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BRIEFING

A graphic element for the 'Natural Assets North' logo, consisting of a stylized mountain peak in shades of purple and blue, with a green leaf and a blue wave-like shape below it.

Natural

ASSETS NORTH

VALUING OUR NORTHERN UPLANDS

**Sarah Longlands
and Jack Hunter**

December 2018

ABOUT IPPR NORTH

IPPR North is the dedicated think tank for the north of England, with bases in Manchester and Newcastle.

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CONTENTS

Introduction	3
Why are northern uplands important?.....	3
In focus: Winter Hill, Bolton	5
The economic and social history of the uplands of Winter Hill.....	5
Winter Hill moor fire, June/July 2018.....	5
The potential benefits of effective management of the North's uplands	9
How to achieve effective management of the North's uplands	11
1. A strategic and joined-up vision for the future of the North's uplands.....	11
2. A place-based and collaborative approach to action	12
3. Targeted investment and aligned incentives.....	12
Next steps for Natural Assets North.....	13
References	14

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The Natural Assets North programme explores the interaction between natural assets, people and the economy in the North, identifying the North's natural capital assets and identifying opportunities to demonstrate and increase their value.

The authors would like to thank the participants at the walking tour of Smithills Estate who took part in our roundtable discussion. Thanks also to the Woodland Trust and Natural England for hosting us.

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INTRODUCTION

Natural Assets North is a new IPPR North project which investigates the natural potential of the north of England, including the quality of its landscape, water and coastlines. The natural capital of the North is immense, but its full potential is not yet being realised. This work is part of IPPR North's work on a Great North Plan.

In the first of a series of briefings on Natural Assets North, IPPR North explores the importance of the North's uplands. The briefing is based on IPPR North's Natural Assets walking tour of Smithills in Greater Manchester, which took place a few days before the Winter Hill fire broke out in July.

The geography of the North is dominated by its magnificent uplands. Taken together, the North's uplands feature heathland, blanket bog, and other forms of wetland such as fens and swamps, and include some of the region's most well-known and loved natural environments, including Northumberland National Park, the North Pennines, the Forest of Bowland, Nidderdale, Yorkshire Dales National Park, the Lake District, and the Peak District.

WHY ARE NORTHERN UPLANDS IMPORTANT?

The health of the uplands of the North underpins the Northern Powerhouse economy, as well as contributing to the wellbeing of its people. For example:

- **Carbon storage:** The North's upland areas contain peat which helps to store carbon that otherwise would be released to the atmosphere, thereby contributing to climate change. Peatland in the UK is estimated to hold 3,200 million tonnes of carbon, which substantially is more than the forests of the UK, France and Germany combined (Northern Upland Chain LNP 2015). The Committee on Climate Change (2018) identified peatland restoration as a crucial step in reducing the UK's overall carbon emissions.
However, much of the North's peatlands have been degraded, which substantially reduces their carbon capacity. Degradation is prevalent across the North's uplands – the NUC LNP (2015), for example, suggests that almost 50 per cent of the North's upland peat resource has been degraded. Degradation has been linked to a variety of land uses, such as moor burning for grouse shooting, afforestation, peat extraction for horticultural use and agriculture (CCC 2018).
- **Water supply:** 70 per cent of all UK drinking water is sourced from upland areas (Commission for Rural Communities 2010). Uplands are the first point of treatment for rainwater before it reaches reservoirs, meaning that if upland peatlands are maintained to a high standard, they can play a crucial role in helping to maintain a high-quality public water supply as well as reducing financial costs of water treatment. Subsequently, environmental protection and support for biodiversity is an essential component of good water catchment management.
- **Flood management:** If well maintained, upland areas act as natural sponges, helping to contain high levels of rainwater. This can reduce the severity of flood events, thereby reducing the impact of flooding on property and on people's lives and, in turn, the economic costs of emergency response services, lost productivity and damage to infrastructure, property and agriculture.

