test to future fiscal events, and,
- Provide targeted funding and development plans for much needed infrastructure in the circular economy, vehicle decarbonisation, and a replacement of the Green Homes Grant.

All these investments have the potential to create jobs, and create more jobs than alternative measures that are not environmentally positive.³⁴ Nature-based solutions also have the potential to create a net increase in jobs in both the short and the long run.³⁵ This report provides tools to assess where the most substantial jobs challenges and the opportunity for well-designed natural environment enhancement coincide, and to provide evidence on the type of rich, good jobs that the sector can generate.

2. Overview of the impacts on economic activity of nature-based solutions

As previously explained, this report focuses on the impacts on economic activity of natural environment enhancement and nature-based solutions. After reviewing the Natural Capital Approach, we put together the framework shown in figure 3 to illustrate some of the main impacts on economic activity and the pathways.

Figure 3: Framework for identifying impacts on economic activity of natural environment enhancement



Source: WPI Economics

We have identified three broad types of key impacts on economic activity:

- **Productivity:** Direct impacts include supporting economic activity such as tourism or sustainable fishing. Indirect impacts include urban cooling provided by green space and water that increases productivity; improved air quality, reducing sickness absence from work; or increased physical and mental health from green space, reducing staff turnover.
- **Financial costs saved:** For example, costs avoided through flood mitigation or carbon sequestration leading to reduced impacts of climate change on economic activity.
- **Pattern of economic activity / jobs:** Natural environment investment will have a different pattern of economic activity and associated jobs than e.g. grey infrastructure, in terms of geography, skill level etc.

In addition, nature-based solutions can offer more resilience than traditional 'grey' infrastructure. Traditional 'grey' infrastructure can often offer more immediate fixes and use less land. However,

well-designed nature-based solutions can offer more effective and resilient solutions in the long run. Grey infrastructure, such as drainage systems in cities, often only provide one service and can struggle to meet increased pressures such as more frequent and intense storm events, causing further issues.³⁶

Increased productivity

There are several routes through which the natural environment can increase economic productivity:

- **Directly supporting economic activity:** Natural capital assets are the foundation of all wealth, consumption and production. The natural environment underpins the process of employment and productivity across the economy. For example, a study of Dorset’s environmental economy³⁷ highlights that natural capital assets provide a range of water, land and sky facilities for leisure, recreation, education and cultural activity alongside services such as flood defence, crop pollination, carbon sequestration and pollutant mitigation. The natural environment also provides market-orientated resources, including fuels (oil), timber, marine produce, and minerals. Some of these are renewable requiring careful management to maintain productivity over time, and some are non-renewable, requiring careful management to maintain optimal depletion rates. A healthy natural environment ensures benefits of all types are maximised over the long-term. Box 3 explores this area further.
- **Urban cooling:** Green and blue urban infrastructure (parks, street trees, lakes, canals etc.) can all help to cool urban areas.³⁸ There is a demonstrated link between hot temperatures and lower worker productivity. Urban cooling also saves businesses money on air conditioning. With the number of very hot days forecast to rise substantially due to climate change the value of green and blue spaces in cities is expected to grow significantly in future years.³⁹ For example in 2018 the natural cooling effects of urban green spaces in Glasgow and Edinburgh were estimated to have prevented productivity losses of £3.15 million.⁴⁰
- **Air pollution removal:** Increased trees and vegetation in urban areas helps remove local air pollution. This has a wide range of important health benefits including reducing illness and deaths from heart attacks and strokes, cancer and diabetes.⁴¹ It has also been linked to economic productivity through leading to more absence from work. CBI Economics (2020) estimate that if UK reduced air pollution to World Health Organization guidelines then a loss of 3 million working days per year could be avoided and the UK economy could benefit by £1.6 billion annually.⁴²
- **Physical and mental health:** Access to green and open spaces improves physical and mental health, which in turn leads to fewer days that employees take off sick:
 - Green space has been linked with reduced levels of obesity in children and young people and there is also strong evidence that access to open spaces and sports facilities is associated with higher levels of physical activity and reductions in a number of long-term conditions such as heart disease, cancer, and musculoskeletal conditions,⁴³
 - Access to urban green space has been linked to significantly lower mental distress levels and higher well-being even after controlling for other factors such as income, employment status and housing type.⁴⁴ The Stevenson/Farmer review found that poor mental health costs employers between £33-£42 billion per year, and costs the

Government a further £24-£27 billion that is likely to cause increased tax burdens on business,⁴⁵

- A study in the Netherlands showed that every 10% increase in exposure to green space led to a reduction in the number of health symptoms experienced equivalent to being 5 years younger,⁴⁶
- The proportion of green and open space is linked to self-reported levels of health and mental health for all ages and socio-economic groups through improving companionship, sense of identity and belonging (Pinder et al. 2009) and happiness.⁴⁷

Box 3: How a healthy environment supports a healthy economy – Dorset case study

As part of the Valuing Nature Programme researchers considered the implications of land-use change in Dorset. Over the past century, Dorset has been subject to agricultural intensification which has contributed to a deterioration of ecosystems in the county across a number of measures.

In a survey conducted as part of the research, a significant proportion of the county's businesses recognised the link between the quality of the environment and the economy.



Photo credit: Dimitris Vetsikas from Pixabay

Over half of the business surveyed stated that the quality of the natural environment was a key reason for conducting business in Dorset, while close to half reported their business being at least somewhat dependent on the tangible benefits that the county's ecosystems provide. A broad range of business sectors rely on these benefits at least to some extent, while some are particularly dependent, including fishing, food and beverage manufacturing, and travel and tourism.

However, this clear link between the natural environment and the economy is not always accounted for in economic modelling. The research modelled a range of scenarios over a 35-year period (2015-2050) where the share of agricultural land either decreased to enable expansion of habitats with high conservation value or intensified, and compared the simulated impacts of these changes.

Using a standard economic modelling approach (called 'input-output' modelling) that does not incorporate links between the quality of the environment and economic activity, simulating changes in land use leads to very modest economic impacts (with economic output changing by 0.3% or less) under each scenario. Of these slight changes to output, intensification of agriculture resulted in the highest increase.

However, when incorporating links to the environment into the approach (using 'agent-based' modelling), the importance of the environment to a wide range of economic activities in Dorset becomes apparent. Under this analysis the estimated economic impacts of simulated ecological restoration are considerably higher than under increased agricultural land use. **Creating habitats with high conservation value in 41% of agricultural land by 2050 was found to lead to a change to economic output of up to 5%, delivering a £0.8 billion increase in GVA and creating more than 25,000 jobs.**

Source: Newton et al. (2019)⁴⁸

Saving financial costs

Nature-based solutions can lead to the saving of financial costs for business, people and the public sector. A major example is flood mitigation; natural capital such as floodplains connected to their rivers⁴⁹, forest cover⁵⁰ and coastal saltmarsh⁵¹ are associated with an ability to reduce flooding.

Valuing the impact of specific natural capital improvements on flood mitigation is challenging due to the range of factors that can cause flooding. Steart Marshes, managed by the Wetlands and Wildfowl Trust, is an example of a restored wetland that is designed to reduce flood risk to local properties by storing floodwater. By enabling flood risk management across the coastline of the Severn Estuary it contributes to the protection of 100,000 homes and businesses with an estimated value of £5 billion.⁵²

Coastal habitats, and in particular saltmarsh, provide a natural buffer, significantly reducing wave energy and the height of surge waves. The flood risk management benefits of UK coastal habitats have been calculated to be worth more than £4.5 billion.⁵³

Some of the best evidence comes from the Committee on Climate Change which commissioned research on four case studies comparing the costs and benefits of anticipating climate change risk compared to waiting for and reacting to adverse climate events. Studying the Norfolk and Suffolk Broads, The Petteril Catchment in Cumbria, Moor House and Upper Teesdale in the North Pennines and Somerset, the analysis found that making land-use change in advance of a climate hazard event occurring delivered higher net benefits compared to waiting until the hazard has occurred.

For example, in the Norfolk Broads there is a risk of flooding that is worsened due to climate change. Flooding causes economic loss in a number of ways including waterlogged agricultural fields, salt water in freshwater and farmland habitats, worsened water quality and temporary loss of grazing land. The analysis found that an anticipatory scenario of a 5% reduction in land use for arable production (returning the land to a mix of semi-improved grassland and saltmarsh habitat) gave the highest net benefit when compared to either a scenario with no land-use change or one where land-use is changed after the flooding event. Anticipating a flooding event and making land-use change early reduced total costs by £490 million over an 80-year time horizon compared to the no land-use change scenario, whilst changing land-use in reaction to the flooding event reduced total costs by £380 million – still a large amount but lower than anticipating the likelihood of flooding beforehand.

Case study – Central Scotland Green Network

The Central Scotland Green Network is a national development within the National Planning Framework which aims to help public organisations and other stakeholders co-ordinate their activities to provide widely accessible and consistently excellent natural environments across Scotland's central belt.

