



# Natural Capital Committee

**Interim response to the 25 Year  
Environment Plan Progress Report &  
advice on a green economic recovery**

July 2020



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# Chair's message

Nine years ago the government published the White Paper, *The Natural Choice*, committing to the objective *'to be the first generation to leave the natural environment of England in a better state than it inherited.'* It established the Natural Capital Committee (NCC) to advise on how best to achieve this objective. The NCC recommended that the government develop a 25 Year Environment Plan (25 YEP) and in 2018 it was finally published, following further advice from the NCC.

The 25 YEP is a huge achievement, setting out the government's ambitions to improve the environment. The 25 YEP proposes, and the Environment Bill mandates, a requirement for an annual Progress Report to set out how the government is performing against the ten 25 YEP goals. The previous Secretary of State, Michael Gove, specially requested that the NCC scrutinises the 25 YEP annual reports, paving the way for the Office for Environmental Protection (OEP) to undertake this function in the future.

The Committee provided an assessment of the government's first Progress Report in 2019. In the absence of a natural capital baseline, the Progress Report focused on a long list of actions, with very little evidence of improvements in the state of our natural capital. As the NCC highlighted in its response, the report did not tell us very much about whether and to what extent there has been progress.

The 2020 Progress Report repeats many of these mistakes and the integrated, system based approach the 25 YEP demands is at real risk of being lost. The report continues to reflect these fundamental weaknesses, and again is unable to provide an assessment of progress, of which there has been very little. The NCC is seriously concerned about the absence of appropriate metrics to measure environmental performance. As the Committee has previously advised, it is crucial to use the right framework and metrics or risk multiple policy failures including the success of the 25 YEP, all future Environmental Improvement Plans, the delivery of Environmental Land Management schemes and environmental net gain. A green recovery will not be possible unless the government understands the baseline position of the environment. From the *ad hoc* evidence presented in the Progress Report, not only is there little evidence of progress, but some worrying evidence of declines. Nine of the 25 years have already passed and it is now looking very likely the next generation will inherit a poorer set of natural assets.

To turn this around, the NCC has already recommended that the 25 YEP should be put on a meaningful statutory footing, including statutory interim and long term targets to ensure the objectives are met. As a matter of urgency, the government should commit to establishing a comprehensive natural capital baseline against which progress can be measured. The NCC has set out in its detailed advice to government how this should be conducted, and subsequently repeated on a five year cycle. These steps are essential if the objectives of the 25 YEP are to be met and if the OEP is to inherit a workable framework to hold government to account.

We can be green and prosperous, but it will not happen by default. The huge opportunities, both economic and environmental, should be grasped by this government.

**Professor Dieter Helm, Chairman**





# Executive Summary

## The Natural Capital Committee's (NCC) interim response to the second 25 Year Environment Plan (25 YEP) Progress Report covers four areas, as follows:

- i) provides **an initial assessment of overall progress** to the extent that is possible;
  - ii) explains **why the reporting framework and indicators** used by the government to provide evidence of progress need reworking;
  - iii) sets out an **alternative natural capital asset-based framework** for assessing progress, and;
  - iv) highlights the opportunity to realise the **significant economic benefits from investing in natural capital assets and delivering the 25 YEP in a more cost-effective way** as part of a resilient green recovery from COVID-19.
- There has only been a 2.2% increase in restoring terrestrial and freshwater protected sites to favourable condition since 2013; the figure currently stands at 38.9%, against a 25 YEP target of 75%.
  - The 25 YEP commits to improving at least 75% of water bodies to be as close to their natural state as soon as practicable; currently only 16% of England's surface water bodies are in a 'high' or 'good' condition status, and this percentage is declining.<sup>2</sup>
  - Progress on air pollutant reductions has stalled following significant reductions between 1990 and 2011. Although there has been a decline in sulphur dioxide and nitrogen oxides emissions of just over 58% and just under 28% respectively since 2011, emissions of fine particulate matter and non-methane organic compounds have levelled off and ammonia has increased.<sup>3</sup>

The Committee will publish its final response to the 25 YEP Progress Report in October 2020, demonstrating how a natural capital framework can be applied to independently scrutinise progress, thereby laying the foundation for the Office for Environmental Protection (OEP) to undertake this function from 2021.

## Key points

**The government is not on course to achieve its objective to improve the environment within a generation. The next generation will, as a consequence, inherit a poorer set of natural assets.**

1. Nine years have now passed since the government made the commitment in the 2011 Natural Environment White Paper, *The Natural Choice*, 'to be the first generation to leave the natural environment of England in a better state than it inherited.'<sup>1</sup> Overall, the NCC is concerned that the evidence presented in the Progress Report at best provides only a partial picture and mostly shows declines in England's environment. For example:

**The government has still not put in place the appropriate metrics and baseline required to measure changes in the environment, as advised by the NCC. This not only prevents a proper assessment of progress but also misses opportunities to identify the projects with the highest economic value.**

1 HM Government, *The natural choice: securing the value of nature* (2011): <https://www.gov.uk/government/publications/the-natural-choice-securing-the-value-of-nature>

2 Defra, *Biodiversity 2020: A strategy for England's wildlife and ecosystem services: Indicators* (2019): <https://www.gov.uk/government/statistics/england-biodiversity-indicators>

3 National Atmospheric Emissions Inventory, *UK emissions data selector* (2019): <http://naei.beis.gov.uk/data/data-selector>

2. The NCC has extensively advised on the need for a comprehensive natural capital baseline census and metrics, as per its Terms of Reference.<sup>4</sup> These fundamental components are essential for measuring progress and appraising environmental restoration / enhancement interventions with a clear understanding of those with the highest economic value.
3. In the Progress Report, a partial selection of datasets and indicators are presented to demonstrate progress, with a range of starting points. The NCC advises that this approach increases the risk of government selecting small positive improvements and ignoring the overall declines in the environment. For example:

- **Indicators:** there is an absence of a transparent and consistently applied criteria for selecting 27 of the 38 published indicators used in the Progress Report. While this is a welcome increase of 21 indicators relative to the 2019 Progress Report, the NCC advises that the indicators need to be included in a consistent way.
- **Status arrows:** the Progress Report issues five different status arrow categories to indicate progress towards the ten 25 YEP goals. While these status arrows are simple to follow, the lack of a transparent criteria for determining how the status arrows have been issued means they cannot effectively be evaluated.
- **Baseline for trends:** the NCC advises that a transparent criteria for selecting different starting points for trend data is needed. For example, Defra's Clean Air Strategy commits to reducing emissions of five key pollutants against a 2005 baseline position. However, the trends for pollutants in the Progress Report are reported against a 1998 baseline.

**The Progress Report lacks an overarching strategic narrative to join up the reporting framework across the ten 25 YEP goals.**

4. The 25 YEP represents the government's overarching strategy for improving the environment. Furthermore, the Environment Bill will require that the 25 YEP and all future Environmental

Improvement Plans (EIP) 'significantly *improve the natural environment*'.<sup>5</sup> The NCC is concerned by the lack of a strategic approach to assessing progress by joining up the range of metric, actions and commitments across the ten goals in an integrated way. For example, 16 strategies (HMG Green Finance Strategy, UK Marine Strategy and the upcoming Nature Strategy) and many actions are detailed in the Progress Report, but it is not clear if they are part of a joined up, coherent and integrated plan to protect and improve the whole environment system. The NCC advises that reporting on progress must go beyond listing strategies and actions and instead provide an assessment of intended outcomes and environmental improvements.

**Statutory interim and long term targets need to be established in the Environment Bill, with the Office for Environmental Protection required to advise on setting and any revisions to these targets.**

5. The NCC has advised that the Environment Bill should include a suite of legally binding interim and long term environmental targets, well beyond a single target in each of the four priority areas, as currently proposed. This is essential for ensuring that the ten 25 YEP goals and all future EIPs drive actual environmental improvement.
6. The OEP's remit needs to be expanded so that the government must consider and respond to its advice on setting and any revisions to interim and long term targets / EIPs. The NCC advises that without a direct role for the OEP, the ambition to significantly improve the environment could be softened in favour of other government priorities and further stalling of progress in meeting the 25 YEP objectives, undermining public confidence in the government's green commitments.

**The Committee has set out a comprehensive, natural capital based framework for assessing progress in protecting and improving the environment. For the Environment Bill and other environmental policies to succeed, using the correct framework / metrics is essential. The Committee has consistently demonstrated how investment in natural capital would yield far greater returns than those afforded by public spending elsewhere. For example, woodland and catchment restoration show economic returns that equal or exceed capital infrastructure investment, including road or rail projects.<sup>6</sup> Wetland creation can generate benefits cost ratios as high as 9:1.<sup>7</sup> If the government's vision for a green recovery is to be a success, then it is essential that it implements an integrated, natural capital approach as per the 25 YEP, to assess where investment is most needed and delivers the highest returns.**

4 HM Government, *Natural Capital Committee Terms of Reference* (2016): <https://www.gov.uk/government/groups/natural-capital-committee#terms-of-reference>

5 Defra, *Environment Bill 2019-21* (2019): <https://services.parliament.uk/bills/2019-21/environment.html>

6 Bateman, I.J. and Mace, G.M., *The natural capital framework for sustainable, efficient and equitable decision making* (2020): <https://www.nature.com/articles/s41893-020-0552-3>

7 NCC, *Natural Capital Committee's third state of natural capital report* (2015) <https://www.gov.uk/government/publications/natural-capital-committees-third-state-of-natural-capital-report>





# Background

**This report sets out the Natural Capital Committee's (NCC) interim advice on the government's second 25 Year Environment Plan (25 YEP) Progress Report, published in June 2020.<sup>8</sup> The Committee's assessment of the Progress Report will be delivered in two parts: an interim report, followed by a final independent assessment of progress in October 2020.**

The previous Defra Secretary of State, Michael Gove, formally commissioned the NCC to scrutinise the 25 YEP Progress Report. The NCC Terms of Reference<sup>9</sup> also requires it to report on the implementation of the 25 YEP, including the development of suitable metrics to track progress against the Plan's objectives. An Outcome Indicator Framework<sup>10</sup> for the 25 YEP was published alongside the Progress Report. The NCC's objective in this advice is not to provide a detailed assessment of the Outcome Indicator Framework (OIF), but focus mainly on those indicators and other data used by the government in the Progress Report.

This interim report: i) provides an initial assessment of the government's 2020 Progress Report; ii) sets out a natural capital framework for assessing progress and iii) makes recommendations for a green economic recovery from the COVID-19 outbreak.

8 HM Government, *25 Year Environment Plan Progress Report: April 2019 to March 2020* (2020): <https://www.gov.uk/government/publications/25-year-environment-plan-progress-reports>

9 HM Government, *Natural Capital Committee Terms of Reference* (2016): <https://www.gov.uk/government/groups/natural-capital-committee#terms-of-reference>

10 Defra, *Measuring environmental change: outcome indicator framework for the 25 Year Environment Plan* (2019): <https://www.gov.uk/government/publications/25-year-environment-plan>



# 1. Initial assessment of the 25 YEP Progress Report

In 2018, the government published a 25 YEP to improve the environment stating that *‘the Plan would be the living blueprint for the environment covering the next quarter of a century.’*<sup>11</sup> The 25 YEP promises action across ten goals with joined up policies in a way which maximises environmental and economic outcomes. The Plan is underpinned by the NCC’s recommendations for a natural capital approach, strong governance and accountability, and a robust delivery framework. The 25 YEP Progress Report sets out the government’s assessment of progress towards each of the ten 25 YEP goals.<sup>12</sup>

In its assessment of the government’s first, 2019 Progress Report,<sup>13</sup> the Committee’s main recommendations were as follows:

- To improve the reporting framework there is an **urgent need to establish a comprehensive baseline on the state of environmental assets** against which progress in achieving the overall objectives and the goals within the 25 YEP can be assessed.
- **Each of the ten 25 YEP goals should be clearly defined. All of the goals must be supported by a number of statutory, quantitative targets** addressing particular aspects of the high-level goal.
- **The OIF must be further developed so it is not based on what is currently measured / existing monitoring programmes, but based on what should be measured.**<sup>14</sup> All of the indicators used in the Progress Report draw on existing monitoring data, resulting in a strong sense of ‘business as usual’ – and not a single indicator measures the full extent or condition of natural capital assets.
- All of the above should be **supplemented with assessments of how changes are impacting upon wellbeing** across the population. Each goal should include a measure of the impact of the environment upon wellbeing. It is not enough to only include wellbeing against the enhanced beauty goal.

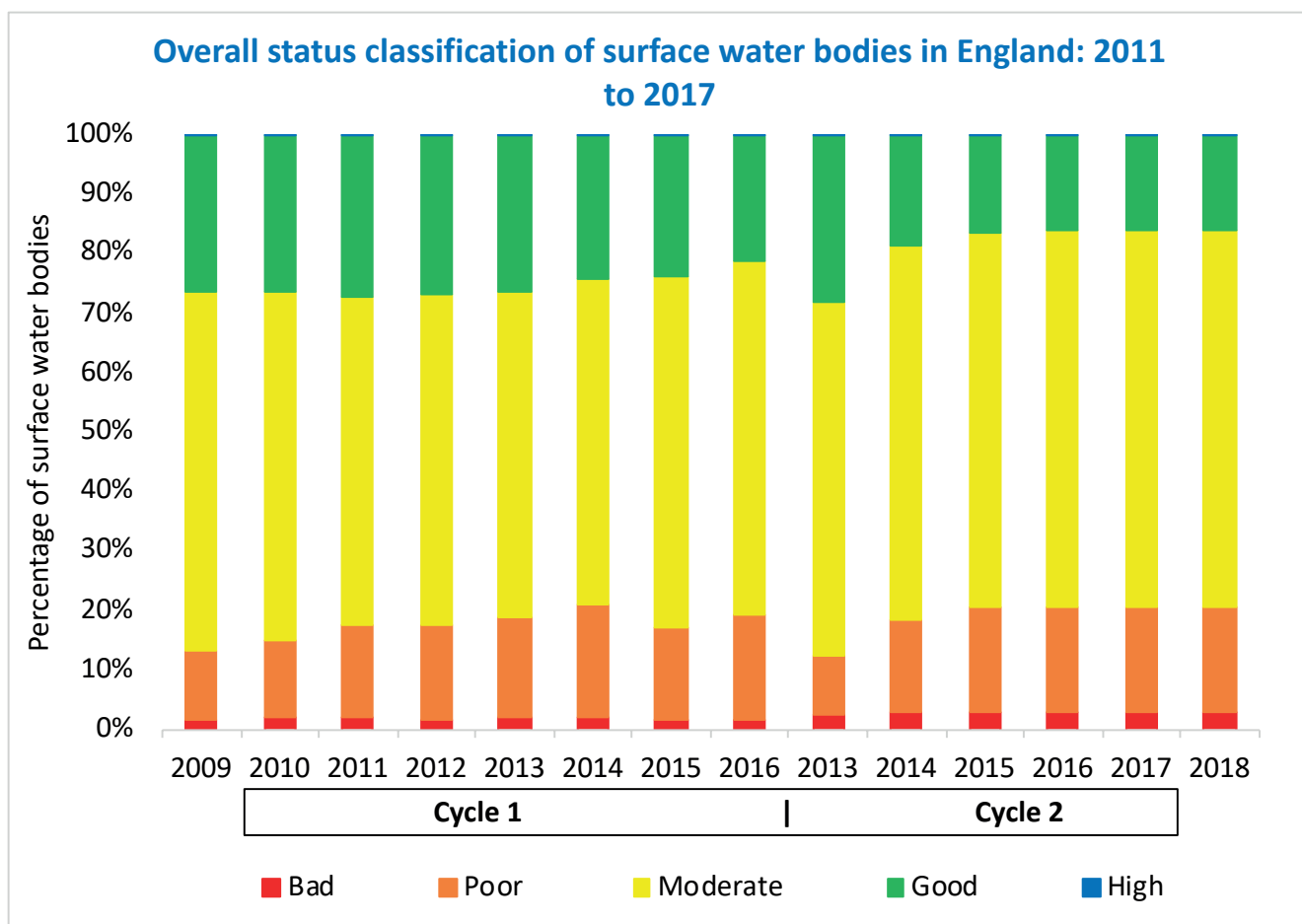
11 HM Government, *A Green Future: Our 25 Year Plan to Improve the Environment* (2018): <https://www.gov.uk/government/publications/25-year-environment-plan>

12 The ten goals are as follows: Clean air, clean and plentiful water, thriving plants and wildlife, reduced risk of harm from environmental hazards such as flooding and drought, using resources from nature more sustainably and efficiently, enhanced beauty, heritage and engagement with the natural environment, mitigating and adapting to climate change, minimising waste, managing exposure to chemicals, enhancing biosecurity.