The size of these costs is considerable - official estimates suggest that a recent instance of widespread flooding during December 2015 and January 2016 – primarily in the North – cost between £1.3 and 1.9 billion alone (Environment Agency 2018). The importance of flood management will only increase in the future, given that climate change will likely bring more extreme weather patterns.

- **Tourism and recreation:** The North's uplands include many Areas of Outstanding Natural Beauty (AONB), hosting a wide diversity of flora and fauna as well as strong local and national path networks. These help generate significant income through recreation and tourism.

A 2010 report estimated that England's uplands, of which the Northern uplands form a considerable proportion, attracted 40 million visitors each year spending just under £2 billion (Commission for Rural Communities 2010).

Overall, tourism is worth over £10 billion a year to the Northern Powerhouse economy and is of particular importance to certain parts of the North. In Cumbria and North Yorkshire, for example, revenue from tourism accounts for a much larger proportion of the local economy than most other places in the country: only in Cornwall does tourism account for a bigger part of the local economy (ONS 2016).

The North's uplands are among some of the most beautiful natural environments in the world, and as such they are a key part of both the 'Northern Powerhouse' brand that is sold to investors, and of the popular vision of the North that attracts tourists to the region, and the UK more generally.

- **Farming:** While agriculture, forestry and fishing is a relatively small sector of the Northern economy in terms of total GVA and employment, healthy upland areas continue to be important for upland farming communities – particularly for grazing livestock. In their 2010 report, the Commission for Rural Communities estimated that 44 per cent of all breeding ewes and 30 per cent of beef cows in England are in the uplands (Commission for Rural Communities 2010).

In addition, farming also remains a significant sector in the most rural areas, including those in the Northern uplands. In the most sparsely populated rural settings, agriculture, forestry and fishing accounts for just under a third (32.2 per cent) of all local units of registered businesses (Defra 2018). Farms can directly support tourism and recreation by providing accommodation and activities for visitors.

IN FOCUS: WINTER HILL, BOLTON

Winter Hill, standing at 456 metres high, is an important local landmark in the town of Bolton. It is a large area of upland, consisting of a mosaic of habitats including grasslands, woodland and peat, as well as significant proportions of agricultural land. Winter Hill straddles the local authority areas of Bolton Metropolitan Borough Council, which is a constituent member of the Greater Manchester Combined Authority, and Blackburn with Darwen Council. The ownership and management of the area is mostly split between two organisations.

- United Utilities own approximately 3,706 acres of water catchment land with 12 reservoirs receiving water directly or indirectly from the Winter Hill Catchment. This includes 1,180 hectares of woodland within the Rivington and Belmont estate that is managed by a dedicated team of woodland officers and specialist contractors.
- The Woodland Trust own the Smithills Estate in Bolton, a 1,700-acre upland site on the southern and western side of Winter Hill within Greater Manchester. Originally in the ownership of Bolton Council, the Smithills Estate represents the largest site that the Woodland Trust has ever purchased. The Woodland Trust are leading on work to develop the Northern Forest which will include the Smithills Estate. This is a plan to plant 50 million trees in and around the northern cities of Liverpool, Manchester, Leeds, Sheffield and Hull.

THE ECONOMIC AND SOCIAL HISTORY OF THE UPLANDS OF WINTER HILL

The uplands of Winter Hill were of great historical importance for the local economy. During the industrial revolution, the owners of cotton mills and bleachworks redirected the water supply off the hill to ensure a reliable source of water further downstream.¹ Winter Hill also had rich coal seams and was mined directly from various sites across the hill. In addition, the site was also home to a number of brickworks as the clay in which the coalseams were originally laid down was also extremely valuable, known as 'fireclay' and used to make fire resistant bricks (GeoLancashire 2018)

As well as its economic importance, Winter Hill has also been an important focus for civic action. For example, in 1896, Winter Hill was the site for one of the earliest mass trespass movements which argued for the public right to roam on the uplands. The event attracted up to 8,000 Bolton citizens who made the seven mile walk from Bolton Town Centre to over the top of Winter Hill (My Pennines 2018).