In an assessment of the benefits of the Network⁵⁴, monetary estimates were made of many of the benefits that it will bring. By 2050 it is expected to provide total net present benefits of:

- £513 million reduced crime
- £742 million improved physical health
- £1,290 million improved mental health
- £2,311 million carbon sequestration
- £1,206 million reduction in flood damage

It is also expected to bring many further benefits that were not monetised including better air and water quality, reduced noise pollution and enhanced biodiversity.

Finally, we cover the impact of natural environment investment on the location of economic activity and associated jobs in chapter 4, and what type of jobs are associated with the investment in chapter 5.

3. Connecting labour market conditions and nature-based solutions: characterising the labour market

Unemployment and underemployment are likely to be substantially higher in the coming years

Covid-19 has led to a wide range of economic impacts. UK Gross Domestic Product fell 9.9% in 2020, the largest decline in the G7.⁵⁵ Economic activity has been severely curtailed in sectors that have been subject to substantial restrictions, and our travel patterns and the types of products and services we buy have changed substantially. To support people's livelihoods the Government has taken major economic support measures. These are forecast to raise Government borrowing to a peacetime high of £355 billion (16.9% of GDP) in 2020-21, and the Government plans increases in taxes that will take the overall tax burden to its highest level since the late 1960s.⁵⁶

These measures have mitigated the potential rise in unemployment, now forecast to reach 6.5% at the end of 2021.⁵⁷ However, this still means that 850,000 more unemployed people are forecast to be unemployed at the end of 2021 than would have been the case. Alongside this, there are likely to be further labour market impacts not captured by the official unemployment measure. For example:

- People discouraged from seeking employment: 450,000 people will have been on furlough from their jobs for more than six months, causing significant 'scarring' effects from the loss in work skills and knowledge.⁵⁸
- Increased part-time work: National output is expected to be 3% lower in the medium term than would have otherwise been the case.⁵⁹ This is likely to increase the number of people who would like to work full-time but can only find a part-time job.

As the need for pandemic restrictions recedes, employment will partially bounce back. However, we are likely to see both higher unemployment and underemployment in the medium-term.

Characterising labour market challenges

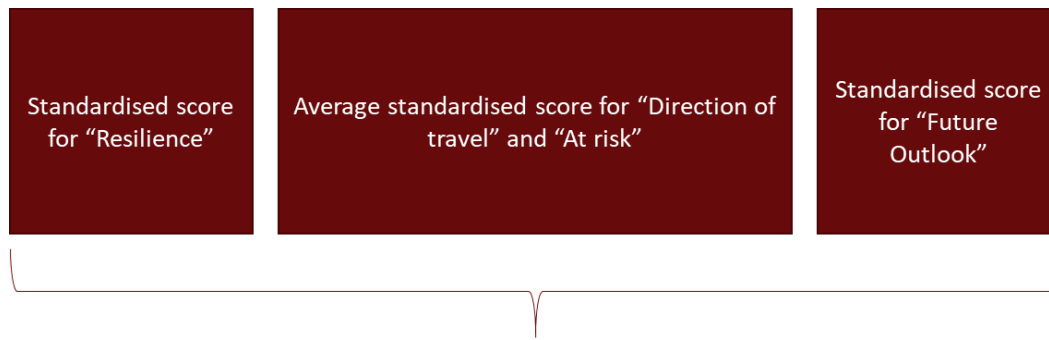
The economic impacts of the crisis, in common with the health and social impacts, are not evenly spread and have intensified many of inequalities that were already present in the UK.⁶⁰ To understand the potential challenges at a local level we have used official labour market data to characterise the labour market challenges for all Local Authorities and constituencies in Great Britain as the economic impacts of COVID-19 emerge. Table 2 shows our measures and sources.

Table 2: Labour market challenges: categories and sources

Element	Measure	Source
Resilience: Proportion of working age population underemployed in 12 months ending September 2019	Number of people unemployed	Claimant count (ONS)
	Number of people economically inactive wanting a job	Annual Population survey (ONS)
	Number of part-time workers who say they could not find a full-time job	Annual Population survey – regional level data (ONS)
Direction of travel Percentage increase in underemployment in 12 months ending September 2020	Change in number of people unemployed	Claimant count (ONS)
	Change in number of people economically inactive wanting a job	Annual Population survey (ONS)
	Change in number of part-time workers who say they could not find a full-time job	Annual Population survey – regional level data (ONS)
At risk Proportion of working age population supported by employment support schemes as at end January 2021	Total employments on furlough – Coronavirus Job Retention Scheme (CJRS)	HMRC coronavirus (COVID-19) statistics
	Total no. of claims made for Self-Employment Income Support Scheme (SEISS) – 2 nd tranche	HMRC coronavirus (COVID-19) statistics
Future outlook Forecast change in jobs to 2025	Forecast change in employments to 2025 compared to 2019	Institute of Chartered Accountants in England and Wales (ICAEW) and Oxford Economics sectoral forecasts ⁶¹ combined with sectoral employment patterns from Business Register and Employment Survey (ONS)

To analyse the data we have constructed an index. We have based this on standardisation of each of the elements, a method which estimates how far each constituency / Local Authority differs from the average.⁶² Using these standardised measures we combine the four elements into a ‘Labour Market Challenge Score’ where 100 reflects the average constituency / Local Authority and places that are likely to have greater labour market challenges have higher scores (to avoid double-counting we take the average of the ‘direction of travel’ and ‘at risk’ elements first, as these both reflect trends during the pandemic).

Figure 4: Construction of labour market challenge score



Labour market challenge score: Average standardised score across three elements above, reindexed so that average consistency has a score of 100

This allows us to look across the country at each of these measures, and at the composite index. Table 3 shows the results for the five constituencies that we find are likely to face the most labour market challenges, and those that are likely to face the least.

Table 3: Labour market characterisation for example constituencies that our analysis suggests face the most and least significant labour market challenges

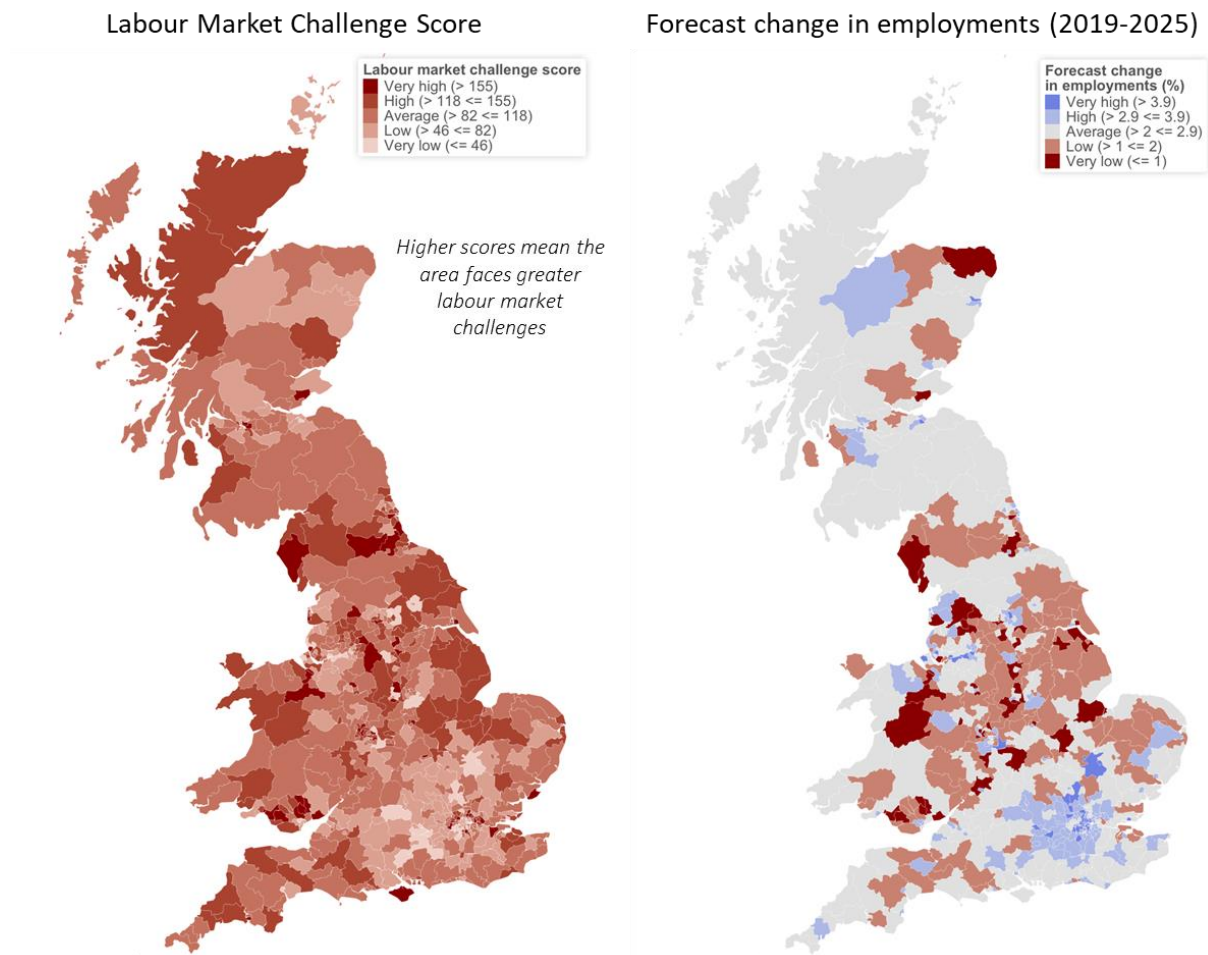
Constituency	Proportion of working age population underemployed pre-pandemic (Sep 2018 to Sep 2019)	Percentage increase in underemployment (Sep 2019 to Sep 2020)	Proportion of working age population on CJRS and SEISS (end-Jan 2021)	Forecast percentage change in employments 2019-2025	Index score (average constituency = 100)
The 5 constituencies with the most significant labour market challenges					
Washington and Sunderland West	18%	-12%	11%	-1%	239
Wolverhampton South East	15%	36%	14%	0%	215
Derby South	14%	41%	17%	0%	215
Kingston upon Hull East	14%	33%	11%	-1%	206
Brent Central	10%	124%	29%	2%	201
The 5 constituencies with the least significant labour market challenges					
Richmond Park	7%	75%	12%	4%	23
Altrincham and Sale West	8%	24%	15%	4%	22
Hitchin and Harpenden	8%	-3%	16%	4%	21
Wokingham	6%	20%	16%	4%	14
Sheffield, Hallam	5%	44%	9%	3%	0