13 NCC, *Response to the 25 Year Environment Plan Progress Report 2019* (2019) <https://www.gov.uk/government/publications/natural-capital-committee-advice-on-governments-25-year-environment-plan>

14 Defra, *Measuring environmental change: outcome indicator framework for the 25 Year Environment Plan* (2019): <https://www.gov.uk/government/publications/25-year-environment-plan>

**Figure 1: Surface water bodies classification**



Source Environment Agency 2020

The NCC notes that the government has acted on some of these recommendations, by including a number of measurable commitments – which is a step in the right direction towards each goal having a number of statutory quantitative targets. There has also been a marked increase in the number of indicators presented: 27 have been included and 8 provide an assessment, albeit partial, of natural capital assets. This represents a positive step forward in reporting on environmental trends. However, there remain several critical areas that need to be addressed. The NCC will provide a detailed assessment of progress against the 25 YEP in its final response. The data presented in the Progress Report at best provides only a partial assessment of progress against the ten 25 YEP goals. The NCC advises that incorporating data beyond the OIF would increase data richness and considerably improve the assessment. Based on an initial assessment, the Committee is concerned by some worrying declines in the environment and very little demonstrated progress. For example:

- The data provided on emissions for five key air pollutants against the goal ‘Clean air’ shows that progress on reducing emissions has stalled, following significant reductions between 1990 and 2011.
- ‘Clean and plentiful water’: the 25 YEP commits to improving at least 75% of water bodies to be as close to their natural state as soon as practicable; the Progress Report states only 16% of England’s surface water bodies are in a ‘high’ or ‘good’ condition (as shown in Figure 1).
- The majority of the six indicators used in the Progress Report for the goal ‘Thriving plants and wildlife’ present trends which are declining. Only one of the status arrows issued shows a positive trend for the indicator ‘Area of woodland in England’, but the government has missed its own woodland creation targets for the last eight years.<sup>15</sup>

<sup>15</sup> Forest Research, *Forestry Statistics and Forestry Facts & Figures* (2019): <https://www.forestryresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/>

Overall, the Committee concludes that the Progress Report does not adequately provide an evidence based assessment of progress on the overall objective of the 25 YEP: whether the environment has improved or not. The five main drivers for this are as follows:

- i) The absence of a baseline and transparent criteria against which to assess trends in environmental change;
- ii) The lack of an overarching strategic narrative / integrated approach to join up the reporting framework across the ten 25 YEP goals;
- iii) The use of poorly developed status arrows to indicate progress;
- iv) Limited use of available environmental data to track progress across all of the goals, and;
- v) The absence of quantitative targets and milestones against each goal.

Further detail on each of these five drivers is provided below. The NCC's assessment of the evidence used to measure progress against the ten goals is summarised in Table 3.

## **i) The absence of an environmental baseline and transparent criteria for starting points selected to assess progress towards the 25 YEP goals.**

The OIF does not have an associated baseline making it difficult if not impossible to use to provide empirical evidence of progress.<sup>16</sup> This is reflected in the Progress Report where the starting points for the data range from 1960 to 2017 (as summarised in Table 1 below) meaning an assessment of progress within and across the ten goals areas is difficult. The NCC advises that one option would be to use a 2011 baseline, where possible, to align the assessment of progress against the 2011 Natural Environment White Paper, in which the government first made the commitment to leave the environment in a better state. It is common for government to report on progress against a fixed baseline. The Department for Business, Energy and Industrial Strategy (BEIS), for example, reports on progress against a greenhouse gas emissions baseline of 1990.<sup>17</sup> Defra has set air quality targets against baseline position of 2005.<sup>18</sup>

In many cases, the wide variation in baseline could be explained by the different points in time when the data has become available. The NCC also recognises the challenges in setting a uniform baseline across all of the ten goals, which vary significantly. This means that it is even more important to establish a transparent, consistent and clear criteria to justify the selection of different starting points. In the table '*Summary of indicators and commitments*' datasets are given trend arrows with barely any start dates presented (only 4 of 27).<sup>19</sup> The reader has to cross reference with the text to find the starting points to fully understand the trend arrows issued. The NCC advises that government should be clear on the scope for environmental improvement (i.e. maintain or enhance natural assets) relative to the different data trend starting points. For example, the government's net zero target requires a 100% decrease of greenhouse gas emissions against the 1990 levels by 2050.

<sup>16</sup> Defra, *Outcome indicator framework for the 25 Year Environment Plan: 2020 update* (2020): <https://www.gov.uk/government/publications/25-year-environment-plan-progress-reports>

<sup>17</sup> BEIS, UK greenhouse gas emissions statistics (2018): <https://www.gov.uk/government/collections/uk-greenhouse-gas-emissions-statistics>

<sup>18</sup> Defra, *Air quality: Explaining air pollution at a glance* (2019): <https://www.gov.uk/government/publications/air-quality-explaining-air-pollution>

<sup>19</sup> HM Government, *25 Year Environment Plan Progress Report: April 2019 to March 2020* (2020) Pages 51-60: <https://www.gov.uk/government/publications/25-year-environment-plan-progress-reports>

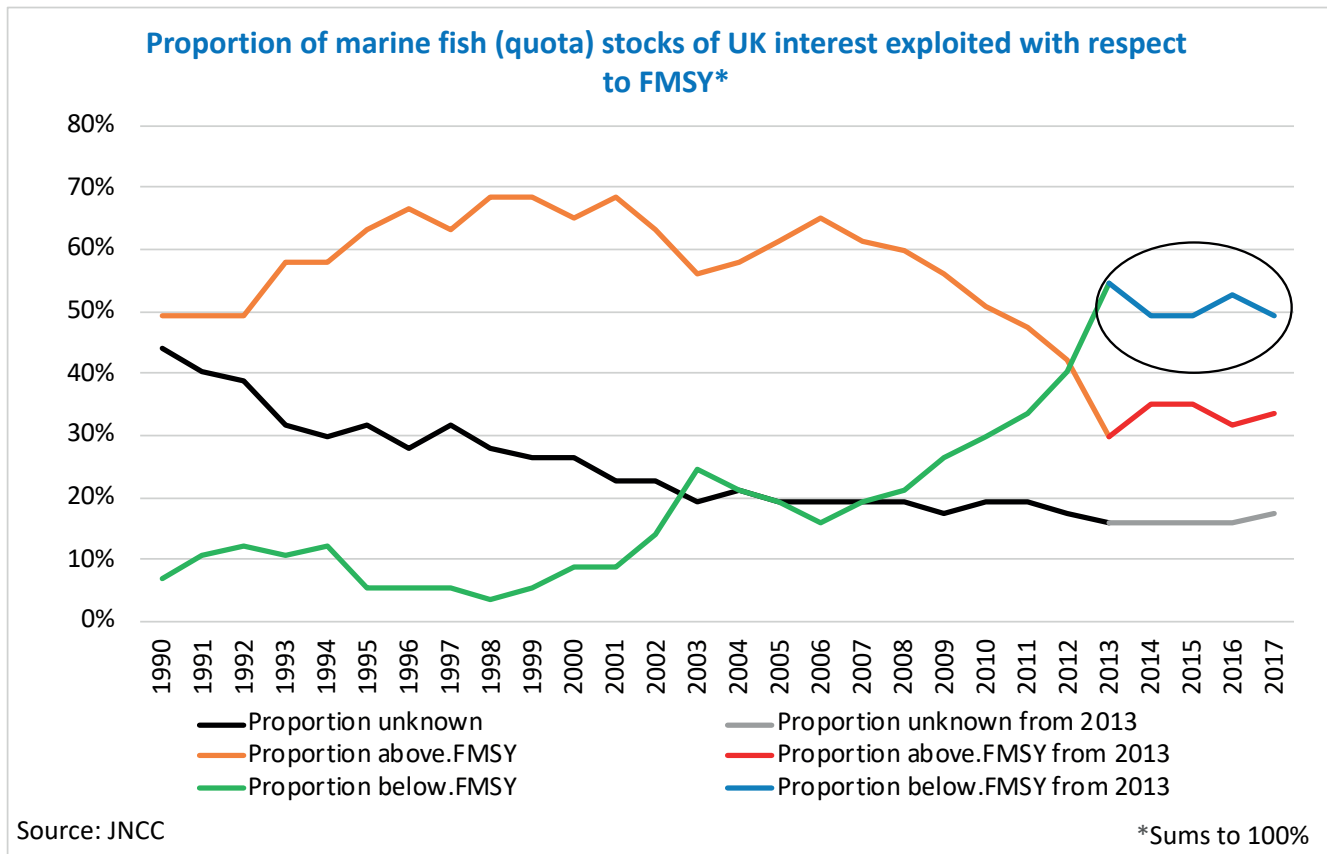
**Table 1: Examples of variability in starting points / baseline for indicators used to assess progress against each 25 YEP goal**

25 YEP goal	Variability in starting points
<b>Clean air</b>	Defra's Clean Air Strategy sets emissions targets for five key air pollutants against a baseline of 2005. <sup>20</sup> However, all five air quality indicators used in the Progress Report have different starting points; 1998, 2011, 1987, 1997 and 1995/97. The data used for ' <i>Emissions of five key air pollutants</i> ' displays the trend from 1998 to 2017, which shows that all five pollutants have decreased. However, the 1998 starting point is not related to the 2005 baseline and corresponding 2020 targets from the Clean Air Strategy so the reader is unable to assess if the strategy has been effective.
<b>Clean and plentiful water</b>	The four indicators presented in the Progress Report have three different starting points: 1995, 2008, and 2017. The data used against indicator B3, ' <i>State of the water environment</i> ' only presents one data point, ' <i>in 2017, 16% of all surface waters met the 'good ecological status standard'</i> ' despite more data being available – as shown in Figure 1 (above). <sup>21</sup> The NCC advises that the introduction of the Water Framework Directive in 2009 would be a more obvious baseline for these indicators.
<b>Thriving plants and wildlife</b>	Each of six indicators presented (C1, C7, D2, D3, D6 and D7) have different starting points: 2008, 1990s, 2003, 1998, 1970 and 1980. However, no information is provided in the Progress Report on the appropriate year for evaluating progress, for example D2 and D7 report progress from different years than the data starting points (2011 rather than 2003; and 1987 rather than 1980 respectively, but no explanation is offered to why this is the case). In addition, the NCC advises that government should provide a target or narrative on what positive progress looks like against these various starting positions.
<b>Using resources from nature more sustainably and efficiently</b>	Four indicators are presented in the Progress Report, with a range of different starting points: 1973, 2010, 1990 and 2001. The indicator ' <i>Efficiency of agricultural production measured by Total Factor Productivity</i> ' compares 1973 to 2018 presenting a 53% increase in productivity. However, there is no information justifying the selection of a 1973 baseline.
<b>Mitigating and adapting to climate change</b>	This goal has a starting point / baseline linked to the commitment: ' <i>reduce greenhouse gas emissions by at least 100% of 1990 levels</i> ' – the BEIS data on emissions of greenhouse gases is presented against the 1990 baseline. One of the indicators from the OIF matches this starting point (A2), however the remaining two (D3, and J1) diverge from the 1990 baseline (1998 and 2001).
<b>Minimising waste</b>	The two indicators used start in 2010, but no information is provided as to why 2010 is the starting point. In addition, no information is provided on what ' <i>eliminating all avoidable waste by 2050</i> ' means relative to 2010 levels.

<sup>20</sup> Defra, Clean Air Strategy (2019): <https://www.gov.uk/government/publications/clean-air-strategy-2019>

<sup>21</sup> Defra, Biodiversity 2020: A strategy for England's wildlife and ecosystem services: Indicators (2019): <https://www.gov.uk/government/statistics/england-biodiversity-indicators>

**Figure 2: Proportion of marine fish stock exploited with respect to Maximum Sustainable Yield (MSY)**



Source: JNCC

The Progress Report covers the period 'April 2019 to March 2020' yet none of the 27 indicators used in the report within this time period. This is likely due to lags in data availability, however, the Progress Report would benefit from a clear narrative on data availability and rationale for the reporting period selected. Where more recent data has been presented, it has often been compared to a baseline / starting point in the distant past, rather than more recent data points without any clear justification. This can convey a very different assessment of progress – as highlighted in Figure 2. For example, in the Progress Report, a starting point of 1990 shows significant improvement in the proportion of fish that are being fished sustainably (i.e. within Maximum Sustainable Yield) from around 10% in 1990 to just under 50% in 2017. However, if the baseline had been set in 2013, then there would be no change – as highlighted by the black circle.

## ii) The lack of an overarching strategic narrative / integrated approach to join up the reporting framework across the ten 25 YEP goals.

The NCC advises that to achieve the overall aim of the 25 YEP and all future EIPs, joined up integrated delivery across government, local government and delivery

bodies is required. In total, 16 different strategies are mentioned in various places within the Progress Report. It is not clear if these strategies represent part of a holistic, coordinated plan to deliver the aims of the 25 YEP, or if they would have happened anyway. The 25 YEP was created to be the central plan for environmental improvement and should review, monitor and report on all strategies and actions.

The Committee has emphasised in its advice the importance of managing natural capital assets as a system, recognising the important trade-offs, co-benefits and co-dependencies. The 25 YEP is underpinned by this approach. However, there is limited evidence in the Progress Report that potential trade-offs between the goals, commitments and data – particularly in terms of using resources from nature and the damage this might cause – have been properly considered. For example, of the marine indicators used, including the indicator 'Percentage of fish stocks fished at or below levels of maximum sustainable yield' there is no consideration of trade-offs between harvesting fish and shellfish stocks for food, and the stocks required to sustain other flows of services.

The 40 'priority actions' mentioned in the 2019 Progress Report<sup>22</sup> as 'actions expected to make the most significant contribution to the ten goals of the plan' are not obviously included in the 2020 report. Failing to include and report against the priority



actions raises concerns as to whether they are part of the strategic, coordinated plan to deliver the 25 YEP, or if they are policy actions which would have happened independently of the 25 YEP. The NCC cannot comment on recent progress against the actions or assess if they have made the most significant contribution to the ten 25 YEP goals.

The Progress Report does not provide any measure or assessment of how well the 25 YEP goals have been integrated into local delivery through the Arm's Length Bodies. The NCC is concerned this prevents a full assessment of progress because the strategies, actions and indicators mentioned are not linked to local delivery. The future delivery mechanisms for the 25 YEP such as the Environmental Land Management (ELM) schemes and Local Nature Recovery Strategies (LNRS) are not obviously related to the indicators presented in the Progress Report.

### iii) Progress is framed using a series of arrows which fail to accurately represent the state of the environment.

In the Progress Report, five arrows, as presented in Figure 3, are used to summarise the government's assessment of changes in data trends.

The NCC is concerned by the absence of a clear criteria or evidence for determining these five arrow categories. This can lead to a potential misrepresentation of the data trends, as highlighted below:

- Under the 'Clean air' goal, 'rural background concentrations of ozone' has been issued with a 'stable' arrow despite a recent increase in concentrations from 68 µg/m<sup>3</sup> to 74 µg/m<sup>3</sup> from 2017 to 2018. This is presented as a significant increase in the OIF Report.<sup>23,24</sup>

- 'Using resources from nature more sustainably and efficiently': the percentage of fish stocks fished at or below maximum sustainable yield is reported to be 49% in 2017, meaning 33% of fish stocks are overfished and 17% have no data. This is a long way from what should be considered good environmental condition. Despite this a green upward, short-term trend, positive outcome arrow has been issued. The Committee notes that the data shows an increase since 1990 levels, however since 2013 the trend has been stable – as shown in Figure 2.
- Data on the condition of protected sites is used to demonstrate progress against the goal 'Thriving plants and wildlife'. 38.9% of protected sites are currently in favourable condition – against a commitment of 75% being in favourable condition by 2042. A stable arrow has been issued despite the statement in the Progress Report that 'based on recent trends we are not on track to meet our commitment...'
- 'In 2017, 16% of all surface waters met the 'good ecological status' standard, compared with the 25 YEP objective of 75% as soon as is practicable' – a stable arrow has been issued when the commitment is nowhere near being met and no definition for 'as soon as practicable' has been provided.

The NCC recommends that government should address the limitations of this approach to issuing status arrows by: i) defining what 'short term' is, ii) defining the parameters of change / identifying statistically significant changes to justify issuing positive or negative outcomes, iii) linking the arrows to the commitments made and iv) provide clear narrative on the scope for environmental improvement (i.e. maintain or enhance natural assets) relative to the different data trend starting points. An example of how the data could be presented following this approach is detailed in Table 2.

**Figure 3: Progress Report arrows to present change in trends**

#### Key



Downward short-term trend, positive outcome



Stable short-term trend, stable outcome



Upward short-term trend, positive outcome



Downward short-term trend, negative outcome



Upward short-term trend, negative outcome

**The arrows show simply whether the trend has recently increased or decreased and the colour coding reflects whether that is a positive or negative outcome for the environmental goal.**







Source: 25 YEP Progress Report April 2019 to March 2020

22 HM Government, *25 Year Environment Plan Progress Report: January 2018 to March 2019* (2019) Pages 11-19: <https://www.gov.uk/government/publications/25-year-environment-plan-progress-reports>  
 23 Defra, *Outcome indicator framework for the 25 Year Environment Plan: 2020 update* (2020) Page 19: <https://www.gov.uk/government/publications/25-year-environment-plan-progress-reports>  
 24 µg/m<sup>3</sup> is micrograms per cubic meter of air





**Table 2: Example of how status arrows could be used to represent the state of the environment**

Indicator	Measurable commitments	Progress towards commitment/ long term trend	Arrow	A common starting point (baseline e.g.: 2011)	Arrow	Short term trend (e.g.: last 1-3 years)	Arrow
Emissions of greenhouse gases	To reduce greenhouse gas emissions by at least 100% of 1990 levels (net zero) by 2050.  <i>The UK Climate Change Act</i>	The most recent final figures are for 2018, UK greenhouse gas emissions were 451.5 million tonnes (MtCO <sub>2</sub> e), 43.1% lower than in 1990.		When using a common point (e.g.: 2011) across all indicators, greenhouse gas emissions have declined by around 18.4% when compared to 2011 levels.		When comparing emissions to 2017 emissions have declined by just over 2.1% (a reduction of around 9.5 Mt-CO <sub>2</sub> e).	
The percentage of fish stocks fished at or below levels of maximum sustainable yield	N/A	The percentage of fish stocks fished at or below levels capable of producing maximum sustainable yield (FMSY) has increased from 7% in 1990 to 49% in 2017, whereas the percentages fished above FMSY or at unknown levels relative to FMSY have both decreased over the same time period.		When using a common point (e.g.: 2011) across all indicators, fish stocks increase from around 33% to around 49%, however, this trend has been flat at around 50% since 2013.		When comparing the 2017 data with 2016 we can see a small decline from around 52% to just over 49%.	