The Smithills Estate, as part of the West Pennine Moors, provides significant community benefit as a recreational resource for walking and other activities (and therefore helps support health and wellbeing) and, as an area with significant natural beauty, helps to attract (and retain) people to the area.

WINTER HILL MOOR FIRE, JUNE/JULY 2018

In the days leading up to IPPR North's walking tour and roundtable at Smithills on 28 June, a major moorland fire had broken out across Saddleworth Moor, roughly 30 miles away. By that time, the fire had already covered over 1,500 acres (6 sq km) and had been declared a major incident by Greater Manchester Police. The Saddleworth fire eventually spread to over 2,700 acres (11 sq km).

¹ See: <https://www.woodlandtrust.org.uk/visiting-woods/wood-information/smithills/history-of-smithills-estate-overview/through-the-ages-at-smithills-estate/>

The day after the IPPR North roundtable, a fire broke out near to the iconic television mast on Winter Hill itself. On 29 June a second fire broke out in the east of the Smithills Estate, and by the 30th the two fires had merged. This was also declared a major incident. In total, 2,000 acres (8 sq km) of upland moor was burned at Winter Hill, a third of which was part of the Smithills Estate owned by the Woodland Trust and much of the remainder by United Utilities.

In both cases, the potential for widespread fire damage was exacerbated by an unusually long period of hot, dry weather. Rainfall on 11 July helped efforts to contain the incident, although the fires at Saddleworth and Winter Hill were only declared to have been extinguished on 8 August – well over a month after they had begun.

To date there has been no comprehensive analysis of the cost to local ecosystems, the environment, the economy and public health from the fires, however it is likely to have been considerable. An initial assessment of the loss of natural capital benefits caused by the Saddleworth fire undertaken by the Greater Manchester Urban Pioneer identified many millions of pounds of losses related primarily to carbon, recreation and health.

Firstly the impact on biodiversity alone is likely to have been significant. The Woodland Trust, for example, have said that the natural ecosystem, including flora and fauna, will take years to recover (Woodland Trust 2018).

Secondly, the fire released significant levels of carbon dioxide into the atmosphere. Preliminary analysis by the Centre for Ecology and Hydrology suggested that the fire could have released as much as half a million tonnes of carbon dioxide into the atmosphere (Martin 2018). If correct, this is equivalent to yearly CO₂ emissions from over 100,000 cars.²

Thirdly, there is evidence to suggest that there was also a significant negative effect on air quality across Greater Manchester and beyond. IPPR North analysis of Greater Manchester air quality data suggests that the fires in Saddleworth and Winter Hill had a significant and negative impact on air quality across the whole city region (see table 1).

In the week following 24 June, when the scale of the fires was at its peak, the average daily exposure to particulate matter (PM₁₀) exceeded 40 parts per million (ppm), which is double the limit recommended by the World Health Organisation, on eight occasions across Greater Manchester.³ Based on historical data, this is roughly five to six times what might normally be expected. In addition, there were two occasions when the European Commission's legal limit (50 ppm) was breached (roughly six times what might normally be expected), as well as three occasions during the following week.

2 Based on IPPR analysis using EPA calculator. See: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

3 Based on readings from 10 locations across the city region

TABLE 1

Week commencing	Number of instances where daily average PM ₁₀ exceeded:			
	>20ppm	>40ppm	>50ppm	
23 April 2018	11	1	1	
30 April 2018	18	3	1	
7 May 2018	39	2	1	
14 May 2018	28	3	0	
21 May 2018	59	2	0	
28 May 2018	55	1	0	
4 June 2018	40	0	0	
11 June 2018	26	1	0	
18 June 2018	10	0	0	
25 June 2018	46	8	2	<i>Fires start</i>
2 July 2018	50	4	3	
9 July 2018	22	0	0	
16 July 2018	16	1	1	
23 July 2018	19	1	0	
30 July 2018	5	0	0	
6 August 2018	8	0	0	<i>Fires officially over</i>
13 August 2018	9	0	0	

Source: IPPR North analysis of Clean Air GM (2018)

During the same period locations across much of Greater Manchester saw a much higher number of individual spikes in PM₁₀ readings than would otherwise be expected, including many extremely high instances of PM₁₀ air pollution. PM₁₀ readings from monitoring stations in Greater Manchester exceeded 50ppm 188 times in the first week of the fires, which is seven to eight times higher than the normal weekly average. Of these, there were 16 readings of PM₁₀ in excess of 100ppm, and four readings in excess of 150ppm.