Notes: Dark red shows the constituencies with the worst metrics on each element and light red shows the best (greater than 1.5 standard deviations from the mean in either direction). A higher labour market challenge score means our index suggests the area faces more significant labour market challenges.

Labour market challenges: summary results

Using our composite index, we can analyse the data for important patterns. We use the constituency level data as this is the more granular option. Figure 5 maps the results for the overall labour market challenge score and for just the forecast change in employments metric.

Figure 5: Labour Market challenge score and forecast change in employments 2019-2025 by constituency – Great Britain



Source: WPI Economics

Notes: The groups for the labour market challenge score reflect standard deviations from the mean. Very High contains constituencies more than 1.5 times above the mean, High contains constituencies between 0.5 and 1.5 times above the mean, Average contains constituencies less than 0.5 times above or below the mean, Low contains constituencies between 0.5 and 1.5 times below the mean, and Very Low contains constituencies greater than 1.5 times below the mean.

Table 4 shows the average results split by degree of rurality. This shows that:

- Predominantly urban areas tend to have had higher underemployment pre-pandemic and have seen a greater increase over the year ending September 2020. However, the ICAEW forecasts suggest they are likely to see a greater rise in available jobs over the next few years due to their sectoral mix.

- Predominantly rural areas by contrast tend to have lower underemployment pre-pandemic and a lower increase over the year ending September 2020. However, they also tend to have a slightly larger proportion of people on job protection schemes and a lower forecast percentage change in jobs.

Table 4: Labour market characterisation broken down by rural and urban constituencies

Constituency – Urban-rural classifications	Proportion of working age population underemployed pre-pandemic (Sep 2018 to Sep 2019)	Percentage increase in underemployment (Sep 2019 to Sep 2020)	Proportion of working age population on CJRS and SEISS (end-Jan 2021)	Forecast percentage change in employments 2019-2025	Labour market challenge score (average constituency = 100)
Predominantly Urban	10%	47%	16%	2.7%	100
Urban with Significant Rural	10%	40%	15%	2.2%	99
Predominantly Rural	8%	38%	18%	2.0%	102

Notes: A higher labour market challenge score number means our index suggests the area faces more significant labour market challenges.

We can also split the results by the type of settlement in which the largest proportion of each constituency's population lives, shown in table 5.⁶³ This shows that:

- London has been hit hardest during the pandemic, with a greater increase in underemployment than other areas and a higher proportion of the population on job protections schemes.
- Constituencies where the majority of the population live in towns that are not within conurbations tend to have lower underemployment pre-pandemic and a lower increase over the year ending September 2020. However, they tend to have a lower forecast percentage change in jobs.
- Our index suggests that the greatest combination of issues will be seen in large and medium towns within conurbations, other cities (that are not classed as core cities) and small towns (outside conurbations).

Table 5: Labour market characterisation broken down by city-town classification of constituencies

Constituency – city/town primary classification	Proportion of working age population underemployed pre-pandemic (Sep 2018 to Sep 2019)	Percentage increase in underemployment (Sep 2019 to Sep 2020)	Proportion of working age population on CJRS and SEISS (end-Jan 2021)	Forecast percentage change in employments 2019-2025	Labour market challenge score (average constituency = 100)
Core City (London)	10%	53%	19%	3.6%	94
Core City (outside London)	11%	37%	14%	3.2%	90
Large Town in Conurbation	11%	48%	15%	2.6%	104
Medium Town in Conurbation	10%	45%	16%	2.3%	108
Small Town in Conurbation	8%	44%	16%	2.7%	81
Other City	11%	41%	15%	2.5%	104
Large Town	9%	42%	16%	2.5%	95
Medium Town	9%	35%	16%	2.3%	98
Small Town	10%	29%	16%	1.8%	112
Village or smaller	8%	36%	17%	2.1%	99

Notes: Dark red shows the constituencies with the worst metrics on each element and light red shows the best (greater than 1.5 standard deviations from the mean in either direction). A higher labour market challenge score means our index suggests the area faces more significant labour market challenges. The table omits a single constituency that has a classification of ‘Village or smaller in Conurbation’.

4. Place matters: the locations of jobs associated with nature-based solutions

Different types of nature-based solutions are appropriate for locations across the UK. An assessment of nature-based jobs in Scotland found that the majority of jobs (55%) are in rural or remote locations but there are a significant minority in both urban locations (21%) and urban areas with significant rural areas nearby (24%).⁶⁴

We have identified a range of information to allow us to understand the location of potential activity in more granular detail, and overlaid this with labour market analysis that we discussed in chapter 3.

Afforestation

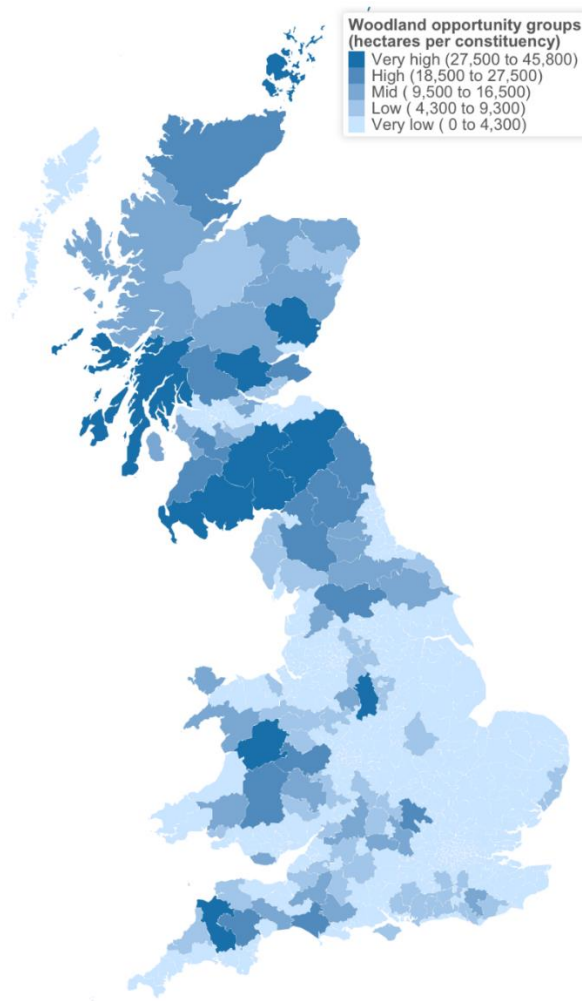
There is significant potential for increased tree cover in the country. However, tree planting must be done with sensitivity to the environment they are planted in. The Natural Capital Committee point out that the right tree in the right place can bring a multitude of benefits, but that tree planting without careful planning is likely to lead to the loss of other habitats, or adverse impacts on soil, water quality and air quality amongst other issues.⁶⁵ For example, higher quality agriculture land and existing woodland, environmentally sensitive sites and peatlands are poor places for new tree planting.

Furthermore, recent evidence suggests that woodland creation on richer organo-mineral soils can trigger soil carbon losses that might at least partly counteract the benefits of sequestration by new trees. The RSPB have recently released analysis that builds on this evidence to identify the areas potentially most-suited to new woodland planting on lower-risk mineral soils.⁶⁶

We have calculated how many hectares of these most suitable areas there are per constituency (see figure 6 and overlaid this data with our labour market analysis. We find that:

- Almost two-thirds of the most suitable land for tree planting in Great Britain is in constituencies that our analysis (see chapter 3) suggests have greater than average labour market challenges. These constituencies have on average 3,260 hectares of the most suitable land for tree planting, 70% greater than the average 1,890 hectares in those constituencies with better than average labour market challenges.
- A total of 112,000 hectares of the most suitable land lies within the so called ‘Red Wall’ constituencies
- If the Government raised its ambition from 30,000 hectares of planting per year to 50,000 hectares in line with Committee on Climate Change’s more ambitious scenario, then around an extra 5,000 jobs could be created across the country. These could be targeted to areas with the most severe labour market challenges over the next few years – just the 10% of constituencies with the greatest challenges contain over 125,000 hectares of suitable planting land.