## iv) The Progress Report does not draw on all available environmental data to track progress across all of the goals.

The Committee welcomes the use of 27 of the 38 available indicators. This is an improvement relative to the 2019 report. The NCC recognises the challenges associated with undertaking a full assessment of progress due to data availability, especially with regard to some goals such as *'Thriving plants and wildlife.'* However, the evidence presented provides only a partial assessment of progress against each goal. For example:

- It is not clear why 27 indicators have been selected and used in the Progress Report when 38 have been reported in the OIF Report. There are gaps in the data presented. The Committee has advised that the development of marine and soils indicators should be fast tracked as these assets are most at risk of being used unsustainably.<sup>25,26</sup> It is positive that three marine indicators have been used in the Progress Report, but this data alone is insufficient to assess the state of the marine asset. Data on soils is entirely absent despite *'Healthy soils'* being a headline indicator.
- The richness of the data presented in the Progress Report could be significantly improved. For example, the State of Nature Report 2019 presents trends in individual species and species groups alongside the overall trends in abundance and distribution of species.<sup>27</sup> The Progress Report only makes use of the overall trend which disguises crucial information at the species level.
- Very few of the planned 66 indicators are ready – only 18 of the 38 currently published are fully ready for reporting. The remaining 20 are published as interim indicators meaning *'further development is expected to extend or improve the reporting against the indicator.'*<sup>28</sup> The Progress Report does not clearly identify which 27 indicators presented are finalised and which are interim.

The Committee's assessment of the data used in the Progress Report is presented in Table 3. Most of the data presented in the Progress Report is from the Defra Group, failing to reflect that delivery of the 25 YEP, future EIPs and the Environment Bill requires join up/data from across national and local government (for example, Department for Business Energy and Industrial Strategy, Department for Transport, Department of Health and Social Care and Ministry of Housing Communities and Local Government). The indicators presented have been designed independently of policy actions / commitments or making it difficult to use them to assess progress. For example:

- The goal *'Reducing risk of harm from environmental hazards'* has no data or indicators included to report on progress, despite flood defence spending being doubled to £5.2 billion – the largest amount of funding mentioned in the Progress Report.
- The goal *'Using resources from nature more sustainably and efficiently'* uses measures of *'Efficiency of agricultural production'*. The NCC advises that it is difficult to see how measuring farming efficiency will lead to using resources from nature more sustainably without further information on whether the inputs are causing wider damage to water / the environment.

25 NCC, Natural Capital Committee advice on marine management (2019): <https://www.gov.uk/government/publications/natural-capital-committee-advice-on-marine-management>

26 NCC, Natural Capital Committee advice on soil management (2019): <https://www.gov.uk/government/publications/natural-capital-committee-advice-on-soil-management>

27 NBN, *State of Nature 2019* (2019): <https://nbn.org.uk/stateofnature2019/reports/>

28 Defra, *Outcome indicator framework for the 25 Year Environment Plan: 2020 update* (2020): <https://www.gov.uk/government/publications/25-year-environment-plan-progress-reports>



**Table 3: Review of status arrow ratings and indicators / metrics used in 2020 Progress Report for each of the ten 25 YEP goals**

## 1. Clean Air

Indicator / metric used and data status <sup>29</sup>	Status arrow issued <sup>30</sup>	Commitment made	NCC comments on the suitability of the metric used
<b>A1</b> Emissions for five key air pollutants (final)	NH <sub>3</sub> – Increase, negative PM <sub>2.5</sub> – Stable NMVOCs – Stable SO <sub>2</sub> – Decrease, positive NOx – Decrease, negative	Meeting UK emissions ceilings, as well as revised ceilings in place for 2020 – 2029 and 2030 onwards.	<b>General comments:</b> More information is required to make this metric meaningful. It should be linked to the levels of exposure (human and environmental) so the reader can assess the significance of the data.  <b>Commitment:</b> No information has been provided on what the emission ceilings are so the data cannot be used to say if these are on track or not. To improve this the graph could have included the emissions ceilings to assist in interpreting the data. The Clean Air Strategy targets against the 2005 baseline are missing. <sup>31</sup>  <b>Status arrow issued:</b> Status arrow in the summary table does not match the picture presented in the Annex. It is unclear where the five trends for the arrows have been taken from, 1990 or 2013.
<b>A3</b> Concentrations of fine particulate matter (PM <sub>2.5</sub> ) in the air (final)	Decrease, positive	The legal limit value for concentrations of PM <sub>2.5</sub> is 25 µg/m <sup>3</sup> (decreasing to 20 µg/m <sup>3</sup> in 2020) annual mean.	<b>General comments:</b> More information is required on how the population weighted annual mean is calculated. The data presented cannot be used to assess what percentage of the population are exposed to harmful levels of PM <sub>2.5</sub> . Presenting the data on a map would significantly improve the interpretation of this data, for example, as already used on the National Atmospheric Emissions Inventory. <sup>32</sup>  <b>Commitment:</b> The commitment is specific enough to measure progress against, however the 2019 Progress Report <sup>33</sup> and Clean Air Strategy <sup>34</sup> stated that Defra will ‘ <i>reduce fine particulate matter concentrations so that the number of people living in UK locations above the World Health Organisation (WHO) guideline is reduced by 50% by 2025</i> ’. Although WHO target is mentioned in the Progress Report the commitment is not repeated and instead the legal limit value is used. The legal limit value is double the WHO guideline (20 µg/m <sup>3</sup> legal limit value vs 10 µg/m <sup>3</sup> WHO target).

<sup>29</sup> As detailed in the Outcome Indicator Framework

<sup>30</sup> HM Government, *25 Year Environment Plan Progress Report: April 2019 to March 2020* (2020): Taken from the ‘summary of indicators and commitments table’ page 51, the key has been summarised to: downward, short-term trend, positive outcome = decrease, positive; downward short-term trend, negative outcome = decrease, negative; stable, short-term trend, stable situation = stable; upward, short-term trend, positive outcome = increase, positive and; upward short-term trend, negative outcome = increase, negative.

<sup>31</sup> Defra, *Clean Air Strategy* (2019): <https://www.gov.uk/government/publications/clean-air-strategy-2019>

<sup>32</sup> National Atmospheric Emissions Inventory, *Emission Map Data for PM<sub>2.5</sub> (Particulate Matter < 2.5µm) in 2017* (2020): [https://naei.beis.gov.uk/data/map-uk-das?pollutant\\_id=122&emiss\\_maps\\_submit=naei-20181001143325](https://naei.beis.gov.uk/data/map-uk-das?pollutant_id=122&emiss_maps_submit=naei-20181001143325)

<sup>33</sup> HM Government, *25 Year Environment Plan Progress Report: January 2018 to March 2019* (2019): <https://www.gov.uk/government/publications/25-year-environment-plan-progress-reports>

<sup>34</sup> Defra, *Clean Air Strategy* (2019): <https://www.gov.uk/government/publications/clean-air-strategy-2019>

<p><b>A4</b> Rural background concentrations of ozone (O<sub>3</sub>) (final)</p>	<p>Stable</p>	<p>There are target values for ozone set by the Air Quality Directive for the protection of health and vegetation.<sup>35</sup></p>	<p><b>General comments:</b> The lack of detail provided against this indicator makes it very difficult to interpret whether the data presents a positive or negative measure of environmental condition. Statistical significance and the target values should be included as a minimum.</p> <p><b>Commitment:</b> The commitment detailed is not a commitment, the target values from the Air Quality Directive should have been used in the Progress Report. Failure to include them leaves the reader unable to interpret whether the data is within the commitments or not.</p> <p><b>Status arrow issued:</b> The report details a recent increase in concentrations of ozone (from 68 µg/m<sup>3</sup> to 74 µg/m<sup>3</sup>) but no information is provided on the statistical significance of this or if it is within the expected variation. In addition, the OIF reports this increase as significant therefore issuing a status arrow of stable appears misleading.</p>
<p><b>A5</b> Roadside nitrogen dioxide (NO<sub>2</sub>) concentrations (final)</p>	<p>Decrease, positive</p>	<p>The legal limit value for concentrations of NO<sub>2</sub> are 40 µg/m<sup>3</sup> annual mean and 200 µg/m<sup>3</sup> hourly mean.<sup>36</sup></p>	<p><b>General comments:</b> Data presented is not linked to the actions taken. The creation of 40 local plans to tackle roadside NO<sub>2</sub> concentrations should be clearly linked to the data on NO<sub>2</sub>. Without this linkage it is hard to judge if these plans are in the places which need to reduce their NO<sub>2</sub> levels or if they have been selected at random. Further information on how roadside emissions are split between sector and their relative contribution should be included and could be factored into the green recovery.</p> <p><b>Commitment:</b> The commitment is specific enough to measure progress against, however no information is provided on the areas where NO<sub>2</sub> has exceeded the legal limit value and how significant this is. Without this information, the extent to which the commitment is on track or not cannot be assessed. The Clean Air Strategy targets against the 2005 baseline are missing.</p> <p><b>Status arrow issued:</b> The arrow does not reflect the fact that some areas are exceeding the legal NO<sub>2</sub> limit.</p>
<p><b>A6</b> Exceedances of damaging levels of nutrient nitrogen deposition on ecosystems (final)</p>	<p>Stable</p>	<p>None mentioned.</p>	<p><b>General comments:</b> No information is provided on the statistical significance of the change over time, more information is required. The target from the Clean Air Strategy is missing.</p> <p><b>Status arrow issued:</b> Issuing a stable arrow when 94.8% of habitats are exceeding the critical threshold for nitrogen deposition is arguably misleading.</p>

<sup>35</sup> EU Air Quality Directive 2008/50/EC

<sup>36</sup> Defra, Air pollution in the UK (2018): <https://uk-air.defra.gov.uk/library/annualreport/index>



## 2. Clean and plentiful water

Indicator/metric used and data status	Status arrow issued	Commitment made	NCC comments on the suitability of the metric used
<p><b>B2</b> Serious pollution incidents to water (final)</p>	<p>Decrease positive</p>	<p>None mentioned.</p>	<p><b>General comments:</b> Information on the source of the pollution incidents is missing, without that information it is difficult to decide the appropriate action required. Data for this indicator is available from 2001 but the data point selected is 2008, no rationale is provided for why this is the case.</p> <p><b>Status arrow issued:</b> The trend from 2008 to 2018 could be interpreted as stable rather than decreasing and positive. No information on the statistical significance of the change is presented.</p>
<p><b>B3</b> Water tests meeting good status (interim)</p>	<p>Stable</p>	<p>Our legal target is for 75% of surface waters to meet Good Ecological Status standard by 2027.<sup>37</sup></p>	<p><b>General comments:</b> The data in the Progress Report does not match the data in the OIF. The Progress Report presents data on surface waters whereas the OIF presents status of river water bodies in England as an interim indicator. No reference is provided for the source of data.</p> <p><b>Commitment:</b> The commitment is specific enough to measure progress against, however two slightly different commitments are made: ‘meeting Good Ecological Status standard by 2027’ (in the Water Framework Directive) and ‘as soon as practicable’ (in the 25YEP). Arguably the 25 YEP has softened this commitment, the WFD is a more specific, time bound commitment. More information should be provided on what Good Ecological Status standard is and why it should be met.</p> <p><b>Status arrow issued:</b> Trend arrow cannot be issued because the Progress Report does not present a trend. It only presents data from 2017. In addition, if a trend had been presented it would show a decrease in the proportion of surface water bodies awarded high or good ecological status since the indicator was first prepared in 2009. In 2018, 16% of surface water bodies assessed under the Water Framework Directive (WFD) were in high or good status compared with 25% in 2009 and 23% in 2013.<sup>38</sup> It is therefore difficult to justify how a stable arrow has been issued against this indicator.</p>

<sup>37</sup> EU Water Framework Directive 2000/60/EC

<sup>38</sup> Defra, *A strategy for England's wildlife and ecosystem services, Biodiversity Indicators: 2019 assessment* (2019) <https://www.gov.uk/government/statistics/england-biodiversity-indicators>

<p><b>B4</b> Condition of bathing waters (final)</p>	<p>Stable</p>	<p>None mentioned.</p>	<p><b>General comments:</b> This goal would benefit from data to show either the impact terrestrial activities are having on the marine environment, or provide a measure of marine environmental quality. Without this additional data a complete picture is not presented and it limits the usefulness of the data shown to assess changes in the environment. The data only provides a partial picture of the impact bathing waters has on humans.</p> <p><b>Status arrow issued:</b> A stable arrow is presented despite a positive increase since 1995, the arrow may have been issued on the last four years of trend data which has remained stable. This demonstrates how inconsistently the arrows have been issued.</p>
<p><b>B5</b> Water bodies achieving sustainable abstraction criteria (final)</p>	<p>Increase, positive</p>	<p>To increase the proportion of water bodies with enough water to support environmental standards to 90% for surface water bodies and 77% of ground water bodies by 2021.<sup>39</sup></p>	<p><b>General comments:</b> More information is required to interpret this data, it should be linked to goal four, '<i>reducing the risk from environmental hazards</i>' and goal seven, '<i>mitigating and adapting to climate change</i>'.</p> <p><b>Commitment made:</b> The commitment is specific enough to measure progress against, however it is difficult to assess if the commitment made is ambitious enough because no justification is provided for why only 77% of groundwater bodies and 90% of surface waterbodies should meet sustainable levels, a 100% target for both would seem more appropriate.</p> <p><b>Status arrow issued:</b> Surface water bodies with the required flow standards have increased by 2% since 2017 and ground water bodies have no change since 2017. It is confusing that a 2% increase over only two data points has resulted in a positive increase arrow, the statistical significance of this change should be included.</p>

<sup>39</sup> HM Government, *A Green Future: Our 25 Year Plan to Improve the Environment* (2018); <https://www.gov.uk/government/publications/25-year-environment-plan>

### 3. Thriving plants and wildlife

Indicator/metric used and data status	Status arrow issued	Commitment made	NCC comments on the suitability of the metric used
<p><b>C1</b> Clean seas: marine litter (interim)</p>	<p>Increase, negative</p>	<p>To achieve or maintain Good Environmental Status (GES) in our seas by 2020.<sup>40</sup></p>	<p><b>General comments:</b> It is not clear why this indicator has been used against the goal <i>‘thriving plants and wildlife’</i> a more suitable position for it would be against the goal eight, <i>‘minimising waste’</i>. The majority of the data available for this indicator, as presented in the OIF, has not been included in the Progress Report with no explanation as to why.</p> <p><b>Commitment made:</b> No information has been given on what <i>‘Good Environmental Status’</i> in our seas means and how this data relates to it. It seems unlikely with the scant data presented it will be possible to assess if Good Environmental Status has been achieved by 2020.</p> <p><b>Status arrow issued:</b> It is unclear if the arrow is linked to the commitment made.</p>
<p><b>C7</b> Healthy seas: fish and shellfish populations (interim)</p>	<p>No status</p>	<p>To achieve or maintain Good Environmental Status (GES) in our seas by 2020.<sup>41</sup></p>	<p><b>General comments:</b> Not enough information is presented to give an accurate measure of condition. There is more data available for marine which could have been included, the Progress Report only uses one indicator for marine wildlife which significantly underestimates the importance of the marine environment.</p> <p><b>Commitment made:</b> As above, no information is given on what <i>‘Good Environmental Status’</i> in our seas is and how this data relates to it. It seems unlikely with the scant data presented it will be possible to assess if Good Environmental Status has been achieved by 2020.</p> <p><b>Status arrow issued:</b> There is a general lack of data for the marine environment, the NCC supports the absence of a status arrow for this indicator.</p>

40 The Marine Strategy Regulations 2010: <http://www.legislation.gov.uk/uksi/2010/1627/contents/made>

41 The Marine Strategy Regulations 2010: <http://www.legislation.gov.uk/uksi/2010/1627/contents/made>

<p><b>D2</b> Extent and condition of protected sites – land, water and sea (interim)</p>	<p>Stable</p>	<p>Restoring 75% of one million hectares of terrestrial and freshwater protected sites to favourable condition.<sup>42</sup></p>	<p><b>General comments:</b> More data is available in the OIF which has not been used in the Progress Report. Further detail is required such as, the definition of favourable condition, which protected habitats are currently in favourable condition and how this compares to the rest of the land cover. In addition, the data presented on the condition of Sites of Special Scientific Interest is more appropriate for reporting against the target from Biodiversity 2020: ‘... at least 50% of SSSIs in favourable condition, while maintaining at least 95% in favourable or recovering condition’.<sup>43</sup> This target is missing from the Progress Report and government is not on track to meet it.</p> <p><b>Commitment made:</b> The commitment could be made specific enough to measure progress against if it was time bound. The commitment presented is not ambitious enough. It should be extended to all priority sites. The Progress Report only contains part of the commitments made in the 25 YEP. The 25 YEP included a commitment to increase the proportion of protected and well-managed seas. Although this is not specific enough to assess progress against it is disappointing that data and commitments on marine have not been included.</p> <p><b>Status arrow issued:</b> Although the data presents a stable trend it is difficult to see how a stable arrow is suitable when only 38.9% of Sites of Special Scientific Interest are in favourable condition, especially when compared to a commitment of 75%.</p>
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42 HM Government, *A Green Future: Our 25 Year Plan to Improve the Environment* (2018): <https://www.gov.uk/government/publications/25-year-environment-plan>

43 Defra, *Biodiversity 2020: A strategy for England’s wildlife and ecosystem services: Indicators* (2019):<https://www.gov.uk/government/statistics/england-biodiversity-indicators>

<p><b>D3</b> Area of woodland in England (final)</p>	<p>Increase, positive</p>	<p>Increasing woodland area in England in line with our aspiration of 12% cover by 2060.<sup>44</sup></p>	<p><b>General comments:</b> This data does not provide information on the quality or type of woodland, without this information the reader cannot judge if the woodland is benefiting the goal – ‘<i>Thriving plants and wildlife</i>’ or ‘<i>Mitigating and adapting to climate change</i>’. Incomplete picture presented.</p> <p><b>Commitment made:</b> The commitment made could be specific enough if more information was provided on whether government is on track to meet 12% from the current position of 10%. To reach the commitment of 12% by 2060 government has set a planting rate of 5,000 – 10,000 ha per year.<sup>45</sup> Annual planting rates from the Forestry Commission show that the 5,000ha target has not been reached every year from 2010 to 2018.<sup>46</sup></p> <p><b>Status arrow issued:</b> Government has missed its own planting targets for the last eight years therefore a positive, increase arrow should not have been issued.</p>
<p><b>D6</b> Abundance and distribution of priority species in England (interim)</p>	<p>Decrease, negative</p>	<p>None mentioned.</p>	<p><b>General comments:</b> More data is required to get an accurate picture of species trends, only presenting priority species is at best a partial picture. This trend data will mask important trends happening at the species level. Data on local / national extinctions and species near critical thresholds would be useful. The data used in the State of Nature 2019 report could have added to the richness of the picture presented.</p>
<p><b>D7</b> Species supporting ecosystem functions (interim)</p>	<p>Decrease, negative</p>	<p>None mentioned.</p>	<p><b>General comments:</b> The report fails to record the data as interim. This could leave readers interpreting pollinators as the only species which support ecosystem function. The text states that the trend is masking the trends of individual species, but no information is provided on whether this is significant or if presenting the overall trend is accurate.</p>

44 HM Government, *A Green Future: Our 25 Year Plan to Improve the Environment* (2018): <https://www.gov.uk/government/publications/25-year-environment-plan>

45 Defra, *Climate change: second national adaptation programme (2018 to 2023)* (2018): <https://www.gov.uk/government/publications/climate-change-second-national-adaptation-programme-2018-to-2023>

46 Forest Research, *Forestry Statistics and Forestry Facts & Figures* (2019): <https://www.forestryresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/>

#### 4. Reducing the risk of harm from environmental hazards

Indicator / metric used and data status	Status arrow issued	Commitment made	NCC comments on the suitability of the metric used
No data presented.		None mentioned.	<b>General comments:</b> It is surprising that only climate data has been used with nothing linking this to the risk from environmental hazards, especially given the flooding in winter 2019/20. Data is available which could be used against this goal. The data should be closely aligned with data presented for goal seven, 'Mitigating and adapting to climate change', to reflect the close linkages between these two goals. Resilience should be integral to any climate change related indicators.