Finally, it is likely that levels of PM_{2.5} pollution in Greater Manchester were significantly elevated on several occasions during the wildfires.

PM_{2.5} pollution comprises fine particles less than 2.5µm in diameter. It is a more serious health concern because the smaller particles can travel more deeply into the lungs and cause more harmful effects.

Data for PM_{2.5} pollutants was only collected from two measuring stations in Greater Manchester at the time of the outbreak of fire. Of these, only one has data beyond 26 June. This single series (taken from Salford M60) shows several large spikes in the days following the outbreak of fire on Saddleworth and Winter Hill, with individual readings as high as 150 ppm.

The high measurements of PM₁₀ and PM_{2.5} that were recorded during the time of the fires at Saddleworth and Winter Hill are normally extremely rare in Greater Manchester. As such it is likely the fires made a significant negative contribution to air quality across large parts of the city region and beyond. However, this analysis should be considered indicative only, not least because pollutant levels are also likely to have been affected by the unusually hot weather.

The impact of the fires on public health in Greater Manchester, and beyond, are still unknown. However, it is possible it was considerable, given the consistent international evidence of the impact on mortality of wildfire smoke exposure,⁴ and of the short-term impact of exposure to elevated levels of PM₁₀ in general.

Although such fires remain a rare occurrence in the North, the risk of wildfire is likely to increase with the impacts of climate change (EEA 2016), and drier summer conditions. This risk is exacerbated by the degradation of peatlands.

4 See: <https://ehp.niehs.nih.gov/doi/full/10.1289/ehp.1409277>

THE POTENTIAL BENEFITS OF EFFECTIVE MANAGEMENT OF THE NORTH'S UPLANDS

The 2018 upland fires at Winter Hill and Saddleworth are a timely reminder of the importance of effective and responsible management of our natural assets.

Just as it was in previous centuries, the Northern uplands underpin the health of the Northern economy and its people. In this section, we outline what might be some of the benefits of a 'system-wide' approach to managing natural assets. These benefits include the following.

- **Maximising carbon storage:** Healthy peatlands are the North's most important store of carbon, and have considerable potential to grow.

Not only is this important for reducing the North's (and the UK's) net carbon footprint, but data from Natural England suggests that there are clear economic benefits to be gained from the restoration of upland areas. Their modelling showed that the benefits of investment in peatland restoration would provide £460 million net benefit in terms of avoided carbon leakage over the next 40 years, as well as the value of improved biodiversity (estimated at £300 million), improved water quality reduced flooding (NUC LNP 2018). Putting this into practice would also help the UK to meet the UN Sustainable Development Goals.

However, for significant restoration of peatlands at scale, there is a need to ensure that land is used in a way that maximises the possible environmental, public health and long-term economic benefits. This will require new models for investment in natural assets which are based on the potential returns on investment from restoring peat, including the cost benefits of avoided carbon emissions over the next 40 years.

- **Boosting health and wellbeing:** Not only do beautiful and accessible uplands provide a net benefit to public health, proper management will help to reduce the risk of uncontrolled fires in upland areas which, as recent events demonstrate, can entail significant and serious risks to public health. As one participant in our roundtable discussion at Smithills argued, "properly managed assets are good for peoples' health, poorly managed natural assets can do the opposite".

Maintaining a healthy upland ecosystem reduces the likelihood, frequency and the severity of flood events, and plays a role in the water treatment process.