Figure 6: Hectares potentially available for new woodland on lower-risk mineral soils by constituency



Source: RSPB and WPI calculations

Notes: Each group in the above map has been calculated to contain 20% of the land area potentially available for new woodland on lower-risk mineral soils in Great Britain, reflecting the concentration of available land. Just 11 constituencies are in the Very High group, with 529 constituencies in the Very Low group but both contain 20% of the total opportunity.

Urban Green Infrastructure

Last year the National Trust commissioned an analysis of greenspace interventions focused within some of the UK's most deprived urban neighbourhoods from Vivid Economics and Barton Willmore.⁶⁷ The report showed that a £5.5 billion capital investment in the Future Parks Accelerator programme focused within some of the UK's most deprived urban neighbourhoods could deliver £20 billion in physical health and wellbeing benefits to these communities, in tandem with the active travel, biodiversity, carbon capture and air quality enhancements. Table 6 summarises the benefit cost ratio calculated in the research and the estimate of job creation from this programme.

Table 6: Extracts from Urban Green Infrastructure Options Appraisal for Future Parks Accelerator

	Parks upgrade	Green Neighbourhoods: new parks	Green Neighbourhoods: street trees & street parks	Regional parks	Total of all programmes
Capital spend (£m)	1,200	400	2,500	1,400	5,451
Benefit cost ratio	100	3.8	3.1	2.3	20
Temporary jobs created	7,300	2,500	16,000	13,500	40,000
Permanent jobs created	1,000	180	1,300	3,800	6,300

Source: Vivid Economics and Barton Willmore (2020)⁶⁸

The National Trust have extended research undertaken by Friends of the Earth⁶⁹ to analyse which neighbourhoods in England have a green deficit, taking into account the quality of green space that people have access to (for example, a ‘high quality’ 25 square metre green space will be worth the same as a 50 square metre green space of fair quality). Overlaying these locations with our labour market analysis we find that:

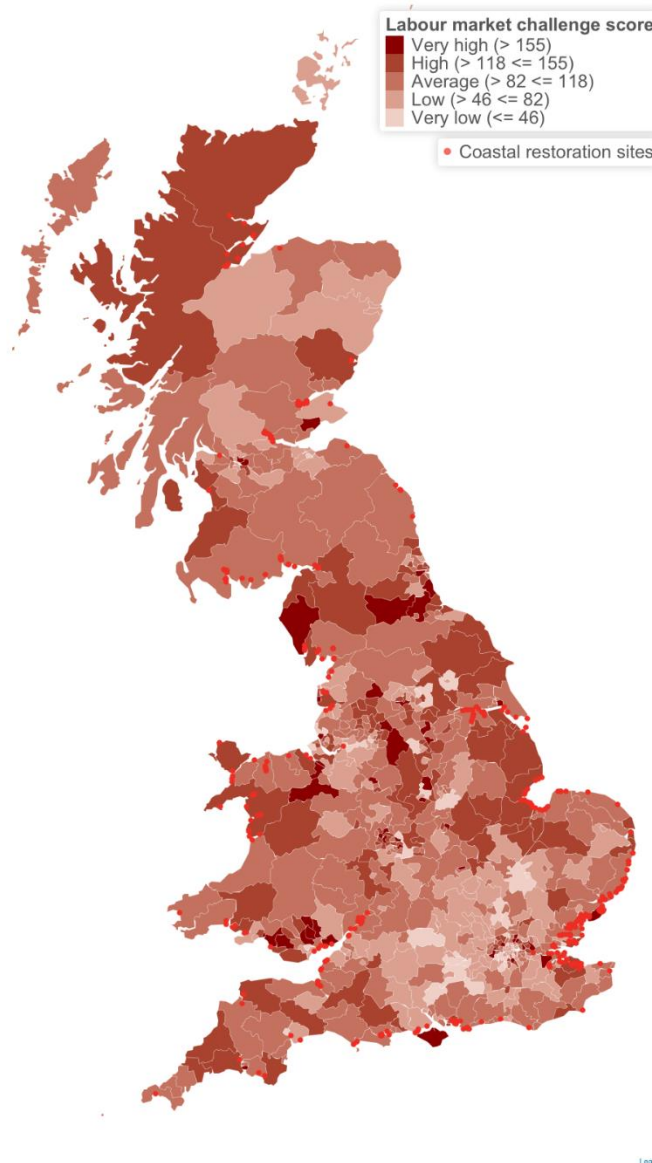
- **Places in England that our analysis suggests have the greatest labour market challenges tend to have poorer access to green space too:** The 20% of English constituencies with the greatest labour market challenges (see chapter 3) contain 27% of the population that live in neighbourhoods that the National Trust analysis suggests have a green deficit.
- **However, this is only true of the areas with the greatest labour market challenges:** The proportion of the population living in green deficit neighbourhoods is the same for English constituencies with greater than average labour market challenges compared to those with better than average (22% in each case). This suggests the focus from the point of view of the labour market should be on the communities who are facing the most severe job challenges.
- **Targeting urban green infrastructure improvements to green deficit neighbourhoods could rapidly create over 11,000 jobs in the fifth of constituencies with the worst labour market challenges:** Vivid Economics identifies 40,000 temporary jobs across the country from the programme of urban green infrastructure. If the programme was designed to target areas with an urban green deficit, then we calculate this would create 11,000 temporary jobs in the fifth of constituencies with the worst labour market challenges.

Coastal habitat restoration

In 2018, the RSPB identified 52 priority opportunities for new coastal habitat around the UK, out of 348 potential sites.⁷⁰ Overlaying these locations with our labour market analysis we find that 10 of the locations are in the fifth of constituencies that face the most significant labour market challenges.

Our analysis also shows that constituencies with at least one priority opportunity for new coastal habitat face slightly greater than average labour market challenges (score of 103). However, what is notable is that they particularly face greater future risks; 18% of their working age population is on furlough (compared to 16% for other constituencies) and growth in employments is forecast to be 2.1% compared to 2.5% elsewhere.

Figure 7: Locations of identified priority coastal restoration sites and labour market challenge score by constituency



Source: RSPB⁷¹ and WPI Economics

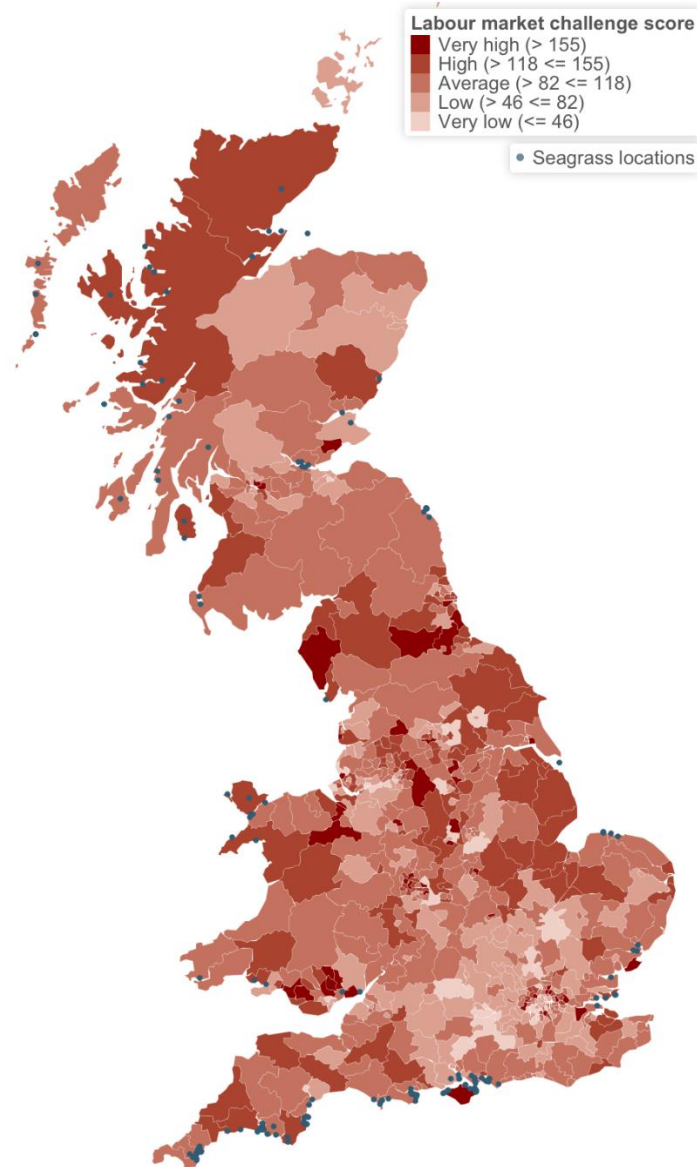
Seagrass restoration

There is no available data of the priority locations for seagrass restoration. However, a recent study has collated all reported locations of current and historic known seagrass meadows.⁷² We have overlaid these locations with our labour market analysis to characterise the types of locations seagrass currently exists. This may be a helpful indicator for the types of locations / labour market conditions in areas where restoration might be required. It is likely this is an underestimate of both the number and extent of seagrass as many meadows are unreported and area sizes included within the data for known meadows are estimates. Figure 8 overlays these locations with our labour market challenge scores.