#### 5. Using resources from nature more sustainably and efficiently

Indicator / metric used and data status	Status arrow issued	Commitment made	NCC comments on the suitability of the metric used
<b>E4</b> Efficiency of agricultural production measured by Total Factor Productivity (interim)	Increase, positive	None mentioned.	<b>General comments:</b> More indicators are presented in the OIF than have been used in the Progress Report. The data presented is not an appropriate environmental metric. There are trade-offs in land-use which are missing in the way the data is presented, for example, size of fields, removal of hedgerows and soil health/erosion should be presented alongside this data.  <b>Status arrow issued:</b> Comparing the data to 1973 is inappropriate, that is not a short term trend. Using a shorter trend would have resulted in a stable arrow being issued.
Resource productivity (no indicator)	Increase, positive	Maximising the value and benefits we get from our resources, doubling resource productivity by 2050. <sup>47</sup>	<b>General comments:</b> No information is provided on how resource productivity is linked to the environment. More data is required to give context, for example how many of the resources are non-renewables and overall stocks of resources.  <b>Commitment made:</b> No information is provided on what resource productivity is being doubled from so it will be impossible to measure if this commitment has been achieved or not.
<b>E5</b> Percentage of the annual growth of trees in English woodlands that is harvested (final)	Stable	None mentioned.	<b>General comments:</b> The amount of wood harvested is not related to the goal as it does not present information on sustainability or efficiency. More data is required, for example, area harvested relative to total forest area and relative to grown crop, and area of woodland in sustainable active management.

<sup>47</sup> HM Government, *Resources and Waste Strategy* (2018): <https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england>

<b>C10</b> Productive seas: fish and shellfish stocks safe and environmentally sustainable (interim)	Increase, positive	To achieve or maintain Good Environmental Status (GES) in our seas by 2020. <sup>48</sup>	<p><b>General comments:</b> The data presented shows a worrying amount of stocks which are being fished without information on maximum sustainable yield.</p> <p><b>Commitment made:</b> As above, no information is given on what Good Environmental Status in our seas is and how this data relates to it. It seems unlikely with the scant data presented it will be possible to assess if Good Environmental Status has been achieved by 2020.</p> <p><b>Status arrow issued:</b> The arrow issued is misleading, the data shows just over 33% are overfished and just over 17% have no data. This is a long way from where we should be so a positive arrow is inappropriate. The committee acknowledges that there data shows an increase since 1990 levels, however, since 2013 the trend has been stable.<sup>49</sup></p>
<b>J2</b> Raw material consumption (final)	Stable	None mentioned.	<p><b>General comment:</b> This indicator is not linked to the environment. More information is required to give this data context for example, what is the sustainable limit for raw material consumption, how is this related to the international footprint and what are the current stocks of raw materials.</p>

## 6. Enhancing beauty, heritage and engagement with the natural environment

Indicator / metric used and data status	Status arrow issued	Commitment made	NCC comments on the suitability of the metric used
<b>G4</b> Engagement with the natural environment (interim)	Increase, positive	More people, from all backgrounds, to engage with and spend more time in green and blue spaces in their everyday lives. <sup>50</sup>	<p><b>General comments:</b> Further indicators are available against this goal in the OIF – no explanation has been offered as to why these have not been used in the Progress Report. More data from the Monitor of Engagement with the Natural Environment (MENE) survey could be used.<sup>51</sup> This is a long running dataset and provides valuable insights into how the people engage with the environment, any changes to this dataset should aim to keep this continuity. Data should be included on how this links to wellbeing – this would contribute to the government's understanding of the importance of access to nature in the context of a green economic recovery.</p> <p><b>Commitment made:</b> The commitment should be made more specific, a baseline would assist in assessing what 'more' means.</p>

48 The Marine Strategy Regulations 2010: <http://www.legislation.gov.uk/uksi/2010/1627/contents/made>

49 JNCC, *UK Biodiversity Indicators 2019. Indicator B2 – Sustainable fisheries* (2019): <https://hub.jncc.gov.uk/assets/fd9c66ae-52c8-4e70-8253-6d6a1d23901e>

50 HM Government, *25 Year Environment Plan Progress Report: April 2019 to March 2020* (2020): <https://www.gov.uk/government/publications/25-year-environment-plan-progress-reports>

51 Natural England, *Monitor Engagement with the Natural Environment (MENE) 2020*: <https://www.gov.uk/government/collections/monitor-of-engagement-with-the-natural-environment-survey-purpose-and-results>

## 7. Mitigating and adapting to climate change

Indicator / metric used and data status	Status arrow issued	Commitment made	NCC comments on the suitability of the metric used
Emissions of greenhouse gases (no indicator)	Decrease, positive	To reduce greenhouse gas emissions by at least 100% of 1990 levels (net zero) by 2050. <sup>52</sup>	<b>General comments:</b> Data is presented against a baseline making it easy to interpret, however it would have benefited from being displayed in a graph to assist the reader in understanding how much action is needed to meet the fourth and fifth carbon budgets.
<b>A2</b> Emissions of greenhouse gases from natural resources (final)	Decrease, positive	None mentioned.	<b>General comments:</b> It is not clear from the indicator presented if the emissions are from natural resources or if the data is showing emissions by sector. Either way, emissions from fishing vessels does not seem to have been included. Context in the way of the targets / recommendations from the Committee on Climate Change (CCC) and carbon budgets would greatly assist the reader in assessing whether the reduction in these sectors is ambitious enough to reach net zero.  <b>Status arrow issued:</b> Although the majority of the emissions have reduced, agriculture has remained worryingly stable.
<b>D3</b> Area of woodland in England (final)	Increase, positive	Increasing woodland area in England in line with our aspiration of 12% cover by 2060. <sup>53</sup>	See comments above.
<b>J1</b> Carbon footprint and consumer buying choices (interim)	Decrease, positive	None mentioned.	<b>General comments:</b> Data presented provides a partial picture. Information on England's international carbon footprint would be more useful, especially when compared to efforts to reach net zero. Data comparing the two would measure actual carbon reduction rather than moving carbon consumption abroad.
<b>Climate Change Adaptation (no indicator)</b>	No trend	None mentioned.	<b>General comments:</b> Pointing the reader to the OIF is insufficient. Adaptation should run through all of the 25 YEP goals and data should be presented in the Progress Report. The CCC recommended in its 2019 report that adaptation is a pre-requisite to meeting most of the other 25 YEP goals. However, this issue also applies to the OIF where the resilience category fails to include most of the relevant resilience metrics. <sup>54</sup> Not one of the indicators in the Progress Report allows climate change impacts to be separated from other factors, and none measure the effectiveness of adaptation actions. This leaves a huge data gap in assessing how resilient and well adapted the environment is to climate change. The CCC's 2019 indicator list should have been used as appropriate. <sup>55</sup>

<sup>52</sup> *The UK Climate Change Act (2008)*: <http://www.legislation.gov.uk/ukpga/2008/27/contents>

<sup>53</sup> HM Government, *A Green Future: Our 25 Year Plan to Improve the Environment (2018)*: <https://www.gov.uk/government/publications/25-year-environment-plan>

<sup>54</sup> CCC, *Progress in preparing for climate change – 2019 Progress Report to Parliament (2019)*: <https://www.theccc.org.uk/publication/progress-in-preparing-for-climate-change-2019-progress-report-to-parliament/>

<sup>55</sup> CCC, *Progress in preparing for climate change – 2019 Progress Report to Parliament Appendix B (2019)*: <https://www.theccc.org.uk/publication/progress-in-preparing-for-climate-change-2019-progress-report-to-parliament/>



## 8. Minimising waste

Indicator / metric used and data status	Status arrow issued	Commitment made	NCC comments on the suitability of the metric used
<p><b>J3</b> Municipal waste recycling rates (interim)</p>	<p>Stable</p>	<p>Eliminating all avoidable waste by 2050 and all avoidable plastic waste by the end of 2042.<sup>56</sup></p> <p>To recycle at least 50% of household waste by 2020.<sup>57</sup></p>	<p><b>General comments:</b> A graph would have benefited the readers understanding of this data. It is difficult to relate the data presented to the two commitments, more information is required on if the recycling rate needs to reach 100% by 2024 to meet the ‘<i>avoidable plastic waste commitment</i>’.</p> <p><b>Commitment made:</b> Two commitments have been made, one is not specific enough to judge if progress has been made. For example, a definition is required for what ‘<i>avoidable</i>’ means and how much waste is currently avoidable. The data used can only assess progress against one which does not appear to be on track, the 18/19 recycling rate is 45%, 5% lower than the 2020 commitment of 50% by 2020.</p> <p><b>Status arrow issued:</b> Displaying a stable trend is misleading because the recycling commitment is not on track to be delivered by 2020.</p>
<p><b>J4</b> Residual waste arising by type and sector (interim)</p>	<p>Stable</p>	<p>Eliminating all avoidable waste by 2050 and all avoidable plastic waste by the end of 2042.</p>	<p><b>General comments:</b> The data presented is difficult to interpret and assess whether it is displaying a positive or negative trend against the commitment. Appropriate data should follow the waste hierarchy; reduce, reuse, recycle. Displaying the data of landfill and incineration misses the majority of the information related to waste and leaves the reader questioning what other action is being taken to ‘<i>minimise waste</i>’.</p> <p><b>Commitment made:</b> The data presented on landfill and incineration cannot be used against the commitment made.</p> <p><b>Status arrow issued:</b> The data shows a short term increase in waste going to incineration, no information is provided on whether this is good or bad for the environment or why this has happened. It is difficult to justify adding a stable arrow with the insufficient data presented.</p>

<sup>56</sup> HM Government, *Resources and Waste Strategy* (2018): <https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england>

<sup>57</sup> HM Government, *Resources and Waste Strategy* (2018): <https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england>

## 9. Managing exposure to chemicals

Indicator / metric used and data status	Status arrow issued	Commitment made	NCC comments on the suitability of the metric used
<p><b>H3</b> Emissions of mercury and persistent organic pollutants to the environment (no information)</p>	<p>Decrease, positive</p>	<p>Reduce remaining land based emissions of mercury to air and water by 50% by 2030.<sup>58</sup></p>	<p><b>General comments:</b> This indicator is listed as ‘not available for reporting in 2020’ in the OIF so it is unclear where this data has originated from. The context of the data should be included, for example the UK has signed up to the Stockholm Convention on Persistent Organic Pollutants (POPs) which has limits on the POPs which can be used but this has not been included. Following the Stockholm Convention POPs should have decreased so this data is at best showing a partial picture because it misses out other relevant chemicals which should be included against this goal.</p> <p><b>Commitment made:</b> The commitment is not specific enough to measure progress against, a baseline is required to know what a 50% reduction looks like. In addition, it is not ambitious enough as it misses out the many other chemicals which should be included against this goal.</p> <p><b>Status arrow issued:</b> The trend presented is obvious due to the legislation in place.</p>

<sup>58</sup> HM Government, *A Green Future: Our 25 Year Plan to Improve the Environment* (2018); <https://www.gov.uk/government/publications/25-year-environment-plan>

## 10. Enhancing biosecurity

Indicator / metric used and data status	Status arrow issued	Commitment made	NCC comments on the suitability of the metric used
<b>H1</b> Abatement of the number of invasive non-native species entering and establishing against a baseline (interim)	Increase, negative	Enhancing biosecurity to protect our native wildlife and livestock, and boost the resilience of our trees and plants. <sup>59</sup>	<b>General comments:</b> Interim indicator has been presented, the number of invasive species establishing fails to assess the impact this is having. The number of invasive species is likely to increase due to climate change and this data should be linked to goal 7, 'Mitigating and adapting to climate change'. <b>Commitment made:</b> The commitment is not specific enough to be measurable.
<b>H2</b> Distribution of invasive non-native species and plant pests and diseases (interim)	Increase, negative	Enhancing biosecurity to protect our native wildlife and livestock, and boost the resilience of our trees and plants.	<b>General comments:</b> Interim indicator has been presented, the number of additional tree pests and diseases becoming established in England within a rolling 10 year period. This implies there is a baseline number of tree pests and diseases but that information has not been presented. More data is available which has not been presented, for example, the number of plant pest and disease outbreaks and bee pest and disease outbreaks. More information is needed to gauge the impact the pests and diseases are having. <b>Commitment made:</b> The commitment is not specific enough to be measurable.

### v. The 25 YEP goals are not supported by clear, ambitious, quantified statutory targets and milestones.

The NCC reiterates its previous advice that reporting on progress is further compounded by lack of precision and ambiguity in the ten goals.<sup>60</sup> The Committee notes the inclusion of 'measurable commitments' against some of the goals. In most cases the commitment is not specific enough to measure progress against, for example of the 15 commitments included in the 'summary of indicators and commitments' table only 6 are specific enough:

- The goal 'Thriving plants and wildlife' is open to a wide variety of interpretations and 'Managing exposure to chemicals' fails to define which chemicals are included and whether these chemicals are harmful or not. It is also unclear whether the goal refers to human or environmental exposure.

- Against 'Emissions of five key air pollutants' the commitment box details that UK wide emission ceilings are in force but no information is provided on what these are hence the data presented cannot be compared to the emissions ceilings.
- The goal 'Thriving plants and wildlife' details a commitment from the Marine Strategy Regulations: 'to achieve or maintain Good Environmental Status in our seas by 2020' but no information is provided on what 'Good Environmental Status' is or how it is relevant to the data presented.
- When compared to the 2019 Progress Report some of the commitments have been amended to be less ambitious. For example, the following commitment: 'reduce fine particulate matter ( $PM_{2.5}$ ) concentrations so that the number of people living in UK locations above the World Health Organisation (WHO) guideline levels is reduced by 50% by 2025.'<sup>61</sup> The 2020 report fails to repeat this commitment and instead reports on a legal limit of  $25\mu\text{g}/\text{m}^3$  which reduces to  $20\mu\text{g}/\text{m}^3$  in 2020. The WHO limit is  $10\mu\text{g}/\text{m}^3$ .

<sup>59</sup> HM Government, *A Green Future: Our 25 Year Plan to Improve the Environment* (2018): <https://www.gov.uk/government/publications/25-year-environment-plan>

<sup>60</sup> NCC, *Response to the 25 Year Environment Plan progress report 2019* (2019) <https://www.gov.uk/government/publications/natural-capital-committee-advice-on-governments-25-year-environment-plan>

<sup>61</sup> HM Government, *25 Year Environment Plan Progress Report: April 2019 to March 2020* (2020): <https://www.gov.uk/government/publications/25-year-environment-plan-progress-reports>

## Limited coverage of existing commitments and targets

Some commitments and targets are missing from the Progress Report, despite them being set elsewhere, for example:

- The 25 YEP commits to ‘embed a ‘net environmental gain’ principle for development to deliver environmental improvements locally and nationally’;<sup>62</sup> this commitment is entirely missing from the ‘next steps’ section where biodiversity net gain is mentioned. The NCC reiterates its previous advice that environmental net gain should apply to nationally significant infrastructure and the marine environment.<sup>63</sup> Failure to include net environmental gain risks undermining the government’s current plans for a green recovery and allows developers to focus entirely on biodiversity rather than treat the environment as a system. The green recovery provides an opportunity to fully embed environmental net gain principles. Without urgent action there is a real danger of further environmental degradation of England’s terrestrial and marine ecosystems.
- The 2019 Progress Report commits to: ‘improving our approach to soil management: by 2030 we want all of England’s soils to be managed sustainably...’ and states that Defra will invest to develop soil metrics.<sup>64</sup> The 2020 Progress Report does not repeat or report on progress against these commitments, and the headline indicator: ‘Healthy soils’ in the OIF is still unavailable for reporting.
- Defra’s Clean Air Strategy targets are missing from the Progress Report, for example, the Clean Air Strategy states ‘our aim is to reduce emissions of PM2.5 against the 2005 baseline by 30% by 2020, and 46% by 2030.’ And ‘our aim is to reduce emissions of ammonia against the 2005 baseline by 8% by 2020 and 16% by 2030.’<sup>65</sup> The Progress Report mentions legal limit values and emissions ceilings but does not detail which emissions ceilings are in place.