However, the health and wellbeing aspects of maintaining and enhancing upland environments like Winter Hill is currently unaccounted for within the health and social care system, or within wider discussions around public health and the economy.

Tackling air pollution, for example, has recently been identified as a priority for policymakers, but there has been little or no focus on management of natural assets such as uplands as a means towards this. Instead, public policy has focused on road transport emissions and industrial and domestic combustion.⁵ This is understandable, given that these together represent a major proportion of overall contributions to air pollution, however, the possible effects of climate

⁵ See, for example, the government's Clean Air Strategy, or at the city-region level, Greater Manchester's Low Emission Strategy.

change mean that the risks of spikes in air pollution as a result of wildfires will only become greater in future – and therefore investment in uplands should be considered part of a comprehensive approach to tackling air pollution. This is starting to be recognised in Greater Manchester’s policy priorities, however more needs to be done to ensure their value is recognised across the North.

- **Preserving and enhancing the North’s natural beauty:** The uplands of the North are some of the world’s most beautiful natural landscapes. In and of itself, this represents an argument for investment, to preserve them for future generations. There are also economic arguments for doing so as well. As set out above, upland areas provide significant benefits for the economy through tourism, and they are a key part of the Northern Powerhouse brand that is sold to investors. There would likely be significant negative effects upon the attractiveness of the North to tourists and investors alike if there are further serious events such as wildfires and floods that may have been avoided through investment in the natural environment.

The North’s natural environment also helps to strengthen the quality of place, making it more attractive for people who live and work in the north of England and thereby contributing to healthy local villages, towns and cities.

HOW TO ACHIEVE EFFECTIVE MANAGEMENT OF THE NORTH'S UPLANDS

The recent fires at Winter Hill and Saddleworth, as well as the recent International Panel on Climate Change (IPCC 2018) report on the urgent risks posed by climate change, underline the need for a radically different approach to managing and investing in the North's uplands.

However, to achieve this, there is a need for a much more long-term and strategic approach to upland management in the North. This will include the following.

1. A STRATEGIC AND JOINED-UP VISION FOR THE FUTURE OF THE NORTH'S UPLANDS

We need a strategic approach to the planning and management of the North's uplands, so that we can maximise the potential environmental, social and economic benefits and, in turn, so that we can play our part in securing their long-term future.

Currently, there is little or no accounting for the natural environment and its foundational role in the economy within strategic debates at both a city-region and a pan-Northern level. Valuation of natural capital benefits and losses is also largely absent from cost benefit analysis and investment decision-making processes, including mainstream planning processes, which tend to be focused upon residential and employment land uses.

As such, the North's natural assets often lack a 'seat at the table' in decisions taken about planning and the economy within combined authorities and organisations such as Transport for the North. This leads to sub-optimal decision-making that does not account for the potential benefits and risks associated with management of the North's uplands.

More generally, although the government's 25 Year Environment Plan⁶ is a step in the right direction, there isn't a mainstream policy narrative which articulates environmental opportunities and challenges, and their relationship with the health of the economy and people of the North. Instead, these issues tend to remain on the periphery of political debate about the Northern Powerhouse.

This approach risks underplaying the value of the benefits that natural assets generate from economic and environmental opportunities such as carbon capture and storage to the wider social benefits of leisure and recreation for health and quality of life. It also risks overlooking the importance of building the resilience of the North to cope with future environmental shocks, including the likely increase in risks from wildfires and flooding.

6 See: <https://www.gov.uk/government/publications/25-year-environment-plan>

2. A PLACE-BASED AND COLLABORATIVE APPROACH TO ACTION

The uplands provide a foundation for the activities of a wide range of actors, and many more have a strong vested interest in a healthy upland ecosystem, even if they operate further afield.

As such, this will necessitate working in close collaboration, in order to align objectives and target resources towards maximising the overall health of the uplands' ecosystems.