Overlaying these locations with our labour market analysis we find that constituencies with seagrass have greater labour market challenges than others, with an average labour market challenge score of

107, versus 98 for constituencies without seagrass. This is driven by a higher proportion of people on furlough (17% vs 16%) and a lower increase in expected employments (2.2% vs 2.4%).

Figure 8: Locations of reported current and historic seagrass meadows and labour market challenge score by constituency



Source: Green et al. (2021)⁷³ and WPI Economics

Box 4: Case study – Seagrass restoration in Dale Bay, Wales

A collaborative effort between WWF, Swansea University, Project Seagrass and Sky Ocean Rescue has established the UK's biggest seagrass restoration scheme, with around 1.2 million seagrass seeds planted over 2 hectares in Dale Bay in Wales. Not only is this hugely beneficial to the environment, given seagrass' ability to capture carbon up to 35 times faster than tropical rainforest, increase biodiversity and fisheries productivity, improve water quality and help manage coastal flooding, but it also has the potential to provide a range of employment opportunities in coastal areas.



Photo credit: Lewis Jefferies and WWF

Restoring seagrass meadows involves various processes, from harvesting seeds and putting them into biodegradable sacks for planting, to maintaining the meadow. Associated research is crucial, as is stakeholder engagement. The pilot for the Dale Bay restoration employed a range of full and part time permanent, seasonal and contracted staff, amounting to 2.9 Full Time Equivalents over two years.

Over the next 3-5 years seagrass restoration at two new sites will commence which is anticipated to employ over nine Full Time Equivalents, including technical lab work, project management and stakeholder engagement, with additional employment through boat hire and seasonal contractors. In future years, mechanisation is anticipated to reduce the cost and labour intensiveness of maintaining the meadow.

In the longer-term seagrass meadows provide nursery habitats for juvenile fish, supporting sustainable fishing and supports local tourism through protecting eroding beaches, snorkelling opportunities and recreational fishing.

Though seagrass meadows are relatively new as a nature-based solution, they used to cover much more of the UK's seabed than they do today; currently, UK seagrasses amount to less than 10% of the estimated number in existence a century ago. There is huge potential for both people and the environment in restoring these habitats as a nature-based solution.

Sources: WWF⁷⁴, WWF⁷⁵, Swansea University⁷⁶, Green et al⁷⁷

Peatland restoration

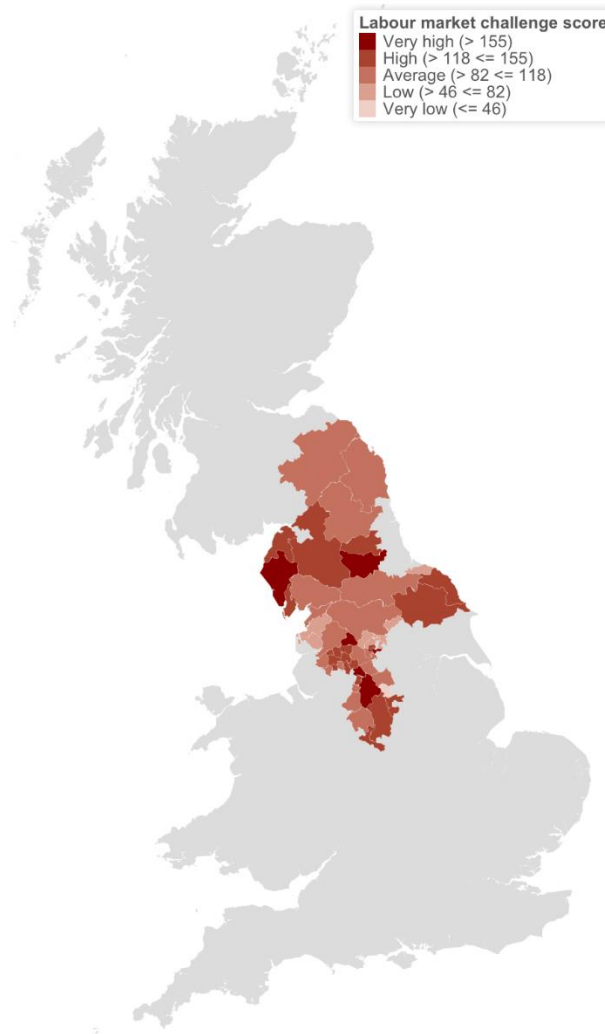
Most peatland in the country needs restoring and / or conserving. For example, of the 2.7 million hectares of peatlands in the UK, approximately 76% is degraded, but only 2-4% has been restored in some way over the last 30 years.⁷⁸ There is no comprehensive publicly available dataset of peatland opportunity in the country.

However, to investigate the potential connection between peatland restoration and the labour market we have looked at the 'Great North Bog' proposal. This proposal is an ambitious peatland restoration initiative being developed by the North Pennines AONB Partnership, the Yorkshire Peat Partnership and the Moors for the Future Partnership. It is a landscape approach to restoration across nearly 7000 square kilometres of upland peat in the Protected Landscapes of northern England.

Damaged peat in the area releases 3.7 million tonnes of carbon annually. The programme aims to develop a working partnership to deliver a 20-year funding, restoration and conservation plan.⁷⁹

The Great North Bog comprises peatland in or close to the national parks of the Peak District, Lake District, North York Moors, Yorkshire Dales and Northumberland along with the North Pennines, Nidderdale and Forest of Bowland AONB and the South Pennines regional park. To analyse the link between this proposal and the labour market, we have estimated which constituencies fall within 20 miles of the proposed programme (double the distance of the average commute by car in 2019). Figure 9 shows the labour market challenge scores for these constituencies.

Figure 9: Labour market challenge scores of constituencies within 20 miles of the Great North Bog initiative



Source: The Great North Bog - Vision⁸⁰ and WPI Economics

Overlaying these locations with our labour market analysis we find that:

- Constituencies close to the Great North Bog initiative are likely to face substantially greater labour market challenges. We find that the average labour market challenge score is 111 for those constituencies versus 97 for the constituencies not close to the initiative.

- Constituencies close to the Great North Bog initiative have a poorer outlook for forecast increases in employments: 1.8% growth in employments to 2025, versus 2.5% for constituencies not close to the initiative.

Although it is not known how much of the 7000 square kilometres of peatland requires restoring, it is likely to be in the region of half. Across a 20-year period this could imply as much as 17,500 hectares per year of restoration activity. This is a substantial uplift over the current rate – over the past 20 years the average across the three leading programmes has been 5,500 hectares, with one of the partners estimating that in some recent years around 7,000 hectares may have been achieved.

If an additional 10,500 hectares per year were restored, then based on an estimate of 3 jobs per 100 hectares (see discussion of recent RSPB report⁸¹ in chapter 5) we estimate that around 315 jobs would be created (half directly, and half indirectly or through induced effects on the local economy). However, the seasonal nature of the work (it can take place from late October until March 31st), access restrictions and potential disruption from poor weather means this is probably an overestimate. We therefore take the conservative assumption that around half of the jobs would be generated by the programme – i.e. around **150 jobs total**. We estimate that around **50** of these would be in the fifth of constituencies that face the greatest labour market challenges.

The potential for job creation even within this one programme could be larger than this. A recent estimate of peatland restoration jobs in Scotland found that a £51 million investment across 10 years could support 770 jobs directly.⁸²

In the future it would be possible to overlay peatland extent and condition data with our labour market analysis more systematically. Natural England are embarking on a new project to develop improved evidence on the extent, depth and condition of English peat using a combination of field survey, earth observation and modelling.

Potential new employment in constituencies facing the greatest labour market challenges

Bringing the analysis above together, we find that looking at just three types of enhancement an expanded programme of nature-restoration could create at least 16,050 jobs in the 20% of constituencies likely to face the most significant employment challenges:

- **Woodland creation:** If the Government raised its ambition for planting per year to 50,000 hectares then around an extra 5,000 jobs could be created and there is sufficient suitable land to target this on the 10% of constituencies likely to face the most significant employment challenges.
- **Urban Green Infrastructure:** Targeting urban green infrastructure improvements to neighbourhoods with a green deficit could rapidly create over 11,000 jobs in the fifth of constituencies with the worst labour market challenges.
- **Peatland restoration:** Looking only at the proposed Great North Bog, at least a further 50 jobs could be created in the fifth of constituencies with the worst labour market challenges. This is likely to be substantially higher across the whole of the country.

5. The type of jobs associated with nature-based solutions

Natural environment investment will have a different pattern of economic activity and associated jobs than alternative investments. In this section we review the evidence on the numbers of jobs generated by nature-based solutions and whether these are net increases when alternative uses for the land / investment are taken into account. We also consider what sectors of the economy the jobs are in and review evidence on the skill and /or qualification level required for them.