## The need for more ambitious commitments

The Committee advises that, many of the commitments set out in the Progress Report are simply not ambitious enough to reverse years of environmental declines. For example:

- The Progress Report commits ‘to achieve or maintain Good Environmental Status in our seas by 2020’ as detailed in the Marine Strategy Regulations (2010).<sup>66</sup> The NCC advises that the targets and thresholds in Defra’s 2019 Marine Strategy part one lack ambition to improve the marine environment and instead simply maintain it in its current, poor condition.<sup>67</sup> The future high level objectives and criteria for measuring progress, the operational targets, indicators and thresholds bear no relation to natural capital asset assessment requirements for ensuring sustainability of ecosystem service flows or for natural capital accounting. There are no references or linkages in the document to the 25 YEP or to the Environment Bill. The NCC reiterates its previous advice that unless the environment is treated as a system and marine targets are included within the Environment Bill trade-offs and synergies will be missed.<sup>68</sup> There is a real risk that targets which benefit the terrestrial environment will negatively impact the marine environment, and as a consequence with public money will be spent on environmental degradation rather than improvement.
- The scope of the £640m Nature for Climate fund is too narrow. There are other aspects of the environment beyond peatland restoration and woodland creation which contribute to carbon storage, for example, other soils, marine, freshwater, wetlands and saltmarshes are all out of scope.<sup>69</sup> In addition, restoring 35,000ha of peatland when 22% is currently in good condition will result in a total of approximately 27%<sup>70</sup> of England’s peatlands being in good condition, a fraction of the Committee on Climate Change’s (CCC) recommended target to restore 50% of upland peat and 25% of lowland peat across the UK.<sup>71</sup>

62 HM Government, *A Green Future: Our 25 Year Plan to Improve the Environment* (2018) Page 33: <https://www.gov.uk/government/publications/25-year-environment-plan>

63 NCC, *The Natural Capital Committee’s response to Defra’s net gain commission* (2019): <https://www.gov.uk/government/publications/natural-capital-committee-advice-to-government-on-net-environmental-gain>

64 HM Government, *25 Year Environment Plan Progress Report: January 2018 to March 2019* (2019) Page 42: <https://www.gov.uk/government/publications/25-year-environment-plan-progress-reports>

65 Defra, *Clean Air Strategy* (2019): <https://www.gov.uk/government/publications/clean-air-strategy-2019>

66 The Marine Strategy Regulations 2010: <http://www.legislation.gov.uk/ukxi/2010/1627/contents/made>

67 Defra, *Marine strategy part one: UK updated assessment and Good Environmental Status* (2019): <https://www.gov.uk/government/publications/marine-strategy-part-one-uk-updated-assessment-and-good-environmental-status>

68 NCC, *State of Natural Capital Annual Report 2020* (2020): <https://www.gov.uk/government/publications/natural-capital-committees-seventh-annual-report>

69 NCC, *Advice on using nature based interventions to reach net zero greenhouse gas emissions by 2050* (2020): <https://www.gov.uk/government/publications/a-natural-capital-approach-to-attaining-net-zero-nature-based-interventions>

70 Calculated based upon a total of 682,201ha of English peatland provided in ONS estimates: <https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/uknaturalcapitalforpeatlands/naturalcapitalaccounts>

71 CCC, *Land use: Policies for a net zero UK* (2020): <https://www.theccc.org.uk/publication/land-use-policies-for-a-net-zero-uk/>

- The Progress Report details a commitment to *'increasing woodland area in England in line with our aspiration of 12% cover by 2060'*. Although this commitment appears at best to be aspirational, it has not been amended in line with the aim to achieve net zero by 2050 and no context is given on how this fits into UK forestry cover: the CCC recommends increasing UK forestry cover from 13% to 17% by 2050.<sup>72</sup> In addition, no information is provided on yearly woodland creation targets which have been set by Defra at 5,000-10,000ha per year.<sup>73</sup> Government has not met the 5,000ha per year target in any year from 2010 to 2018.<sup>74</sup>
- The NCC recommends that the OEP's remit is expanded so that the government must consider and respond to its advice on target setting and any revisions to interim and long term targets/EIPs. The NCC advises that without a direct role for the OEP, the ambition to significantly improve the environment could be softened in favour of other government priorities and lead to further stalling of progress in meeting the 25 YEP objectives, undermining public confidence in the government's green commitments.
- The current process for updating the 25 YEP and developing future EIPs in the Environment Bill should be strengthened. The wording of the Environment Bill does not explicitly link the evidence the OEP will present on annual progress to the EIPs. The NCC advises that this risks actions outlined in the EIPs being based on political, rather than environmental priorities.

### **Statutory interim / long term targets and role of the OEP**

In the absence of a number of statutory interim targets which are linked to clear long term legally binding targets, it is likely that the ten 25 YEP goals and all future EIPs will become aspirational. The NCC advises that there is a real risk of long term targets being missed or becoming disproportionately expensive to achieve should interventions be delayed. The amended and missed commitments and targets in the 2020 Progress Report clearly demonstrate the need for interim targets that are legally binding. The NCC recommends that in setting targets and determining the remit of the OEP, the government should:

- Include a general overall statutory duty to protect and improve the environment in the Environment Bill as a priority, with the OEP responsible for enforcement. The significant improvement test for targets, as described in the Environment Bill, is highly subjective and decided by the Defra Secretary of State. For example, improving part of the environment could be classed a significant improvement even while other natural assets may be declining.
- The 25 YEP is more ambitious than the EU Directive requirements, and the OEP's remit, budget and staffing should reflect this. The NCC is concerned that an under resourced OEP, without the powers to issue fines in the same way the European Commission currently can, or require that legislation is revised to meet environmental objectives significantly increases the risk of weaker environmental protections.

<sup>72</sup> CCC, Land use: Policies for a net zero UK (2020): <https://www.theccc.org.uk/publication/land-use-policies-for-a-net-zero-uk/>

<sup>73</sup> Defra, *Climate change: second national adaptation programme (2018 to 2023)* (2018): <https://www.gov.uk/government/publications/climate-change-second-national-adaptation-programme-2018-to-2023>

<sup>74</sup> Forest Research, *Forestry Statistics and Forestry Facts & Figures* (2019): <https://www.forestryresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/>



## 2. Natural capital framework for assessing progress against the 25 YEP

**The NCC has set out the main issues with the current 25 YEP reporting framework in the previous section, including the lack of a baseline, limited use of available data / natural capital asset based metrics and poorly defined goals. The Committee recommends a reporting framework underpinned by a natural capital approach for assessing progress against the 25 YEP. This framework will be applied to provide an independent assessment of progress in the Committee's final response and will form the basis for the OEP to undertake its statutory 25 YEP scrutiny function from 2021.**

The natural capital reporting framework is underpinned by three key building blocks, as follows:

- i) determine the core components of natural capital assets;
- ii) identify existing data sets related to these components, and
- iii) undertake an assessment of the state of natural capital/analysis of progress.

### **i) Determining natural capital assets and core components**

The NCC reiterates its previous advice that a robust set of metrics is critical to transparently and clearly measure the state of the environment.<sup>75</sup> The OIF has insufficient emphasis on the importance of the extent and condition natural capital assets (and pressures where appropriate) in achieving the ten 25 YEP goals. This is further compounded by the 25 YEP goals being poorly defined. In the absence of a clear definition for each goal it is not possible to assess progress. A similar issue exists for the four priority areas within the Environment Bill: for example, there is no definition for water.<sup>76</sup>

In order to comprehensively assess the state of the environment, a key first step is to identify the main natural assets and components for each of these assets. The approach taken to define natural capital assets and develop components follows the Committee's definition, in the paper '*Towards a framework for defining and measuring changes in natural capital*' (Table 4).<sup>77</sup> The NCC will publish a list of components for each of the natural capital assets against the 25 YEP goals in its final response due in October 2020.

Given the complexity of natural systems and the potential overlap of elements from these definitions, some assets should be consolidated together to avoid duplication. For example, species and ecological communities have been consolidated under the heading '*biota*', while coasts and oceans under the heading '*marine*'. Assets have also divided into abiotic and biotic elements (see Figure 4 below).

<sup>75</sup> Natural Capital Committee. *Annual Report 2019 Sixth Report to the Economic Affairs Committee of the Cabinet* (2019): <https://www.gov.uk/government/publications/natural-capital-committees-sixth-annual-report>

<sup>76</sup> The priority areas detailed in the Environment Bill are: i) air quality, ii) water, iii) biodiversity and iv) resource efficiency and waste reduction.

<sup>77</sup> NCC, *Working paper: Towards a framework for defining and measuring changes in natural capital (March 2014)*: <https://www.gov.uk/government/publications/natural-capital-committee-initial-term-working-papers-2012-to-2015>

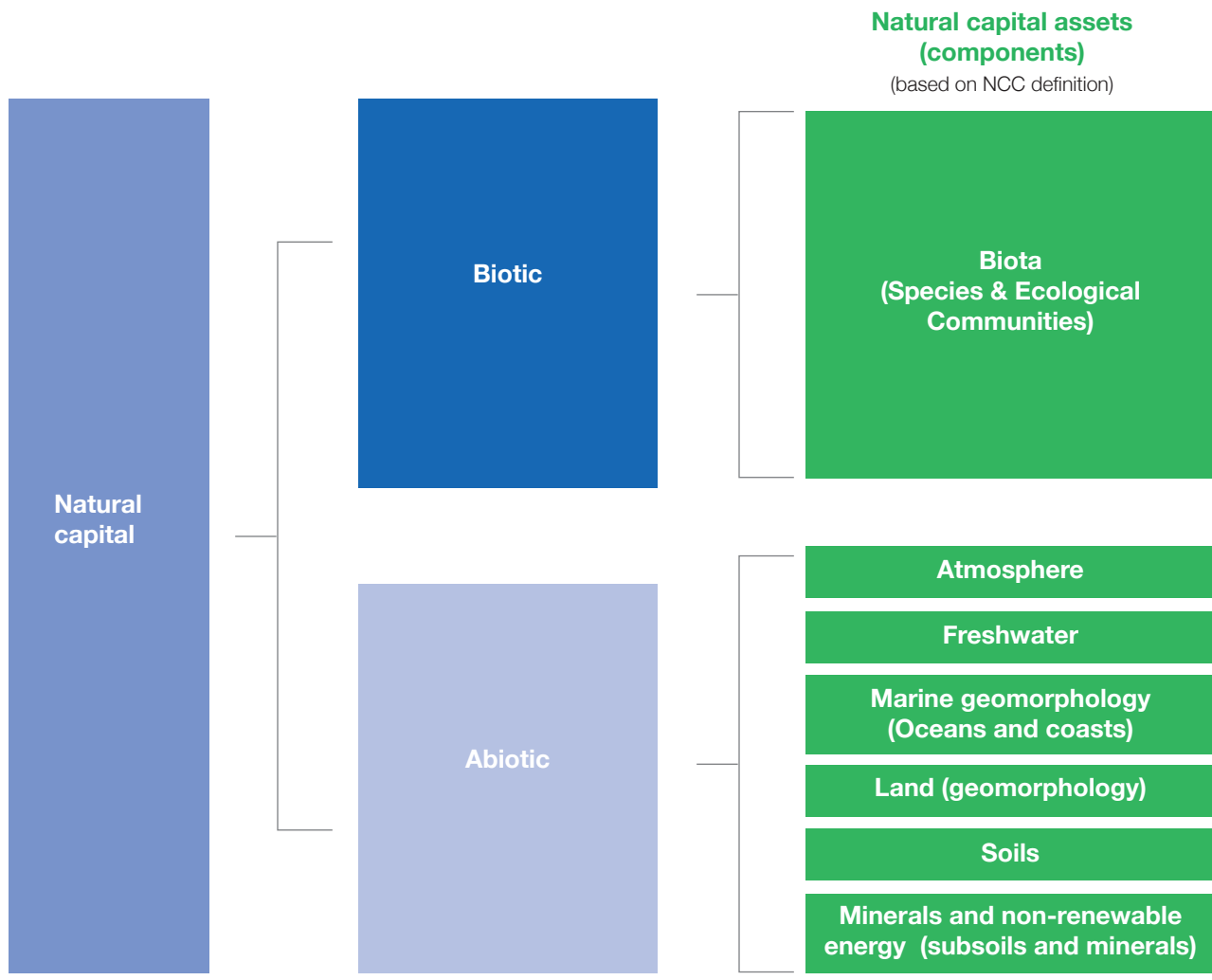
**Table 4: NCC definitions of natural assets, broad habitats, and goods**

<b>Natural Capital asset</b>	<b>Definition</b>
<b>Atmosphere</b>	The layer of gases surrounding Earth including oxygen, carbon dioxide and nitrogen used by all living organisms, and the processes which give rise to climate and weather.
<b>Freshwaters</b>	Freshwater bodies (rivers, lakes, ponds and groundwaters) and wetlands. This includes water, sediments, living organisms and the interactions between these.
<b>Oceans</b>	Saline bodies of water that occupy the majority of the Earth's surface. This includes water, sediments, living organisms and the interactions between these.
<b>Species</b>	All living organisms including plants, animals, fungi, and micro-organisms.
<b>Ecological Communities</b>	A group of actually or potentially interacting species living in the same physical environment e.g. wildlife habitats.
<b>Soils</b>	The combination of weathered minerals, organic materials, and living organisms and the interactions between these.
<b>Land</b>	The physical surface of the Earth and space for human activity. This includes the various landforms and processes which shape these (weathering and erosion).
<b>Sub-soil assets</b>	Other non-living substances in the Earth's crust including rocks and aggregates as well as non-mineral substances such as fossil fuels.
<b>Minerals</b>	Naturally occurring, non-living substances with a specific chemical composition formed by geologic processes.
<b>Coasts</b>	The transitional zone between land and oceans. This includes water, sediments, living organisms and the interactions between these.

Source: NCC 2014



**Figure 4: Natural capital asset components**



Source: NCC 2020

The seven natural capital assets groups need to be aligned with the ten goals in 25 YEP and the four priority areas outlined in the Environment Bill so this analysis can be used to track progress against the goals and targets (see Table 5 below). It is important to highlight that not all of the goals in the 25 YEP are based on asset extent or condition: four goals and one of the priority areas are pressured based.<sup>78</sup> In addition to mapping the natural capital components to the goals, these components have also been mapped to the UK National Ecosystem Assessment (NEA) habitat types for completeness.

<sup>78</sup> The goals identified in the 25 YEP as pressures are: goal seven, mitigating and adapting to climate change, goal eight, minimising waste, goal nine, managing exposure to chemicals and goal ten, enhancing biosecurity. The priority area which is a pressure is: resource efficiency and waste reduction.

**Table 5: Aligning NCC asset grouping with 25 YEP goals and Environmental Bill priority areas**

NCC asset grouping	Main 25 YEP goals	Environmental Bill priority areas	UKNEA broad habitats
Atmosphere (abiotic)	<p>Clean air Mitigating and adapting to climate change</p> <p><i>But will also cover:</i></p> <ul style="list-style-type: none"> <li>• Minimising waste</li> <li>• Managing exposure to chemicals</li> </ul>	<p>Air quality, Climate change act – carbon budgets, Resource efficiency and waste reduction</p>	
Freshwaters (abiotic)	<p>Clean and plentiful water</p> <p><i>But will also cover:</i></p> <ul style="list-style-type: none"> <li>• Minimising waste</li> <li>• Mitigating and adapting to climate change</li> <li>• Managing exposure to chemicals</li> <li>• Reducing the risks of harm from environmental hazards</li> <li>• Using resources from nature more sustainably and efficiently</li> </ul>	<p>Water, Resource efficiency and waste reduction</p>	<ul style="list-style-type: none"> <li>• Freshwater, wetlands, and floodplains</li> </ul>
Marine (abiotic)	<p>Mitigating and adapting to climate change</p> <p><i>But will also cover:</i></p> <ul style="list-style-type: none"> <li>• Minimising waste</li> <li>• Managing exposure to chemicals</li> <li>• Enhancing beauty, heritage</li> <li>• Engagement with the natural environment</li> </ul>	<p>Resource efficiency and waste reduction, Climate change act – carbon budgets, Resource efficiency and waste reduction, Water.</p>	<ul style="list-style-type: none"> <li>• Marine</li> <li>• Coastal margins</li> </ul>

<p>Biota (biotic)</p>	<p>Thriving plants and wildlife Enhancing biosecurity</p> <p><i>But will also cover:</i></p> <ul style="list-style-type: none"> <li>• Minimising waste</li> <li>• Managing exposure to chemicals</li> <li>• Mitigating and adapting to climate change</li> <li>• Using resources from nature more sustainably and efficiently</li> <li>• Enhancing beauty, heritage and engagement with the natural environment</li> </ul>	<p>Biodiversity</p>	<ul style="list-style-type: none"> <li>• Marine</li> <li>• Coastal margins</li> <li>• Semi-natural grassland</li> <li>• Farmland</li> <li>• Mountains, moorlands, and heaths</li> <li>• Urban</li> <li>• Woodland</li> <li>• Freshwater, wetlands, and floodplains</li> </ul>
<p>Soils (abiotic)</p>	<p>Mitigating and adapting to climate change</p> <p><i>But will also cover:</i></p> <ul style="list-style-type: none"> <li>• Minimising waste</li> <li>• Managing exposure to chemicals</li> </ul>		
<p>Land (geomorphology)</p>	<p>Enhancing beauty, heritage and engagement with the natural environment</p> <p>Reducing the risks of harm from environmental hazards</p>		
<p>Resources and non-renewable energy</p>	<p>Using resources from nature more sustainably and efficiently</p> <p>Minimising waste</p>		

Source: NCC 2020

## ii) Identifying existing datasets related to natural capital asset components

Existing datasets need to be scoped against the identified asset components to investigate if they can be used to assess the state of natural capital assets. The scoping process will be undertaken through an extensive desk literature review which assesses as many available datasets as possible to see if they measure the extent or condition of the assets. If a limited number of datasets are found, proxy datasets (e.g. data on emissions) could be used as a substitute to indicate changes in the condition and extent of the assets, where appropriate.