The government has already recognised the importance of partnership to good management of the uplands.⁷ Existing partnerships, including some LNPs, are increasingly making a positive impact but largely remain vehicles for collaborative arrangements between organisations that are directly involved in management of uplands areas (such as protected landscape management bodies, conservation agencies and NGOs, and utilities companies such as water providers).

Instead, there are no formal mechanisms to engage with wider organisations who generally operate in a different geographical area, but who have a strong interest, whether they acknowledge it or not, in well-managed upland areas. This includes large businesses as well as strategic bodies such as combined authorities, local enterprise partnerships or Transport for the North.

This could change. Devolution offers a chance to develop a more strategic and place-focused approach to management of the natural environment. It also allows for a much more nuanced approach to policymaking which recognises the challenges and opportunities of different places and provides a forum for key strategic partners to engage and agree a shared vision and plan for the area.

However, to date, devolution deals in the North have been agreed with major metropolitan areas, using economic geographies to determine administrative boundaries. This, coupled with the fact that few people actually live in upland areas compared to economic centres, means that the focus of policymakers is often elsewhere. One way that this has played out is that there are few areas of upland covered by a devolution deal.⁸

3. TARGETED INVESTMENT AND ALIGNED INCENTIVES

Any new approach to managing the North's uplands should include a fundamental and comprehensive rethinking of how upland resources are used, and the fiscal incentives of different actors, including those who own and manage land, that determine the current, sub-optimal status quo.

The upland economies already receive sizeable amounts of funding, particularly through EU farming subsidies. In many cases, these funds underpin the continued sustainability of local farms in the uplands, which would otherwise be financially unsustainable.

However, the current design of funds, specifically the Common Agricultural Policy (CAP) does not effectively incentivise good environmental management (Cox, Murray and Round 2017). Although a portion of funds are allocated towards supporting measures that have a positive impact on the environment, this system itself has been found to be ineffective (ECA 2017). In addition, the CAP operates separately from other areas of policy and funding, in a potentially unhelpful 'silo by sector' approach (Cox, Murray and Round 2017).

7 See for example: <https://www.gov.uk/government/publications/role-of-local-nature-partnerships-an-overview>

8 Although the new North of Tyne deal, which includes the ceremonial county of Northumbria (which includes the Northumberland National Park and a small part of the North Pennines AONB, as well as the Northumberland Coast AONB), offers an opportunity to explore what this might look like

Ownership of land is also a key issue. Although the important role of the uplands in reducing flooding, encouraging tourism and storing carbon means that they are a value asset for them all, their ownership is dominated by a small group of people and organisations. Some of these, such as conservation trusts and water companies, have, to varying degrees, a vested interest in securing their overall health, but other landowners, for example those of grouse moor estates, have tended to act in ways that are not conducive to the long-term health of the wider upland ecosystem (this is implicitly acknowledged by the government's recent voluntary compact for landowners (Evans 2018)). In recent years, ownership of many of natural assets has transferred from the public sector to civil society, in part because of the costs of maintenance. This has implications for the long-term management of these sites, because it depends upon the ability of civil society organisations to secure sustainable funding.

Instead, we need to consider how to funnel investment into maximising the health of local ecosystems.

Investment of this type has been small in scale to date. For example, in its 25 Year Environment Plan, the government announced the grants for a peatland restoration scheme which came online in May 2018. However, even if this was to be spent entirely in the North, it would only cover just under 3 per cent of the upland area of the North.⁹ Other models of investment in peatlands are being explored, for example, the £6 million Pennines PeatLIFE Project, announced in October 2017, bringing together partners from national utility companies, civil society and government agencies in a collaborative European-funded project to fund the restoration of 1,300 hectares of peatland in the North Pennines, Yorkshire Dales and the Forest of Bowland.

But likewise, these schemes lack the scale of resource to match the size of the contribution of the North's uplands to the economy.

NEXT STEPS FOR NATURAL ASSETS NORTH

Recommendations for how to develop a more joined up and system-wide approach to the North's natural assets, as a foundation of a thriving Northern Powerhouse economy, will be set out in detail in IPPR North's overarching report on the North's natural assets, to be published in 2019.