How many jobs are generated by nature-based solutions?

For a number of types of nature-based solutions we have identified estimates of the jobs they generate.

Woodland restoration / creation

We have identified a number of estimates of job generated by woodland restoration or creation (afforestation) projects, shown in table 7. There are short-term jobs associated with the planting phase of a forest project, and permanent jobs once the woodland is planted and requires monitoring and management. The majority of jobs occur in the planting phase, but RSPB / Cambridge Econometrics find that 0.06 permanent jobs are created for every 100 hectares of woodland – the equivalent of 1 job for approximately every 1,670 hectares of woodland.

Table 7: Estimates of jobs associated with woodland afforestation / reforestation

	Jobs per 100 hectares	
	Short-term: during plantation activity	Permanent: monitoring and management
RSPB / Cambridge Econometrics (UK based estimates)	25	0.06
WPI Economics calculations based on New Economics Foundation	22	N/A
UK example case study - Doddington North	23	N/A
WPI Economics calculations based on RSPB Scotland, Scottish Wildlife Trust and WWF Scotland	33	
IPPR	114	
WWF / ILO (mostly for developing countries)	40 to 110	
WPI calculations based Edwards et al, 2012 (study in United States)	64	

Sources: RSPB / Cambridge Econometrics (2021)⁸³, New Economics Foundation,⁸⁴ Doddington North Afforestation project⁸⁵, RSPB Scotland, Scottish Wildlife Trust and WWF Scotland,⁸⁶ IPPR,⁸⁷ WWF / ILO (2020)⁸⁸ and Edwards et al. (2013)⁸⁹

Peatland restoration

We have reviewed a range of evidence and find that peatland restoration generates between **1-4 jobs per 100 hectares of restoration**:

- RSPB / Cambridge Econometrics estimate that 3 jobs are generated per 100 hectares of restoration during the restoration phase. After restoration, the study finds that 1 job-year is created per 1,430 hectares of restored peatland for ongoing operation and maintenance.⁹⁰

- In 2011 GHK estimated that £1 billion spent on peatland restoration would generate 8,700 jobs. Using an estimate of £1,473 up-front capital cost per hectare from RSPB / Cambridge Econometrics and adjusting for inflation, we have calculated that this implies that 1.1 jobs are generated for each 100 hectares of restoration.
- A recent analysis for RSPB Scotland, Scottish Wildlife Trust and WWF Scotland⁹¹ found that peatland restoration projects directly generate approximately one job year of employment per £70,000 spent, and another job through indirect and induced spending caused by the investment. Using a cost per hectare of £1,473 from RSPB / Cambridge Econometrics⁹², this implies around 2 direct jobs and 2 indirect / induced jobs per 100 hectares of restoration.

Coastal restoration – salt marsh

The costs, and associated numbers of jobs, for restoring salt marsh are highly variable due to factors such as the extent of interventions required and a wide range in site accessibility at different locations. RSPB / Cambridge Econometrics estimate **30 jobs per 100 hectares of habitat restored** for medium cost projects, but this could vary anywhere between 14 and 74 jobs for lower and higher cost projects.⁹³

Another estimate of jobs generated by coastal restoration is available from the United States. Edwards et al. (2013)⁹⁴ estimate that coastal restoration projects generate on average 17 jobs per million dollars spent in the United States. Adjusting for inflation and exchange rates implies around 24 jobs per £1 million spent today. If these projects were analogous to the medium cost scenario from RSPB / Cambridge Econometrics then we estimate that this implies around **56 jobs per 100 hectares of habitat restored**.

The RSPB have identified priority locations for 13,550 hectares of new coastal habitat⁹⁵ – our estimates imply this could create around 400-750 jobs if this was carried out over a 10-year period.

- **Woodland restoration / creation:** Between 22-114 jobs per 100 hectare, with most rigorous / applicable estimates clustering around the lower end of that range. For example, 20,000 new hectares of planting per year (moving from the Government's current ambition to the Committee on Climate Change's high ambition scenario) would generate around 5,000 jobs.
- **Peatland restoration:** Between 1-4 jobs per 100 hectares of restoration, with the higher end of the range reflecting indirectly created jobs. For example, the Committee on Climate Changes recommendation to restore 55% of peatland to good status by 2050 implies around 50,000 hectares restored per year. This would imply between 500-2,000 jobs.

Well designed nature-based solutions often deliver a net increase in jobs

Nature-based solutions may have an opportunity cost, and in some cases this can mean the loss of some jobs associated with activities that had been carried out on the land used for nature-based solutions. This potential loss needs to be accounted for when considering how many jobs nature-based solutions would generate.

There is no single answer to how many jobs could be lost due to different types of nature-based solutions, as it will depend on the location and design of a scheme. However, the introduction of the new Environmental Land Management scheme allows farmers and other land managers to be paid for delivering environmental enhancements⁹⁶ and well-designed schemes can ensure more jobs are created than lost. For example:

- The Institute for European Environment Policy reports that “Nature-based Solutions projects, for example coastal habitat protection, have the potential to produce many more jobs per investment than traditional infrastructure projects such as in coal, gas and nuclear power generation. (Edwards et al., 2013; Garrett-Peltier and Pollin, 2009)”⁹⁷
- Most peatland is not intensively farmed, although some lowland peat is. The share of lowland peat that is cropland accounts for just 4% of total UK cropland but it is highly productive land. The Committee on Climate Change assume only 25-50% of lowland peat will be rewetted, and in areas where agricultural output is reduced this can be offset by switching to paludiculture or 'wet-farming', that is food and non-food crops that can be grown in water (e.g. blueberries, reeds, sphagnum) and the rearing of water buffalo on rewetted grassland.⁹⁸
- A detailed study of 23 rewilding sites in Britain found that full-time equivalent jobs increased from 151 to 222 as a result of rewilding – a 47% increase. New activities included nature-based tourism, monitoring, restoration activities, recreation, livestock management and education. There was a reduction in farming of livestock driven by fewer sheep, but natural grazing continues meaning overall livestock numbers are still 54% of pre-rewilding.⁹⁹

The case studies below on RSPB Haweswater and Wild Ken Hill show how nature restoration has the potential to both increase jobs and diversify the sources of income received in the local area, strengthening the local economy.

Box 5: Diversifying income sources and jobs – RSPB Haweswater case study

RSPB Haweswater is managed in partnership with landowner United Utilities. The site supports a range of habitats, including native woodland, species-rich grassland, upland heath, blanket bog and rivers, managed through a sustainable farming operation. The land falls within the catchment of Haweswater reservoir, which is the most important water source of drinking water in North West England, supplying around 2 million people.



Photo credit: David Morris

Management of the site is focused on restoring ecosystem function in order to enhance the land's ability to produce cleaner drinking water, reduced flood risk, better carbon sequestration and the recovery of habitats and species. This is being achieved by reducing the intensity of the farming operation to enable the regeneration of natural vegetation, and physical interventions such as restoring meanders to straightened watercourses, blocking artificial drains in bogs and tree planting.

Before RSPB took over the management of the site, it was run as a conventional hill farm. Used in this way, employment at the site is estimated to have been approximately four Full Time Equivalents (FTEs), with additional casual labour during lambing and gathering.

Under RSPB management, with the restoration programme well underway, the sources of income have diversified bringing resilience to the local economy. Key new sources of economic activity include ecotourism, wildlife watching and grants. With sustainable farming still playing a vital role, livestock sales remain an important source of income. The site now employs ten FTEs, with additional casual labour supporting the farming operation, as well as both residential and local volunteers.

Sources: RSPB (2012)¹⁰⁰, RSPB Haweswater/ Rewilding Britain¹⁰¹, Rewilding Britain¹⁰²

Box 6: Diversifying income sources and jobs - Wild Ken Hill case study

The Wild Ken Hill rewilding project spans 1040 acres of a coastal farm in West Norfolk, including a variety of habitats, from freshwater marshes to woodland and meadows. The project combines rewilding with adjacent areas of regenerative agriculture (a farming approach that helps to conserve and rehabilitate the natural environment) and traditional conservation to support the restoration of wild nature.



Photo credit: Wild Ken Hill

Among the many environmental benefits will be improvements to air and water quality, as well as carbon sequestration and the reintroduction of native species. The programme is also creating a range of commercial and economic benefits outlined below.

The rewilding area formerly was used for crop farming and mixed woodland, with income generated principally from growing crops. Rewilding expands and diversifies the income opportunities from the land which now generates stewardship, pasture-fed livestock, and nature-based tourism income, while the area under regenerative farming still produces crops. Plans to establish a range of new enterprises on the land include an enhanced tourism offering, inviting the community to explore nature through camping, glamping and wellbeing pursuits, educational activities and safaris, as well as emerging payments for ecosystem services.

Before rewilding employment the site employed seven people; rewilding has resulted in the equivalent of two additional jobs, and has also created new volunteering opportunities.

Source: Wild Ken Hill¹⁰³, Rewilding Britain¹⁰⁴

What type of jobs are associated?