These scoped datasets will be consolidated to create a database covering all the seven natural capital asset groups as per Figure 4 above. For example, Figure 5 shows the components and measurements (datasets) which could be used to produce an indicative assessment of the freshwater asset condition and extent.

In addition to the desk literature review, engagement with relevant experts will be required to sense check the literature review and provide expert judgement. Experts from Defra, Arm's Length Bodies, other government departments and/or academia could be consulted.

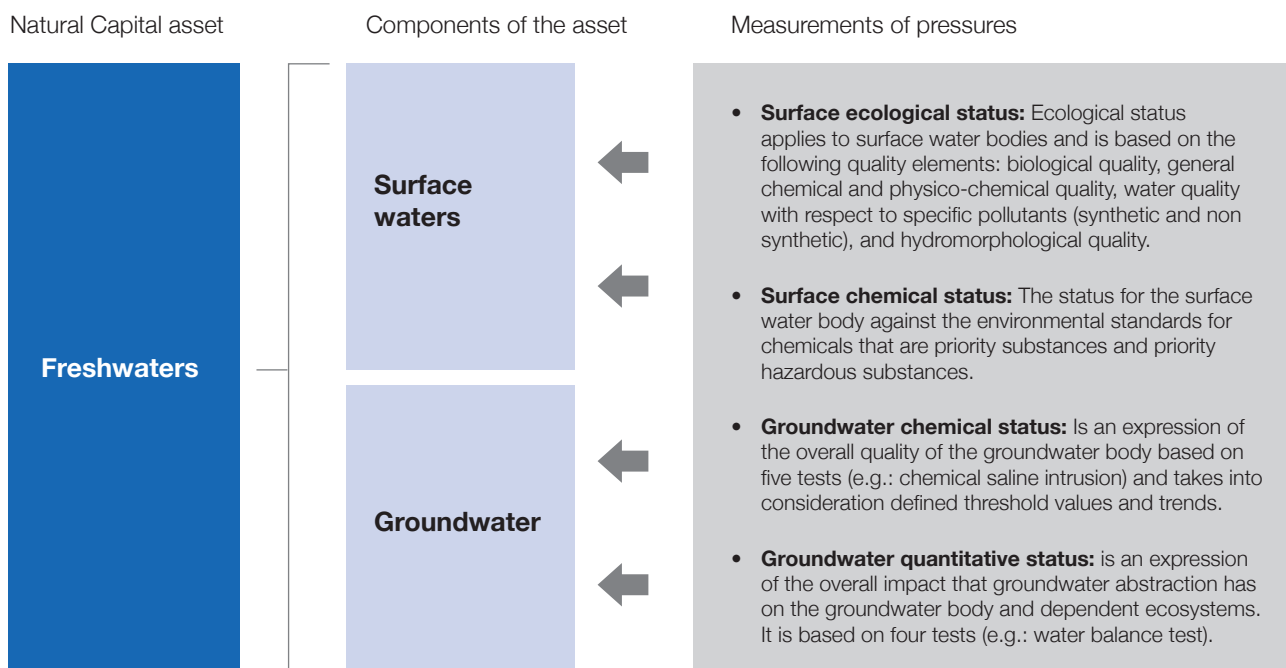
## iii) Assessment of the state of natural capital assets/analysis of progress

The next step is to undertake an assessment of the state of natural capital assets combining both the datasets gathered and expert judgement. Where possible, datasets will be assessed against an agreed starting position, or baseline. The NCC advises that this starting position should be 2011, when government first made the commitment to leave the environment in a better state for the next generation.

To present the status of each dataset, datasets should be given a rag rating (see Figure 6) ranging from no data being available to a comprehensive dataset presenting the condition and extent of a component of the asset.

If a partial picture is presented for the asset due to the limited number of datasets available then an assessment will be provided on how to fill data gaps. Proxy data which does not measure the extent or condition of assets will be replaced for asset data as soon as possible: assets being used unsustainably can still produce many flows and benefits.






**Figure 5: Freshwater asset components**



\* Surface waters here refers to: rivers, lakes, streams, canals, and transitional waters.

Source: NCC 2020

**Figure 6: RAG rating for the atmosphere metrics and datasets**

	No data
	Pressure data or asset proxy data
	Pressure data and asset proxy data
	Limited asset data
	Full asset data

Natural capital assets operate within a system. The components identified through this assessment can be used in an integrated systems based model. This will be integral to understanding and identifying the optimal interventions, and co-dependencies and co-benefits within and between natural capital assets.





# 3. Green economic recovery

**Following significant ‘fiscal rescue measures’ designed to address the immediate threats of bankruptcies, unemployment and poverty resulting from lockdowns due to COVID-19,<sup>79</sup> focus is now turning to ‘fiscal recovery packages’ aimed at helping economies recover as they exit lockdown. On 8 July the Chancellor of the Exchequer announced £30 billion of support for the UK economy.<sup>80</sup>**

The Chancellor’s Summer Statement includes funds to encourage job creation and protection, fund infrastructure projects and boost skills. Announcements included a £3 billion green investment package directed at improving the energy efficiency of buildings, and a £40 million Green Recovery Challenge Fund to help ‘create thousands of new jobs to kick-start the nation’s green recovery from the coronavirus pandemic’.<sup>81</sup>

The NCC advises that there is an urgent need to successfully integrate natural capital and the services it provides into future economic decision making. Recent evidence from the World Economic Forum highlights that \$44 trillion of economic value generation – over half the world’s total GDP – is potentially at risk as a result of business dependence on nature and its services.<sup>82</sup>

The NCC has consistently demonstrated the value-for-money gains to be made by taking a natural capital approach. This makes sound economic sense and provides significant opportunities for sustainable and resilient economic growth. Green projects such as those highlighted in previous NCC reports have some of the highest net benefits and should be prioritised in any green recovery plan.

## Recommendations

- 1. The government’s green recovery initiatives are at risk. The NCC advises that a joined up systems approach and integrated evidence base is needed to ‘build back better’ by enhancing the resilience of our natural capital assets in order to mitigate future shocks on both wellbeing and the economy. The impacts of COVID-19, climate change and biodiversity loss have demonstrated that future spending must account for systemic risks and take a joined up approach to securing natural capital resilience. The 25 YEP provides the basis for doing so.**
- 2. ‘Levelling up’ initiatives aimed at addressing regional disparities and inequalities are now – and should be – a priority for government. The NCC advises that this requires a move to a place-based, spatially responsive decision-making framework, to target spending in disadvantaged regions on more cost-effective nature-based interventions. Natural capital investments can often generate higher benefit-cost ratios (BCRs) than investments in built capital, providing huge opportunities for regions like the South West, for example, to adopt new strategies for not only recovering its economy, but also to ‘level it up’ with other parts of the UK.**
- 3. As the NCC has previously advised, nature based interventions can deliver carbon reductions at a fraction of the cost of engineered solutions and when delivered effectively can enhance the stocks of natural assets and the ecosystem services they provide.<sup>83</sup> However, delivering such interventions requires a joined up systems approach and integrated evidence base. Without this, initiatives to build back better risk focussing on particular issues such as carbon sequestration without considering the wider opportunities and trade-offs.**

79 Hepburn et al, *Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change* (2020), Forthcoming in the Oxford Review of Economic Policy 36(S1): <https://www.smithschool.ox.ac.uk/publications/wpapers/workingpaper20-02.pdf>

80 HMT, *A Plan for Jobs speech* (2020): <https://www.gov.uk/government/speeches/a-plan-for-jobs-speech>

81 Defra, *Government announces £40 million green jobs challenge fund* (2020): <https://www.gov.uk/government/news/government-announces-40-million-green-jobs-challenge-fund>

82 World Economic Forum, *The Future Of Nature And Business* (2020): [http://www3.weforum.org/docs/WEF\\_The\\_Future\\_Of\\_Nature\\_And\\_Business\\_2020.pdf](http://www3.weforum.org/docs/WEF_The_Future_Of_Nature_And_Business_2020.pdf)

83 NCC, *Advice on using nature based interventions to reach net zero greenhouse gas emissions by 2050* (2020): <https://www.gov.uk/government/publications/a-natural-capital-approach-to-attaining-net-zero-nature-based-interventions>

4. The NCC advises that efforts to maintain a stable food supply should avoid a narrow focus on productivity, driving instead towards the broader outcome of a resilient food supply chain which maintains the resilience of the natural capital assets upon which the food system depends. The NCC recommends that this can only be delivered through integrated systems level approach to maintaining our natural capital assets and the services they provide: *'tipping points'* in environmental systems do occur and they have a significant impact on agri-food systems.
5. The NCC advises that the evidence from the 2020 Progress Report indicates that current environmental spending is inefficient and siloed, targeting particular environmental outcomes irrespective of the other 25 YEP goals. This will lead to inefficiencies and perverse economic and environmental outcomes.
6. In response to the impact of COVID-19 on the economy, the NCC recommends that government should take full advantage of this opportunity to refocus, coordinate, and create a framework for spending on the environment at the system level. This should include:
  - Correct institutional frameworks including a catchment system operator, and greater coordination within and across regions. There should be a greater focus on joined up policy making across government, rather than continuing to operate in siloes at a departmental level and then expecting local authorities to create join up at the point of implementation. This includes cross-governmental implementation of and reporting on the 25 YEP, rather than producing a Defra led progress report with no view or critique of how various departments are integrating the 25 YEP into their plans.
  - A long term coordinated plan of investment and actions to deliver the required investment (including public and private sector commitments). For example, the National Infrastructure Commission needs to consider green / blue infrastructure alongside grey infrastructure. The plans need to be delivered through a systematic approach to deliver the highest benefits, capitalising on potential synergies between investments.
- Correct regulatory tools: the OEP should be given the resources and teeth to perform both its scrutiny and enforcement roles effectively; a statutory duty should be placed on the Chancellor to have regard to protecting and restoring our natural capital assets, in line with the 25 YEP, in order to ensure that these considerations are integrated across the budget; implement net environmental gain through the Environment Bill, to extend the statutory basis for natural capital thinking beyond the important but limited concept of biodiversity net gain.
7. The NCC recommends that green recovery spending should meet Green Book guidelines on how to appraise and evaluate policies, projects and programmes.<sup>84</sup> This adopts the Natural Capital framework, recognising the importance of stocks of natural capital assets in the assessment of sustainability. In 2020, the Committee provided further advice on the Green Book, seeking to integrate the natural capital approach into all public policy decisions. This includes a recommendation that the Regulatory Policy Committee (RPC) should have the option to 'Red Flag' a proposal where there is likely to be a net loss to natural capital or where policy options are unsupported by robust evidence of natural capital impacts (as currently happens with proposals that result in significant costs to business). The Committee has consistently demonstrated how investment in natural capital would yield far greater returns than those afforded by public spending elsewhere. Natural capital investments can even in some cases provide an alternative to built capital, providing services such as flood management more efficiently than conventional approaches relying on built capital, and with additional benefits. Wetland creation as a flood management investment can deliver BCRs as high as 9:1.

84 H.M. Treasury, The Green Book: Central Government Guidance on Appraisal and Evaluation (2018): <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>



**8. Private sector investment should be encouraged, including through requiring companies to:**

- **Develop and maintain an investment strategy for managing the natural capital assets which they rely on. The government should incentivise wider adoption and uptake of the corporate natural capital accounting framework outlined in the NCC's third Annual Report<sup>85</sup> and consider requiring provisions to be made for the maintenance of natural capital.**
- **Develop a risk register of natural capital for which they are responsible and use this to maintain its quality and quantity. Government should assign institutional responsibility for monitoring the state of natural capital.**

The following three sections cover: public and private sector returns to natural capital investment; levels of current environmental spending; and 'levelling up' initiatives.

## Public and private sector returns to investments in natural capital

Public spending projects that consider natural capital offer large benefit-cost ratios, in many cases larger than the benefit-cost ratios of traditional built capital investments, such as rail and road projects. In some cases, natural solutions can represent a more cost effective alternative way of providing what would otherwise be provided by built capital, while at the same time providing additional benefits.

Public sector investment in natural capital can take many forms, including the establishment of protected areas, government expenditure on environmental rehabilitation programmes (such as wetlands restoration), subsidies for sustainable agricultural and forest management, and investment in green infrastructure.<sup>86</sup>

A report commissioned by the NCC in 2015 examined several potential natural capital interventions, focusing on the six projects with the strongest economic evidence for investment at scale across England.<sup>87</sup> If all these projects were pursued, the total discounted benefits less the total discounted costs (the Net Present Value) would be between £3.6 billion and £10.2 billion. The benefits to society of these projects were found to outweigh their investment costs by two to three times, which compares favourably with other public-sector investments.

85 NCC, *Natural Capital Committee's third state of natural capital report* (2015): <https://www.gov.uk/government/publications/natural-capital-committees-third-state-of-natural-capital-report>

86 Globe, *Natural Capital: The new political imperative* (2010): [https://globelegislators.org/images/PDF/natural-capital/globe\\_natural\\_capital\\_case\\_studies.pdf](https://globelegislators.org/images/PDF/natural-capital/globe_natural_capital_case_studies.pdf)

87 Eftec, *The Economic Case for Investment in Natural Capital in England* (2015) <https://www.gov.uk/government/publications/natural-capital-committee-research-investing-in-natural-capital>

**Table 6: Net present value estimates of natural capital investment**

Natural capital asset	NPV over 50 years, £m, 2020 prices	
	Low estimate	High estimate
Upland peatland	622	622
Demersal fish (cod)	956	5,223
Shellfish (lobster and crab)	137	137
Saltmarsh	811	811
Wetland	705	3,001
Woodland	393	393
<b>Total</b>	<b>3,623</b>	<b>10,191</b>

The net benefits of each of these projects are presented in Table 6, having been converted from the 2014 price base used in the report.

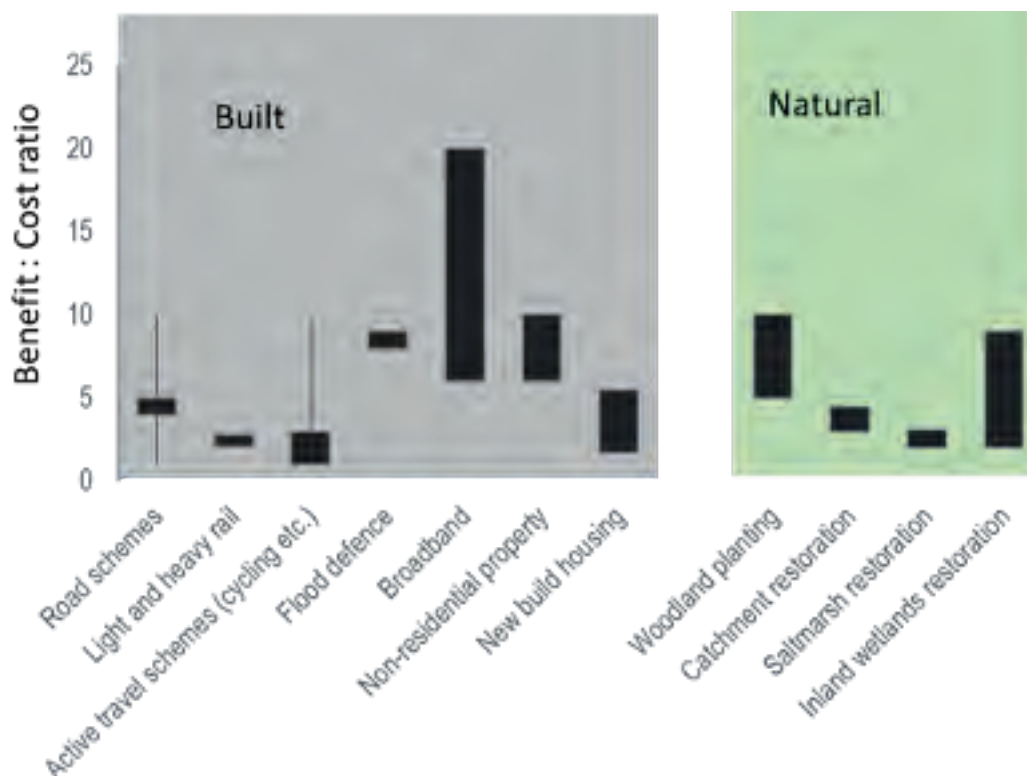
Investments in natural capital compare favourably against benchmarks used to assess investments in built capital. Recent evidence,<sup>88</sup> building on the above analysis together with information from the NCC's 2015 annual report,<sup>89</sup> compared the benefit-cost ratios (BCRs) of natural capital investment projects against typical BCRs from major investments in built capital, as displayed in Figure 7. For example, potential investments in natural assets such as woodlands and wetlands deliver better BCRs than potential investments in almost all types of built capital (with the exception of broadband).

Furthermore, investing in natural capital is not just worthwhile as a complement to investments in built capital: in some cases, it can even replace traditional infrastructure projects and achieve results more efficiently.