⁹ The government has stated that this £10 million grant fund will be enough to cover 6,580 hectares, which is 2.79 per cent of the North's uplands. See: <https://deframedia.blog.gov.uk/2018/05/15/tuesday-15-may-10m-boost-to-englands-iconic-peatlands/>

REFERENCES

- Clean Air Greater Manchester [Clean Air GM] (2018) 'Latest air quality information'. <https://www.cleanaigm.com/air-quality-data/monitoring-stations>
- Commission for Rural Communities (2010) *High ground, high potential – a future for England's upland communities*. <http://www.cumbriacommoners.org.uk/high-ground-high-potential-future-englands-upland-communities>
- Cox E, Murray C and Round A (2017) *Forgotten opportunities: The dynamic role of the rural economy in post-Brexit Britain*, IPPR. <https://www.ippr.org/publications/forgotten-opportunities-the-dynamic-role-of-the-rural-economy-in-post-brexit-britain>
- Department for Environment, Food and Rural Affairs [Defra] (2018) *Statistical Digest of Rural England*, January 2018. <https://www.gov.uk/government/statistics/statistical-digest-of-rural-england>
- European Environment Agency [EEA] (2016) *How is climate change affecting forest fire risk in Europe?* <https://www.eea.europa.eu/data-and-maps/indicators/forest-fire-danger-2/assessment>
- Environment Agency (2018) *Estimating the economic costs of the 2015 to 2016 winter floods*. <https://www.gov.uk/government/publications/floods-of-winter-2015-to-2016-estimating-the-costs>
- European Court of Auditors (2017) Special Report No 21/2017: "Greening: a more complex income support scheme, not yet environmentally effective." <https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=44179>
- Evans R (2018) 'Michael Gove accused of letting wealthy grouse moor owners off the hook', *Guardian*. <https://www.theguardian.com/environment/2018/aug/12/michael-gove-accused-of-letting-wealthy-grouse-moor-owners-off-the-hook>
- GeoLancashire (2018) 'The Geology and Landscapes of Winter Hill and Smithills Moor'. http://webcache.googleusercontent.com/search?q=cache:mZbO_81lyLEJ:geolancashire.org.uk/wp-content/uploads/2015/07/Geol-Landscapes-of-Winter-Hill-Smithills-Moor-.pdf+&cd=1&hl=en&ct=clnk&gl=uk
- IPCC [International Panel on Climate Change] (2018) *Special Report on Global Warming of 1.5°C (SR15)*. <http://www.ipcc.ch/>
- My Pennines (2018) 'West Pennines & Rossendale'. <http://www.mypennines.co.uk/west-pennine-moors/summits/winter-hill.html>
- Martin R (2018) 'Researcher's pictures show frightening extent of 6,400ac moor fire', *AgriLand*. <https://www.agriland.co.uk/farming-news/researchers-pictures-show-frightening-extent-of-6400ac-moor-fire/>
- Northern Upland Chain Local Nature Partnership [NUC LNP] (2016) 'Natural Capital Investment Plan for Peatland'. <http://www.nuclnp.org.uk/wp-content/uploads/2016/01/NUCLNP-Natural-Capital-Investment-Plan-for-Peatland.pdf>
- Reed C E, Brauer M, Johnston F H, Jerrett M, Balmes J R and Elliott T C (2016) 'Critical Review of Health Impacts of Wildfire Smoke Exposure', *Environmental Health Perspectives*. <https://ehp.niehs.nih.gov/doi/full/10.1289/ehp.1409277>
- The Committee on Climate Change (2018) *Land Use: Reducing Emissions and Preparing for Climate Change*. <https://www.theccc.org.uk/publication/land-use-reducing-emissions-and-preparing-for-climate-change/>
- Woodland Trust (2018) 'Smithills update after the Winter Hill fire'. <https://www.woodlandtrust.org.uk/blog/2018/08/smithills-fire-update/>

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