Nature-based solutions generate a rich range of jobs in a wide range of sectors

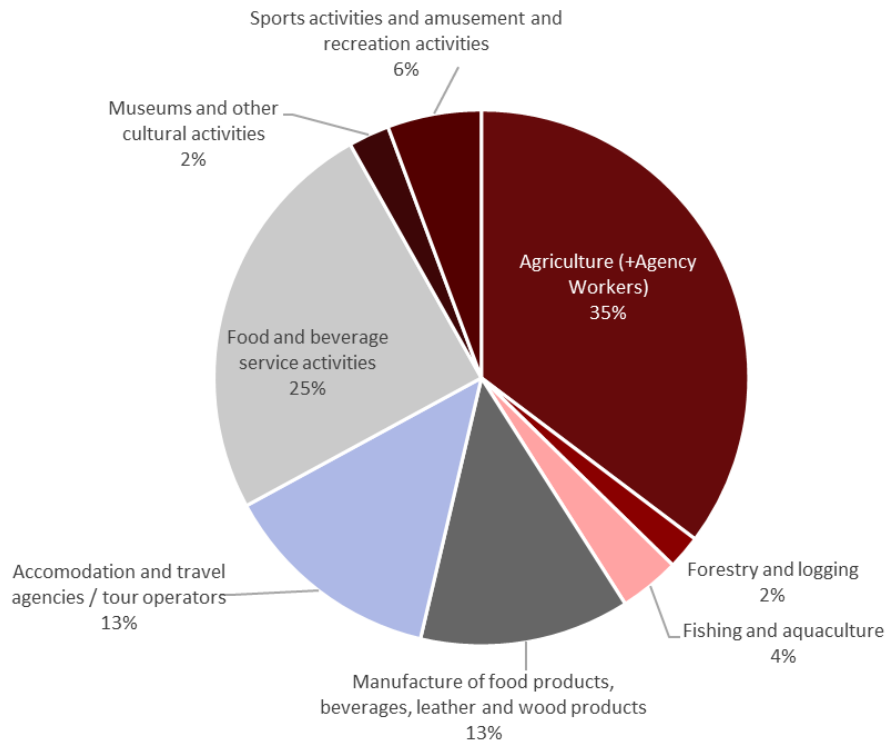
Nature-based jobs are wide-ranging in the type of work and the skill and / or qualification levels needed. A recent study analysed the number of jobs in both nature-based activities directly, and in nature-dependent sectors (i.e. those sectors like tourism that are highly dependent on natural capital). Figure 10 illustrates the wide range of jobs that are linked to the environment.

However, due to the age of the Standard Industrial Codes used to classify economic activity, it is not possible to obtain specific data on nature-based solutions, environmental green finance or urban green infrastructure activities. Currently many nature-based solutions may have their jobs classified within Agriculture, Forestry and Fishing or broader codes such as ‘Construction of water projects’ or ‘Construction of civil engineering projects’. However, there is no specific subdivision on flood management/ restoration of coastal activities for example. Furthermore, other jobs will reflect the increasing demand for higher level digital and technology skills as remote sensing, robotics and the use of data analytics becomes more prevalent in the sector.¹⁰⁵ To ensure the rich employment activity involved in nature-based solutions is fully recognised, the Standard Industrial Codes should be updated soon.

Beyond these sectors, nature-based solutions include an increasingly large range of types of jobs. Recent research by Rewilding Britain found that the variety of jobs involved on sites also increased

significantly from the position before rewilding took place. Many of the new jobs focused on nature-based tourism, monitoring, restoration activities, informal recreation, livestock management and education.¹⁰⁶

Figure 10: Breakdown of jobs in Scotland in nature-based activities and nature-dependent sectors, 2019 (total jobs in year 195,300, with 23,800 not possible to assign to a sector)



Source: Hirst, A. & Lazarus, H (2020)¹⁰⁷

Table 8 shows a sample of the jobs at Cairngorms Connect (a partnership of neighbouring land managers, committed to a 200-year vision to enhance habitats, species and ecological processes across 600 square kilometres within the Cairngorms National Park) and illustrates the breadth of jobs involved.

The technological approaches used in coastal habitat restoration also require a diverse sets of skills. A study in the United States report that, for example, marine debris removal requires, among other job types, boat operators and heavy equipment managers, while oyster reef restoration may require divers, barge operators, fishermen and scientists in addition.¹⁰⁸

A wide range of new technological approaches are being used too, broadening the reach of nature-based jobs into the digital sector. For example, the use of drones is becoming increasingly common for ecological surveying,¹⁰⁹ along with satellite technology. Yorkshire Peat Partnership is a lead innovator in using NASA Landsat and Copernicus Sentinel satellites to monitor peatland restoration, allowing the team to quickly process large areas to assess the success of previously restored sites.¹¹⁰

Table 8: Sample of jobs within the Cairngorms Connect scheme

Direct jobs	Management and support activity	Hospitality, tourism and recreation
Tree nursery manager	Management planning staff	Wildlife and adventure activity operators
Forestry contractors	Administrative staff	Hospitality staff
Ecological surveyors	Skills trainers	Visitor service providers
Nature reserve wardens	Contract supervisors	Accommodation providers for events and conferences
Peatland restoration contractors	Vehicle and equipment supply and maintenance	Caterers
Community Rangers	Infrastructure maintenance	
Deer stalkers and game dealers	Building repairs	
Livestock managers	Track maintenance and construction	

Source: Communication from Cairngorms Connect

Nature-based solutions deliver low-skill entry level to high-skill jobs, with training and progression opportunities

The skill and qualification levels of jobs with natural environment enhancement vary widely. Raymond et al. (2017) find that nature-based activities such as afforestation, agroforestry, the creation of green spaces and management of protected parks and areas can all generate a wide range of jobs from low-skill entry level to high-skill jobs.¹¹¹

In the recovery from Covid we should not only be prioritising employment, but also the creation of good jobs that have long-term prospects. The Joseph Rowntree Foundation have set out the key components of a good job including fair pay, security and good treatment at work. One of the components is training and progression, highlighting the need for jobs to offer accessible training and progression routes.¹¹²

We have found that nature-based solutions offer both:

- **Entry level jobs with an opportunity to acquire transferable certifications:** Arboriculture (tree and perennial wood plant cultivation) for example, can involve acquiring licences in chainsaw use, felling trees and tree hazard assessment. Land management jobs can require specific licences (e.g. for excavator and tractor operation) that can be acquired through short-term training, but skills built up over longer-term experience of carrying out work for ecological purposes is also needed for many specific activities.
- **Jobs which require either high-level academic qualifications or professional accreditation that takes time to build up:** Central teams of e.g. programme managers, conservation specialists, research officers often have degree and post-graduate level qualifications. For example, all the central peatland restoration team at the North Pennines Area of Outstanding Natural Beauty have at Master's-level degrees or doctorates.

However, nature-based jobs are not all about academic qualifications. There are many specific licences, such as for protected species such as bats and dormice, that require gaining experience in the field over a number of years to reach higher level licences.¹¹³

Box 7: Peatland restoration case study –North Pennines AONB Partnership

The North Pennines AONB (Area of Outstanding Natural Beauty) Partnership is the body responsible for co-ordinating efforts to conserve and enhance the North Pennines. Since the 2006 launch of its Peatland Programme it has restored nearly 40,000 hectares of peatland through projects such as Pennine PeatLIFE and Carbon Connects. Recently the Partnership has combined with other peatland restoration programmes through the Great North Bog initiative – an ambitious landscape approach to restoration across nearly 7000 square kilometres of upland peat across northern England.

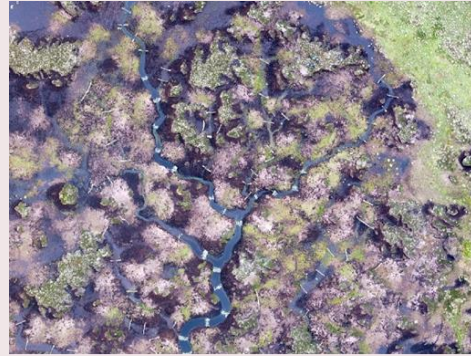


Photo © North Pennines AONB Partnership

Peatlands cover only 3% of the earth's surface but sequester 370 million tonnes of carbon dioxide a year. However, degraded peatland instead emits carbon. Peatland restoration stops the emissions of carbon and ensures the peatland begins to store carbon instead. Restoration can also improve local water quality and biodiversity alongside other environmental benefits.

The Pennine PeatLIFE project will restore over 1,353 hectares of peatland and has established new restoration techniques to suit the unique climatic conditions in Northern England. The project has also showcased the use of technology such as drones as a viable and affordable way to monitor changes in vegetation, and has trialled innovative Payment for Ecosystem Services methods (in particular the UK Peatland Code) to inform future peatland restoration funding streams.

The project requires a wide range of skills and qualification levels. Jobs directly involved in the physical activities include general labourers and machine operators, as well as oversight and planning through project managers and administration roles. The delivery of the programme involves land agents, advisers, data management consultants and a wide range of other roles. The majority of employees are permanent, with additional seasonal staff brought in where needed.