88 Bateman, I.J. and Mace, G.M., *The natural capital framework for sustainable, efficient and equitable decision making* (2020): <https://www.nature.com/articles/s41893-020-0552->

89 NCC, *The state of natural capital: protecting and improving natural capital for prosperity and wellbeing* (2015): <https://www.gov.uk/government/publications/natural-capital-committees-third-state-of-natural-capital-report>

**Figure 7: Estimated benefit to cost ratios for potential large-scale investments in built and natural assets in the UK. All estimates include market and non-market benefits and costs.<sup>90</sup>**



'Green infrastructure' refers to environmental assets (such as forests) that provide services such as flood defence and water quality regulation that would otherwise require costly investments in built capital ('grey infrastructure'), such as water treatment facilities. The National Planning Policy Framework, which sets out the Government's planning policies for England, refers to the important role of green infrastructure.<sup>91</sup>

One example of green infrastructure being used to provide services that are typically provided by grey infrastructure is the Norfolk Rivers Trust's wetland water treatment facility.<sup>92</sup> In this example, used but treated water will pass through a constructed wetland to be filtered further and cleaned, before joining the River Ingol. The natural filtration provided by the wetland achieves the same high standards as the expensive built capital that would conventionally be employed. Unlike this carbon-intensive conventional equipment, the wetland has huge benefits for biodiversity, providing habitat for breeding birds, amphibians, bats, and water voles.

Wetlands can also deliver benefits in the form of natural flood management, by increasing water storage and infiltration in the landscape. Analysis undertaken by the NCC for wetland creation – particularly in areas of suitable hydrology, upstream of major towns and cities, and avoiding areas of high-grade agricultural land – BCRs of 3:1 would be typical, with 9:1 possible in some cases.<sup>93</sup>

Promoting the health of an ecosystem in order to increase one of the services it provides, such as flood defence, often increases the provision of many other ecosystem services. Human interaction with the natural environment can reduce stress levels and increase physical activity, generating significant mental and physical health benefits,<sup>94</sup> not only benefitting the individuals concerned but the wider economy. These benefits are enhanced by projects that expand green and blue spaces. These auxiliary benefits, together with green infrastructure's efficacy and low costs, explain its impressive BCRs.

<sup>90</sup> Reproduced with permission from Bateman, I.J. and Mace, G.M., *The natural capital framework for sustainable, efficient and equitable decision making* (2020): <https://www.nature.com/articles/s41893-020-0552-3>

<sup>91</sup> Ministry of Housing, Communities and Local Government, *National Planning Policy Framework* (2019): [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/810197/NPPF\\_Feb\\_2019\\_revised.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf)

<sup>92</sup> Catchment Based Approach, (accessed 2014): <https://catchmentbasedapproach.org/learn/norfolk-rivers-trust-create-wetland-water-treatment-facility-for-anglian-water/>

<sup>93</sup> NCC, *Natural Capital Committee's third state of natural capital report* (2015): <https://www.gov.uk/government/publications/natural-capital-committees-third-state-of-natural-capital-report>

<sup>94</sup> *Nature and Health. The influence of nature on social, psychological and physical well-being*, Health Council of the Netherlands (2004): <https://www.healthcouncil.nl/documents/advisory-reports/2004/06/09/nature-and-health.-the-influence-of-nature-on-social-psychological-and-physical-well-being>



Improvements to natural capital are not only worthwhile from the perspective of government, which takes into account benefits to society at large. Actions that reverse the decline in natural capital can be lucrative for private companies seeking to cut their own costs. For example, recent analysis demonstrates the potential for both environmental enhancement and private-sector cost savings in the delivery of catchment services such as water quality, water resources, and flood management services.<sup>95</sup> Improving the coordination between the existing investments of the private companies responsible for these services would lead to environmental improvements with the benefits of increased biodiversity and better recreation opportunities, alongside generating cost savings for those private companies.

The specific changes that would be required to improve coordination between providers of catchment services would vary significantly between catchments, depending on the current state of environmental and economic regulation. The report estimated that across the UK, this improved coordination could generate £216 million of cost savings for the private companies providing catchment services.

<sup>95</sup> Vivid Economics, *The Outline Business Case for a Natural Environment Impact Fund* (2018) <https://www.environmentalfinance.co.uk/wp-content/uploads/2019/04/Defra-Natural-Environment-Impact-Fund-Business-Case-June-2018.pdf>

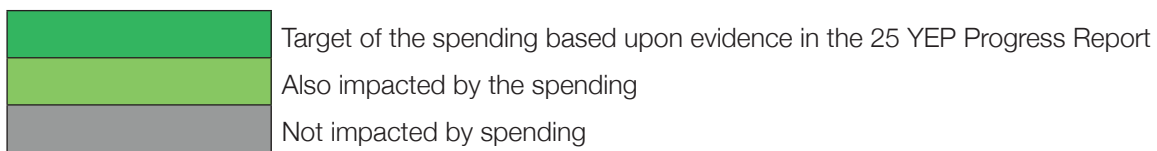
## What is the current investment in environmental improvements?

The following table considers the four amounts of funding highlighted by the Government in its 2020 Progress Report. Each of these amounts was mentioned as evidence of government's commitment to just one of the 25 Year Environment Plan goals. The Table 7 demonstrates that these interventions will also have impacts across many other goals.

The table is by no means a comprehensive review of the government's environmental funding. These four funding commitments were examined for illustrative purposes given that they were highlighted by government in the Progress Report.

**Table 7: Government funding presented in the 25 YEP Progress Report**

	1. Clean air	2. Clean and plentiful water	3. Thriving plants and wildlife	4. Using resources from nature more sustainably and efficiently	5. Reducing the risk of harm from environmental hazards	6. Enhancing beauty, heritage and engagement with the natural environment	7. Mitigating and adapting to climate change
<b>Nature Recovery Network</b> Up to £25 million next year							
<b>Flood defence spending</b> Doubling to £5.2 billion over six years, and £200 million place-based resilience programme							
<b>Woodland Carbon Guarantee</b> £50 million							
<b>Nature for Climate Fund</b> £640 million							



8. Minimising waste	9. Managing exposure to chemicals	10. Enhancing biosecurity
[Grey]	[Grey]	[Green]
[Grey]	[Grey]	[Green]
[Grey]	[Grey]	[Green]
[Grey]	[Grey]	[Green]

The NCC advises that the evidence from the 2020 Progress Report indicates that current environmental spending is inefficient and siloed, targeting particular environmental outcomes irrespective of the other 25 YEP goals. This will lead to inefficiencies and perverse economic and environmental outcomes. Taking an integrated approach that accounts for each policy's impacts across the natural environment is crucial not only to avoid unintended negative consequences, but also to realise fully the potential benefits of spending in each area.

For example, it is vital that the £5.2 billion to be spent on flood defences considers the potential for simultaneous improvements to natural beauty, climate change mitigation, and other 25 YEP goals. Not taking full account of these interdependencies would risk forgoing potential co-benefits. The NCC welcomes the attention given to nature-based solutions by the government's recent *Flood and coastal erosion risk management* policy statement.<sup>96</sup> The NCC would encourage government to further consider natural measures as a component in not just some but all flood defence schemes, prioritising interventions that deliver the most benefits when assessed through the integrated framework of the 25 YEP.

The NCC's assessment of the 25 YEP Progress Report finds limited evidence that the environmental spending announced in the report is being delivered through the integrated 25 YEP framework for environmental improvement, underpinned by evidence on its impact on the full range of natural capital assets which the 10 goal areas represent. Indeed, despite a huge £5.2 billion allocated to flood defence spending, the Progress Report includes no data against goal 5, 'reducing the risk of harm from environmental hazards', and no target is included for this goal.

In order to deliver the most benefits, the NCC recommends that interventions arising from such funding allocations must draw on evidence to assess the wider, system level impacts.

<sup>96</sup> Defra, *Flood and coastal erosion risk management: policy statement* (2020): <https://www.gov.uk/government/publications/flood-and-coastal-erosion-risk-management-policy-statement>

## Green recovery in practice – applying an integrated 25 YEP framework for environmental improvement

### *A joined up approach?*

The impact of COVID-19 on the economy provides an opportunity to reassess, recalibrate, and target spending in disadvantaged regions on more cost-effective nature-based interventions. This would create jobs and drive resilient economic growth.

The NCC is concerned that the drive towards economic recovery following COVID-19 is likely to present many opportunities for prioritising growth ahead of strengthened environmental protections – as evidenced by the huge fiscal packages already delivered unconditionally to aviation.<sup>97</sup> The NCC advises that focus on an economic recovery combined with the consequences of EU-Exit are likely to result in rapid reforms across government and regulation with consequences for the environment (e.g. planning system reforms, cutting red tape for infrastructure, food supply chain reforms etc.).

From the health and wellbeing implications of limited access to nature through to sharp improvements in air quality during lockdown, the importance of nature as a public benefit has been clearly exemplified by recent events (see Box 1). The economic impact of COVID-19 has highlighted the linkages between the economy, wellbeing and the natural environment by heightening issues such as inequality, regional disparity and environmental degradation which interact across all three.

The degradation of the natural world increases the risks from pandemics, climate change, and biodiversity loss; hence measures to restore and protect our natural environment will reduce those risks and increase resilience to their effects. The fundamental connection between healthy, productive communities and thriving ecosystems has been laid bare not only by the impacts of COVID-19, but also by evidence on the longer term threats from climate change and biodiversity loss.<sup>98</sup>

This presents huge opportunities to drive green economic recovery through the 25 YEP framework outlined in the first part of this report. Despite this, policy aimed at addressing these challenges remains siloed, with a failure to account for their impacts across our social, economic and environmental systems leading to increased inequalities and environmental degradation. Without a joined up systems approach and integrated evidence base, initiatives to build back better risk focussing on particular issues such as carbon sequestration without considering the wider impacts and trade-offs.

The NCC advises that any plans for a green recovery should be framed in terms of ensuring that environmental considerations in their entirety, as articulated in the 25 YEP, are fully embedded into economic activity now and recovery post COVID-19. This framing should be applied to all aspects of the economy and the opportunities provided: manufacturing; finance; supply chains; national and local government spend; national and local government estate; housing; infrastructure; transport; the nature of work e.g. travel, offices business trips etc.; retail; entertainment; service industries etc. This extends beyond actions to protect and improve the natural environment, although these will of course be a fundamental component.

<sup>97</sup> Bank of England, Results and Usage Data (accessed July 2020): <https://www.bankofengland.co.uk/markets/bank-of-england-market-operations-guide/results-and-usage-data>

<sup>98</sup> RSPB, *resilient economic* (2020): <https://www.rspb.org.uk/about-the-rspb/about-us/media-centre/press-releases/nature-and-a-green-recovery-from-covid-19/>

## Box 1: A joined up approach to managing natural capital for health and wellbeing

### Air pollution under COVID-19 and net zero

Urban air quality is the top environmental risk factor for premature deaths in Europe. It causes an estimated 40,000 premature deaths a year and reduces productivity, which together costs the economy at least £20 billion per annum.<sup>99</sup>

Two recent reports from the Defra Air Quality Expert Group provide evidence demonstrating the impacts of both short term change, in this case the COVID-19 outbreak, and longer term interventions proposed under the Committee On Climate Change's net zero strategy. Considered together the evidence demonstrates that although the Transport plan issued earlier this year was a step in the right direction, an integrated evidence base is essential to determine the effects of policy interventions across the board on our natural capital assets. Even looking only at the atmosphere, perhaps the most effectively and thoroughly monitored of our natural assets, an integrated systems based approach to decision making is clearly needed to determine the correct actions to take for improvement. Air pollution poses different challenges and health risks depending on location and circumstance, and interventions have a range of costs and benefits such that the full range of options must be considered.

Defra Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK (2020):

- *'There have been significant changes in the emissions of air pollutants from several sectors, but, with the exception of the transport sector which showed a marked decrease, availability of activity and emissions data for the lockdown period is still limited.'*
- *'The most pronounced changes in UK air quality during lockdown have been in the urban environment, notably for nitrogen oxides (NOx). Meteorological conditions have led to higher PM<sub>2.5</sub> during lockdown than the average experienced in equivalent calendar periods from previous years. Changes to population exposure to air pollution are variable and more uncertain than estimates of changes in ambient concentrations. Some urban locations have seen significant falls in NO<sub>2</sub>, and wider working from home has reduced travel exposure more generally in cities. In London, initial estimates of reduction 9 in PM<sub>2.5</sub> exposure compared to business-as-usual are in the range 5-24% depending on factors such as commuting mode.'*<sup>100</sup>

Defra Air Quality Expert Group, Impacts of Net Zero pathways on future air quality in the UK:

- *'Air pollution has immediate adverse health effects on the communities where it is experienced, and care is needed to ensure that during the transition to 2050, air quality impacts are considered and minimised. For example, major low-carbon infrastructure projects have the potential to create localised air quality problems during their development, whilst the use of transitional fuels may cause pollution to rise temporarily in some locations.'*
- *'Decarbonisation of the road and rail transport fleet will bring very significant air quality benefits, reducing NOx and VOCs in cities. However, whilst primary PM emissions from engine and vehicle exhausts will decrease, PM from friction and abrasion (e.g. tyre and brake wear and resuspension of dust) will remain. Clean transport options within the Net Zero strategy, such as walking, cycling and public transport are integral to delivering optimal air quality benefits.'*

99 NCC, *Natural Capital Committee's third state of natural capital report* (2015): <https://www.gov.uk/government/publications/natural-capital-committees-third-state-of-natural-capital-report>

100 Defra Air Quality Expert Group, *Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK* (2020): [https://uk-air.defra.gov.uk/library/reports.php?report\\_id=1005](https://uk-air.defra.gov.uk/library/reports.php?report_id=1005)

- 'There are positive reinforcing interactions between sustainable and lower greenhouse gas food production and improved air quality, particularly associated with reduced ammonia emissions from the agricultural sector. Lower ammonia emissions arising from lower farmed animal numbers, better fertiliser use practises, and improved waste management, may in combination with reductions from other sectors, lead to lower PM in both the urban and rural environment. Decreased nitrogen deposition to ecosystems would be a further benefit. Reductions in methane emissions from agriculture in the UK would have only modest impact on surface O<sub>3</sub> in the UK but would contribute positively to wider global improvements.'
- 'Widespread forest planting and an increased role for biofuel crops means the potential impacts of natural (biogenic) emissions of VOCs should be considered. Increased emissions of VOCs can lead to growth in surface O<sub>3</sub> once mixed with NO<sub>x</sub> that has been emitted from other sectors. Selection of low-emitting plant and tree species should be a key factor in the design of future land-use and bioenergy policies and should be considered in the Defra 'Tree Strategy', currently in preparation. Attention should also be paid to potential changes in soil NO<sub>x</sub> and nitrous oxide (N<sub>2</sub>O) emissions associated with any large-scale change in land cover.'<sup>101</sup>

### **Green spaces, access to nature and human health**

It is clear from the evidence that clean transport options within the Net Zero strategy, such as walking, cycling and public transport are integral to delivering optimal air quality benefits. These also offer additional solutions to some further issues highlighted by the COVID-19 outbreak: noise pollution and access to nature. A joined up national network of safer pedestrian and cycling access routes to provide access to enhanced green spaces offers an opportunity to address these issues, with huge wellbeing and health benefits as demonstrated by the NCC in its 2014 Annual report:

- Today's higher population density in urban areas means that the provision of good quality, accessible and safe urban green space is critical. As over 80% of England's population now lives in urban areas, accessible nearby urban green infrastructure is vital to our nation's wellbeing. A range of studies<sup>102</sup> have shown that living close to green space has a positive influence on a number of general health indicators (including perceived health, stress and disease morbidity).
- Green space supports physical and mental health; it improves air quality, reduces the urban heat effect arising from the built infrastructure, captures and stores carbon, provides habitat and food for wildlife, and reduces flood risk. A major challenge for policy-makers and planners is that not everyone has access to good quality greenspace.
- The provision of green space encourages higher physical activity levels, but this is just one of the health benefits from such areas. Approximately 7m people in England have been diagnosed with mental illness.
- Research in the UK has shown that dissatisfaction with local green space is associated with poorer mental health while participation in green space exercise programmes has been shown to improve confidence, self-esteem and mood. Moving closer to a green space appears to have a long-lasting positive effect on mental health. While it is important to scrutinise the causal claims in this evidence carefully, these effects are likely to be accompanied by substantial economic benefits.
- Natural England estimate that if every household in England were provided with equitable access to good quality green space, then savings of £2.1bn could be achieved every year in averted health costs.<sup>103</sup>

<sup>103</sup> NCC, *Natural Capital Committee's third state of natural capital report* (2015): <https://www.gov.uk/government/publications/natural-capital-committees-third-state-of-natural-capital-report>



## Applying a natural capital approach to support the levelling up agenda

The economic shock of COVID 19 has hit some areas harder than others, and it is the places with least resilience (including those with high levels of deprivation) which will find it hardest to recover.<sup>104</sup> ‘Levelling up’ initiatives aimed at addressing regional disparities and inequalities is now – and should be – a priority for government.

The NCC advises that this requires a move to a place-based, spatially responsive decision-making framework. The following case study sets out the case for using a Green Recovery strategy to implement the Levelling Up policy illustrating this through the exemplar provided with the South West region – an area which is a recognised as significantly economically disadvantaged compared to many other regions of England.

A recent review of the economic impacts of the Coronavirus pandemic on the South West<sup>105</sup> confirms that the region is in the midst of a profound economic shock, and that the economic impact here is amongst the most severe of all places. The immediate impact is expected to be around a 35% loss of output, but focused disproportionately on coastal and rural areas where there is a greater reliance on the hardest hit sectors.<sup>106</sup> There are therefore huge opportunities for the South West to adopt new strategies for not only recovering its economy, but also to ‘level it up’ with other parts of the UK. Prior to COVID-19 regional policymakers had already identified the natural environment as a key driver of prosperity and wellbeing, with regional development strategies around environmental, clean and inclusive growth.<sup>107,108,109</sup>

The South West Partnership for Environment and Economic Prosperity (SWEEP) is a £5 million, 5-year programme funded by the National Environment Research Council (NERC), which connects a wealth of academic expertise within the Universities of Exeter, Plymouth and Plymouth Marine Laboratory with a large group of highly-engaged regional businesses, policy makers and community partners. Table 8 displays some examples of where SWEEP has been working to support the adoption of natural-capital led strategies and investments.