As well as the rich variety of jobs employed for the project, there is a significant impact across a wider supply chain. Plant nurseries are required to provide plants such as sphagnum moss, which plays a vital role in the creation of peat bog. Physical resources such as coir roll, that trap peat sediment but allow water through, are required alongside lime and fertiliser suppliers. However, funding for peat restoration is often not on a guaranteed long-term footing, and this undermines the growth of the UK supply chain that provides the materials for the front-line restoration work.

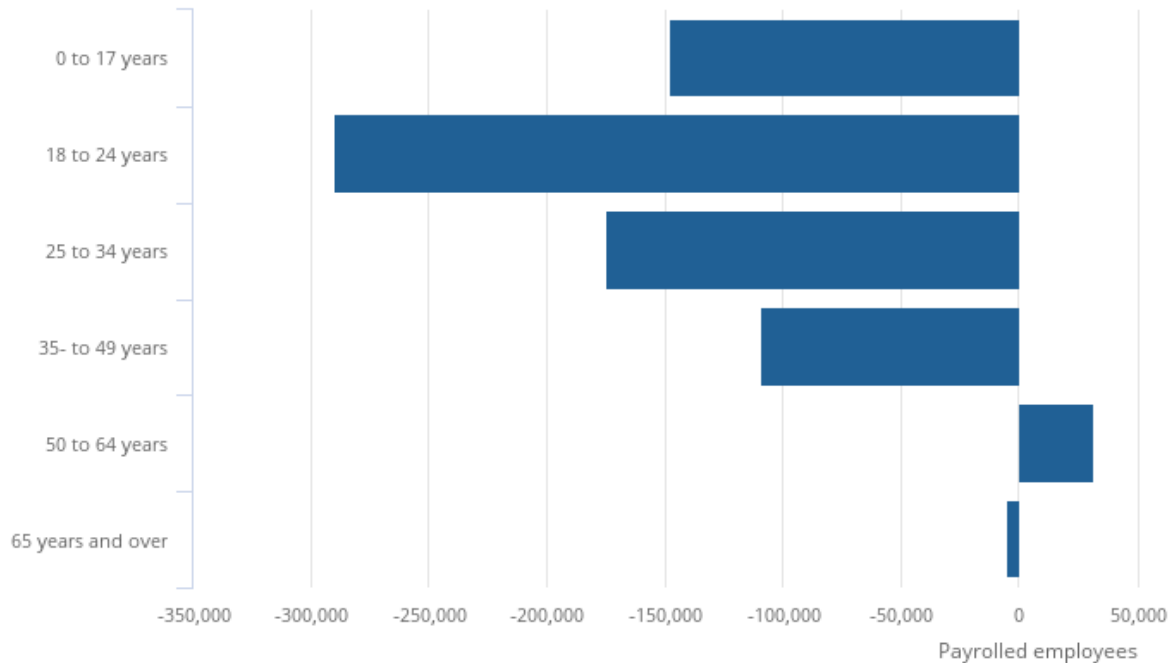
The peatland programmes also foster broader links with the local economy and community. For example, the programmes engage with nearby universities across a range of activities and research including PhD programmes and funding bids and have supported research on the historic environment through carbon dating and pollen analysis. The programmes also engage with students from schools across the region to educate them about the importance of peatland and the natural environment.

Source: North Pennines AONB¹¹⁴

Nature-based solutions offer an opportunity to focus policy support on specific demographic groups

The impact of the pandemic on people's jobs is not falling evenly. In particular, data from HMRC on the changes in the number of payrolled employees shows that of the total 693,000 fall in UK employees between February 2020 and February 2021, 63% were under 25 years old.

Figure 11: Payrolled employees, absolute change from February 2020 to February 2021, seasonally adjusted, UK



Source: HM Revenue and Customs – Pay As You Earn Real Time Information¹¹⁵

Friends of the Earth recently published a report looking at the potential for providing young people with green jobs.¹¹⁶ They find that to deliver afforestation, environmental restoration (e.g. peatlands, seagrass meadows) and decarbonised agriculture will require an expanded workforce across:

- Horticultural trades e.g. growers, nursery staff, nursery assistants, countryside rangers
- Farm workers
- Forestry workers and forest managers
- Environmental and conservation professionals

Upskilling will also be needed for many areas, including for forestry workers and forest managers. The report finds that the economic scarring impact of one year's unemployment for an 18-20 year-old comprises lost earnings of £42,000 - £133,000 over the next twenty years. Hence, Friends of the Earth identify a major opportunity for young people to enter green jobs in the coming years. To assist this change in natural environment enhancement, the report recommends that new apprenticeship standards should be rapidly developed in environmental restoration in areas such as peatland and salt marsh restoration and rewilding, where although there are opportunities for work-based learning there are few existing training opportunities or qualifications.

6. Conclusions

This report has analysed the impacts on economic activity of nature-based solutions, that can enhance the environment in myriad ways and bring substantial environmental and social benefits. However, they also have substantial economic impacts. Our economy depends on the natural world, and activities that protect and enhance it can:

- increase economic productivity;
- reduce economic and social damage from the effects of climate change and events such as floods; and
- reshape the economy, generating activity both directly involved in environmental conservation but also boosting economy activity in sectors that benefit from a healthy natural environment.

Due to the economic impacts of Covid, we are living through the most significant economic crisis of modern times and there is a substantial risk of increased persistent unemployment and underemployment. This report has provided findings and a tool to assess where the most substantial jobs challenges and the opportunity for well-designed natural environment enhancement coincide.

Available evidence looking at direct, indirect and induced job creation suggest a range of numbers of jobs for different types of nature-based solutions. Woodland restoration / creation is likely to create around 25 jobs per 100 hectares, peatland restoration around 1-4 jobs per 100 hectares, and coastal restoration between 30-56 jobs per 100 hectares of habitat restored. The majority of the jobs are during the restoration phase, but there are also longer-term maintenance and monitoring jobs. A range of evidence suggests that in many cases nature-based solutions deliver a net increase in jobs compared to previous or alternative land uses.

Looking at just three types of enhancement (woodland creation, peatland restoration and urban green infrastructure) we find that an expanded programme of nature-restoration could create at least 16,050 jobs in the 20% of constituencies likely to face the most significant employment challenges over the coming years.

Using official labour market statistics we have characterised the labour market challenges for each constituency in Great Britain as the economic impacts of Covid emerge. This is based on pre-pandemic underemployment (**resilience**), the change in underemployment since the start of the pandemic (**direction of travel**), the numbers of people on furlough (**at risk**) and a forecast change in employments to 2025 (**future outlook**).

Our analysis suggests that:

- The greatest combination of issues are likely to be seen in large and medium towns within conurbations, other cities (that are not classed as core cities) and, small towns (outside conurbations),
- Although London has been hit hardest during the pandemic, it has higher forecast increases in jobs,
- Constituencies where the majority of the population live in medium and large towns outside conurbations tend to have lower underemployment pre-pandemic and a lower increase over during the pandemic.

Using this labour market characterisation we have analysed the links between jobs and a number of types of natural environment enhancement.

Woodland creation

- Almost two-thirds of the most suitable land for tree planting in Great Britain is in constituencies with greater than average labour market challenges (3,260 hectares on average versus 1,890 hectares elsewhere),
- A total of 112,000 hectares of the most suitable land lies within the so called ‘Red Wall’ constituencies, and 125,000 hectares of the most suitable land is in the 10% of constituencies with the greatest labour market challenges,
- If the Government raised its ambition from 30,000 hectares of planting per year to 50,000 hectares targeted at areas with greater challenges, then around an extra 5,000 jobs could be created in these places.

Urban green infrastructure:

- Places in England that have the greatest labour market challenges tend to have poorer access to green space too: The 20% of constituencies with the greatest labour market challenges contain 27% of the population that live in neighbourhoods that have a green deficit. However, this is only true of the areas with the greatest labour market challenges suggesting the focus from the point of view of the labour market should be on the communities who are facing the most severe job challenges.
- Targeting urban green infrastructure improvements to green deficit neighbourhoods could rapidly create 11,000 jobs in the fifth of constituencies with the worst labour market challenges.

Seagrass restoration

We find that constituencies that have been known to have seagrass have greater labour market challenges than others, with an average labour market challenge score of 107, versus 98 for constituencies without seagrass. This is driven by a higher proportion of people on furlough (17% vs 16%) and a lower increase in expected employments (2.2% vs 2.4%).

Peatland restoration

Whilst a lack of data restricted us from analysing peatland opportunities across the country, we have illustrated the likely connections through analysis of the ambitious ‘Great North Bog’ initiative. We find that constituencies close to the Great North Bog initiative are likely to face substantially greater labour market challenges and they have a poorer outlook for forecast increases in employment.

Finally, we also find that nature-based solutions generate a rich range of short-term and long-term jobs across a wide range of sectors. Whilst many jobs are in agriculture, forestry or fishing, beyond that there are a wide range of other sectors involved, such as education (including academia), tourism and recreation. There is also increasing demand for higher level digital and technology skills as remote sensing, robotics and the use of data analytics becomes more prevalent. The skill and qualification levels of jobs in natural environment enhancement vary widely, offering both entry level jobs with an opportunity to acquire transferable certifications and jobs which require either high-level academic qualifications or professional accreditation that takes time to build up.

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