104 Energy and Climate Unit, *Sealing the ‘Red Wall’* (2020): [http://ca1-eci.edcdn.com/reports/ECIU\\_Sealing\\_the\\_red\\_wall.pdf](http://ca1-eci.edcdn.com/reports/ECIU_Sealing_the_red_wall.pdf)

105 University of Exeter, *Review of the economic impacts in the Heart of the South West and Cornwall & the Isles of Scilly LEP areas*, (2020) <https://www.exeterchamber.co.uk/blog/2020/05/06/review-of-the-economic-impacts-in-the-heart-of-the-south-west-and-cornwall-the-isles-of-scilly-lep-areas>

106 Heart of the South West Local Enterprise Partnership, *COVID-19 Route Map to Recovery* (2020) <https://heartofswlep.co.uk/wp-content/uploads/2020/06/Heart-of-the-SW-C-19-Route-Map-to-Recovery-June-2020.pdf>

107 Heart of the South West Local Enterprise Partnership, *Local Industry Strategy Progress Statement* (2019) <https://heartofswlep.co.uk/growing-our-economy/local-industrial-strategy/>

108 Cornwall & Isles of Scilly Local Enterprise Partnership, *The natural place to grow great business: Economic Growth Strategy for Cornwall & Isles of Scilly 2012 – 2020* (2012) [https://www.cioslep.com/assets/file/LEP\\_Strategy\\_Document\\_2012-2020.pdf](https://www.cioslep.com/assets/file/LEP_Strategy_Document_2012-2020.pdf)

109 Cornwall & Isles of Scilly Local Enterprise Partnership, *Vision 2030* (2018) <https://www.cioslep.com/vision/vision-2030>

**Table 8: examples of the adoption of natural-capital led strategies and investments under SWEEP**

Marine Natural Capital	Pioneering the natural capital approach, how it can be applied to the marine environment, and particularly to assess trade-offs and value for money in monitoring, protection and rebuilding of marine assets.  SWEEP has developed natural capital assessment tools and approaches for integrated decision-making and environmental progress assessments that support DEFRA’s Marine Pioneer programme and 25 Year Environment Plan.
Mainstreaming Environmental Growth in Cornwall	Development of a suite of natural capital mapping, opportunity and prioritisation tools to inform land-use planning and provide increased opportunities for targeting investment.  SWEEP has been working closely with Cornwall Council on their flagship Environmental Growth Strategy for 2015-2065, which aims to ensure that Cornwall increases the amount and quality of environmental goods and services for the benefit of everyone by encouraging businesses, communities and individuals to work together.
Whole Catchment Approach to Water Management	Development of an integrated and spatially-explicit understanding of catchment scale processes that impact water-based natural capital, economic development and wellbeing in the South West.
Protecting and enhancing the use of the South West Coast	Development of an operational real-time storm impact model that improves the level of detail and accuracy for predicting coastal flooding and other coastal hazards.
Managing Green Space and Horticulture for Pollinators and People	Implementation of a co-ordinated approach to grassland management across Cornwall to increase natural capital and ecosystem service provision for the benefit of people, business crops and wildlife.





## Net zero – nature based interventions

As the NCC has previously advised, nature based interventions can deliver carbon reductions at a fraction of the cost of engineered solutions and when delivered effectively can enhance the stocks of natural assets and the ecosystem services they provide.<sup>110</sup> However, the use of nature based interventions is not an alternative to a major systemic reduction of carbon emissions across all sectors. The government should develop a holistic strategy to reach net zero, which should include changes in energy, transport, housing, infrastructure, industry and land / sea use.

The price of carbon should factor for the ten natural capital based 25 YEP goals and externalities. This is the only way to make sure that the price of carbon is not valued above other services / public goods that nature provides. As the below case study demonstrates, the only way to ensure that these services are accounted for and delivered, and perverse outcomes avoided, is through an integrated systems based approach.

### Case study: Delivering value for money from new woodland planting.

The case study shown in Box 2 (adapted from NCC 2014)<sup>111</sup> concerns proposals to very substantially increase the area of forest – something that the government is going to have to undertake if it wants to hit its net zero commitment. We show that, if the Government adopts the usual approach of initiating change through subsidies then it will be taken up by those landowners who have the lowest production values for their land. This delivers appalling value for money – in fact the costs exceed the benefits by more than £65m every year (assessed using Green Book rules). This is a very real problem. The NCC's 2020 Annual Report highlights this as a major risk to the UK's climate strategy. Instead, an integrated and systems based approach should target those subsidies according to the benefits they will generate – such as carbon storage. If this is done, then the same area of forest, correctly targeted, can deliver net economic benefits of nearly £550m per annum across GB with a BCR of 5:1 – a rate of return which far exceeds the large majority of spending on built capital.

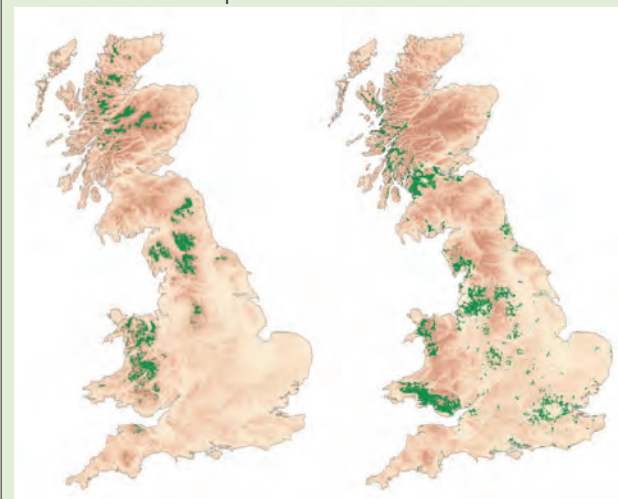
110 NCC, *Advice on using nature based interventions to reach net zero greenhouse gas emissions by 2050* (2020): <https://www.gov.uk/government/publications/a-natural-capital-approach-to-attaining-net-zero-nature-based-interventions>

111 NCC, *Natural Capital Committee's third state of natural capital report* (2015): <https://www.gov.uk/government/publications/natural-capital-committees-third-state-of-natural-capital-report>

## Box 2 delivering value for money from new woodland planting

In our second State of Natural Capital report, we presented analyses undertaken for the Natural Capital Committee and the UK NEA Follow-on.<sup>112</sup> This research looked at *where* new woodlands might best be planted in order to meet the Government's objective of expanding afforested areas. An increase in woodland area of 250,000ha was considered for each of Wales, Scotland and England (750,000ha in total).

The analysis considered two approaches to determining where new forests should be established. The first of these only considered the market values (timber value benefits and costs to agriculture in the form of forgone production) associated with planting. As agricultural losses exceed the market value of timber this leads to new forests being confined to those areas where such losses are lowest; mainly in the uplands (including peatlands which release carbon dioxide when drained for planting trees) and away from major population centres (see left hand map). For Great Britain as a whole, this produces overall losses in excess of £65m per annum.



A second approach was to consider both these market values and a range of non-market values (including recreation and impacts on greenhouse gases).

This analysis suggested that woodlands should be planted around the periphery of major towns and cities across the country generating high recreation benefits and away from peatlands to ensure a net contribution to cutting emissions of greenhouse gases (see right hand map). This would deliver net economic benefits of nearly £550m per annum across GB. Within England this yields benefit cost ratios of 5:1 using lower bound carbon values and nearly 6:1 using higher values.

Water quality improvements were also assessed as part of the model but were not valued in economic terms. Doing so would increase the economic returns and benefit cost ratios further. Similarly, wildlife impacts were considered in the model but not valued in economic terms due to a lack of robust value assessments.

112 Bateman, I.J., et al (2014) UK National Ecosystem Assessment – Follow-On programme

## Food resilience

The sharp increases in demand for food in response to the outbreak of COVID-19 has brought many calls for a focus on domestic production. In the context of green recovery the NCC advises that there are two critical aspects:

1. Efforts to maintain a stable food supply should avoid a narrow drive for productivity, focusing instead on the broader outcome of a resilient food supply chain. Global Food Security defines food supply chain resilience as '*the system's capacity to maintain a desired state of food security when exposed to stresses and shocks*',<sup>113</sup> recognising that food production sits within a complex system of environmental and economic pressures and outcomes which interventions must account for. Price volatility and associated costs are more likely than impacts to supply availability, and barriers to private sector adaptation and the construction of resilience along supply chains should be targeted.<sup>114</sup>
2. Sustainable food production relies upon a system of soil, landscape and resource management that improves fertility and natural capital. UK environmental assets underpinning the food system have been heavily used creating unacknowledged costs and risks for food businesses (including soil erosion, soil compaction and loss of organic soil carbon).

Food security is a good example where prioritising economic growth ahead of environmental protection risks undermining the resilience of both our food system and our natural capital assets and the services they provide.

Environmental degradation interacts with other pressures to make the UK's food system vulnerable to disruption. For example, the potential for worsening climatic conditions leading to stranded assets brings significant financial risk, and the increased efficiency offered by mono culture increases the risk of production shock from disease.<sup>115</sup> The consequences of failing to address these risks could be severe, even considering just the domestic context. The potential formation of an East Anglian 'dust bowl' as a result of climate change events, compounded by damaging agricultural

practices.<sup>116</sup> Such 'stranded land' is just one example of assets suffering from unanticipated or premature write-downs, devaluations or conversion to liabilities as a result of the impact of environment-related factors.

This NCC advises that this throws into sharp relief the need to take an integrated systems level approach to maintaining our natural capital assets and the services they provide: 'tipping points' in environmental systems do occur and that they have a significant impact on agri-food systems.

There is a strong economic case for the agriculture and food sectors to act on environmental restoration. Aligning the creation of financial value from nature with the restoration of underlying natural capital stocks requires measures to ensure food sector businesses actively protect the natural assets which sustain them. The NCC has previously advised on the development of corporate natural capital accounts,<sup>117</sup> to establish a system for measuring and valuing natural capital over time with the explicit recognition of the funding that is required for its maintenance and enhancement. Requiring organisations to gather natural capital information in a coherent and comparable format will help both companies and policy-makers to make better informed decisions about the management of natural capital assets, stimulating both private and public investment to the benefit of business and society more generally.

As the first part of this report demonstrates, the 2020 25 YEP Progress Report presents no data on soils despite the commitment in the 2019 Progress Report to manage England's soils sustainably by 2030. Meanwhile there are several programmes under way to manage the country's soils, which will vie with calls for increased agricultural production, bioenergy crops, and other land pressures such as infrastructure and housing development. In addition to this, interventions such as Local Nature Recovery Strategies, as outlined in the Environment Bill, and the peatland strategy will aim to protect certain natural capital assets – in these cases biodiversity and peat. None of this is currently underpinned by a reporting framework with a comprehensive baseline on the state of environmental assets. Without this policy makers will be unable to make decisions on the sustainable management of our soils within the system of flows, benefits and pressures in which these assets sit.

113 Global Food Security, *Exploring the resilience of the UK food system in a global context* (2018): <https://www.foodsecurity.ac.uk/publications/exploring-the-resilience-of-the-uk-food-system-in-a-global-context.pdf>

114 Committee on Climate Change, *Resilient Food Supply Chains* (2019): <https://www.theccc.org.uk/publication/impacts-of-climate-change-on-meeting-government-outcomes-in-england-paul-watkiss-associates/outcomes-supply-chain-case-study/>

115 WRAP, *Food Futures: from Business as Usual to Business as Unusual* (2015): <https://www.wrap.org.uk/content/food-futures>

116 The Global Food Security Programme, *Environmental Tipping Points and Food System Dynamics: Main Report* (2017): <https://www.foodsecurity.ac.uk/publications>

117 NCC, *Natural Capital Committee research: corporate natural capital accounting* (2015): <https://www.gov.uk/government/publications/natural-capital-committee-research-corporate-natural-capital-accounting>



The second National Adaptation Programme (NAP2) report sets out the government's proposed climate change adaptation (CCA) response to the risk to soils from increased seasonal aridity and wetness along with soils carbon storage capacity.<sup>118</sup> It suggests that Environmental Land Management (ELM) schemes will incentivise good soil management practices through the application of natural capital thinking, enhancing soil's ability to deliver environmental benefits via improved soil quality. .

The NCC supports this but advises again that all of these initiatives should be joined up through the integrated framework for delivering the 25 YEP as outlined in this report, with monitoring and reporting on delivery against all of the ten 25 YEP goals covering all natural capital assets and the flows and benefits derived from them. This approach recognises that natural capital assets such as soils and services they provide – such as carbon sequestration and storage – are nested in a wider ecological, social and economic system. The impacts of interventions are felt beyond the sectors such as agriculture and food which

currently derive direct market value from them. Without such a framework there is no way of assessing whether policies and interventions have been successful in balancing short term production with sustainable management of our soils.

The ELM scheme will need to ensure that farmers are sufficiently compensated for loss of income as a result of delivering public goods (such as pigouvian taxation to address the cost of externalities). As the NCC advised in its 2020 Annual Report,<sup>119</sup> improving farming productivity is acceptable only when it protects and enhances natural capital; such as healthy soils, which are a public good and should be a priority outcome to be delivered by spending through the ELM scheme, with the same priority given to it as to air, water and wildlife. The main public good highlighted in the government's farming consultation document is environmental improvement, and food is not a public good; attempting to designate it as such will lead to considerable environmental destruction, wasting tax payer's money and doing nothing for the food security of poorer populations.

118 Defra, *The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting* (2018): [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/727252/national-adaptation-programme-2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/727252/national-adaptation-programme-2018.pdf)

119 NCC, *Natural Capital Committee's seventh annual report* (2020): <https://www.gov.uk/government/publications/natural-capital-committees-seventh-annual-report>

## Annex 1: Background to the Natural Capital Committee

The government's Environment White Paper: The Natural Choice was published in 2011. In this report, government committed to '*establishing an independent Natural Capital Committee (NCC) reporting to the Economic Affairs Cabinet Committee... The Committee's remit was to advise the government on the state of English natural capital and what needed to be done about it.* The NCC was established in 2012 as an independent committee chaired by Professor Dieter Helm.

Since then, the NCC has published plethora of advice on the sustainable use of natural capital in England and most notably a recommendation to the government to create a 25 Year Environment Plan. The government accepted this recommendation, developed it and it was launched by the Prime Minister, Theresa May in January 2018.

The Committee entered its 2nd term in January 2016, with the key focus being advising the government on the implementation of the 25 YEP; including the development of suitable metrics to be used to track progress against the Plan's objectives.

### **Chairman Professor Dieter Helm, CBE**

Dieter is a Professor of Economic Policy at the University of Oxford and a Fellow of New College, Oxford. He is author of *Natural Capital – how to value the planet* (Yale University Press) and his latest book *Green and Prosperous Land* was published March 2019 (William Collins)

### **Members**

#### **Professor Colin Mayer, CBE**

Colin is Professor of Management Studies, Saïd Business School at the University of Oxford. He is an expert on all aspects of corporate finance, governance and taxation, the regulation of financial institutions and the role of the corporation in contemporary society.

#### **Professor Chris Collins**

Chris is Chair of Environmental Chemistry at the University of Reading. He is the Natural Environment Research Council Soils Coordinator and chairs Defra's Hazardous Substances Advisory Committee providing expert advice to the UK government on how to protect the environment, and human health via the environment from chemicals. His research focuses on determining the factors controlling exposure of biota to environmental pollution and the role of soil organic carbon in modifying pollutant exposure and the parallels between pollutant and carbon cycling in soils.

#### **Professor Melanie Austen**

Melanie is a marine ecologist and interdisciplinary marine researcher who is Head of Science for the Sea and Society group at Plymouth Marine Laboratory. She is an independent member of the Joint Nature Conservation Committee (JNCC), completed a 3 year term as the Chief Scientific Advisor to the UK's Marine Management Organisation (MMO) and for the last twenty years she has been developing and leading UK and EU funded collaborative marine research projects. She has been an Honorary Professor at the University of Exeter medical school since 2014, a member of other Expert Advisory Groups, and has chaired an EU Marine Board expert group on marine ecosystem valuation.

#### **Professor Ian Bateman, OBE**

Ian is Professor of Environmental Economics and a Director of the Land, Environment, Economics and Policy Institute (LEEP) at the University of Exeter. His research interests focus on ensuring sustainable wellbeing through the integration of natural and social science knowledge within decision-making and policy. Particular interests lie in the fields of quantitative analysis, integrated modelling and the valuation of non-market benefits and costs.

#### **Professor Paul Leinster, CBE**

Paul is Professor of Environmental Assessment at Cranfield University and was formerly Chief Executive of the Environment Agency. He also worked at BP International and Schering Agrochemicals, led an environmental consultancy and was Director of Corporate Environmental Services at SmithKline Beecham. He holds a BSc in chemistry, a PhD in environmental engineering and an MBA from the Cranfield School of Management.

#### **Professor Kathy Willis, CBE**

Kathy is a Professor of Biodiversity and Head of the Long-term Ecology laboratory at the University of Oxford. She is also the Principal of St Edmund Hall, one of the Colleges that makeup the University of Oxford. Until recently she was the Director of Science at the Royal Botanic Gardens, Kew. She has over 30 years of research experience focusing on modelling and remotely determining important landscapes for biodiversity and ecosystem services across the world. Most recently she has been leading a research team to develop new and emerging models and technologies to assist land managers in decision-making to ensure the best outcomes for business and biodiversity.

The Committee is supported by a secretariat based in Defra (Department of Food, Environment and Rural Affairs) – Headed by Maniv Pathak, with Elias Scheuermann, Rebecca McIlhiney, Jake Harvey, Andrew Canning-Trigg, Felix Clarke and James Farr.







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