



**Cyfoeth  
Naturiol  
Cymru**  
**Natural  
Resources  
Wales**

# State of Natural Resources Report 2025

Interim Report  
December 2024



# State of Natural Resources Report: Interim report 2024

## About Natural Resources Wales

Natural Resources Wales's purpose is to pursue sustainable management of natural resources. This means looking after air, land, water, wildlife, plants and soil to improve Wales's well-being, and provide a better future for everyone.

### Recommended Citation:

Natural Resources Wales. 2024. State of Natural Resources Report: Interim (Draft) Report. Natural Resources Wales.

Restrictions: None

Mae'r ddogfen hon hefyd ar gael yn Gymraeg

### Copyrights

The content of this report can be used under the [Open Government licence](#)

All images are © Natural Resources Wales and database right. All rights reserved.

## Contents

1. Introduction .....	2
2. Background .....	2
3. How we will present SoNaRR in 2025.....	6
4. How we assess Wales' sustainable management of natural resources .....	8
5. Challenges .....	12
6. Responding to the Challenges.....	16
7. Evidence needs.....	23
References.....	27

# 1. Introduction

The State of Natural Resources Report (SoNaRR) is our assessment of the extent to which Wales is achieving the sustainable management of natural resources (SMNR).

We use the best evidence to assess Wales' natural resources and the benefits we get from them via Wales' ecosystems – clean air and water, thriving wildlife, places for recreation, inspiration, energy, timber, and food.

We assess the main challenges for sustainable management and identify priorities and opportunities for action to improve the state of our natural resources and the benefits they provide.

As we prepare our third assessment, to be published in December 2025, we continue to focus on the main challenges to Wales' natural resources – nature loss, climate change, and pollution and waste.

In this interim report, we set out our plans for the third State of Natural Resources Report, and any major new evidence sources that will be used. We also identify and prioritise any gaps in the evidence, along with progress in filling gaps identified in previous reports.

We also set out some of the key messages that are emerging around sustainable management of natural resources in Wales and their implications for well-being. We hope this will provide a starting point for discussion with users of SoNaRR and other stakeholder to best shape the final report during 2025.

## 2. Background

### Purpose of SoNaRR

The State of Natural Resource Report (SoNaRR) provides a unified baseline of evidence that is common to all users.

The report helps a range of people and organisations with decision-making.

It helps us, as a society, to be aware of the benefits that our natural resources provide and understand how our actions impact on the environment and, hence, on these benefits.

The information in the report enables us to identify and prioritise opportunities for us to make a real difference to the future for Wales and our overseas footprint.

SoNaRR helps influence Welsh Government's policies, including the Natural Resources Policy (Welsh Government, 2017).

The assessment of SMNR contributes to tracking progress against Wales' wellbeing goals (Welsh Government, 2024a).

SoNaRR has been used by the Public Service Boards (PSBs) to inform their well-being plans. PSBs work across all public services in each local authority area in Wales. For example, the Vale of Glamorgan PSB's second well-being plan identifies "Responding to the climate and nature emergencies" as a key priority area. Changes they describe as needed include consideration of transport, energy, food, biodiversity and how they use their buildings and land. (Ein Bro - Our Vale, 2023). They used SoNaRR2020 and its findings in the analysis presented in the Environment and Transport Report part of their Well-being Assessment (Ein Bro - Our Vale, 2022).

Local Planning Authorities use SoNaRR to inform Local Planning decisions. It feeds into our development of [Area Statements](#) to give local actions across Wales and provides opportunity for local actions to be showcased and influence others.

SoNaRR can be used by others looking to lessen Wales' impact on natural resources while securing well-being benefits to the people of Wales.

## Legislative framework

Part 1 of the Environment (Wales) Act 2016 is our legislative framework. It enables us to ensure natural resources and ecosystems are resilient and can provide benefits now, and for the future, through sustainable management. The legislation is based on international best practice of the ecosystem approach.

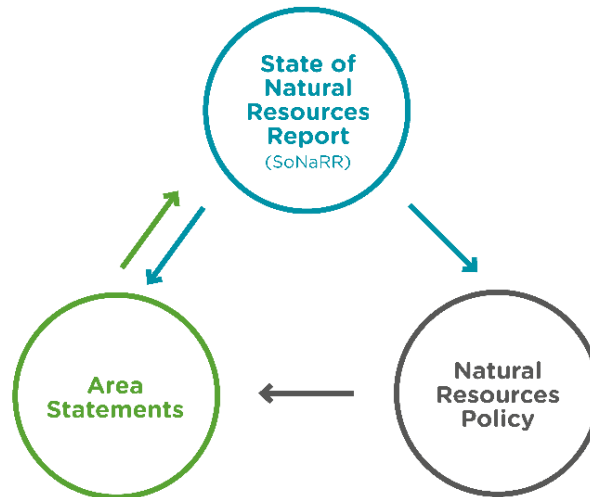
It puts the 1992 United Nations Convention of Biological Diversity Welsh law (*Convention on Biological Diversity, 1992*).

The Well-being of Future Generations (Wales) Act 2015 and Environment (Wales) Act 2016 have been drawn up to reflect the United Nations approach. They link to the approach of other legislation, such as the Planning and Heritage Acts.

Wellbeing assessments set out the wellbeing needs across the Public Service Boards.

The Environment (Wales) Act sets out a delivery framework for the sustainable management of natural resources (Figure 1):

- The State of Natural Resources Report tracks Wales' progress with achieving the sustainable management of natural resources. It's an essential evidence base to support the Welsh Government's Natural Resources Policy.
- Our [Area Statements](#) enable the implementation of the Natural Resources Policy across Wales. Area Statements include national priorities for specific local areas.



**Figure 1 SMNR Adaptive Delivery Framework**

Wales can put in place the transformative change which the UN is calling for by working within this framework.

Also contributing to this change are: Future Wales: The National Plan 2040 (Welsh Government, 2021a), the Welsh National Marine Plan (Welsh Government, 2019) and the Sustainable Land Management Framework (Welsh Government, 2023a).

## What we said in our previous reports

The two previous reports assessed the state of natural resources and ecosystems in Wales and found that we are not sustainably managing our natural resources. They also found that our use of global natural resources is not sustainable or equitable.

Both reports explored the direct causes (or drivers) of this unsustainable management, such as pollution and climate change. They also described the indirect causes – human activities such as economic systems, technological developments, human behaviours and governance.

The [second State of Natural Resources Report](#) (NRW, 2020) introduced the four aims of SMNR, using them to structure the assessment and to identify opportunities for action to improve the sustainable management of natural resources. We highlighted the need for system change through the way we manage and use energy, transport and food.

In 2022-23 NRW hosted a national conversation with the people of Wales about what future they want for nature. (NRW, 2023a). The aim was to raise awareness of the links between lifestyle choices and impact on nature in Wales and globally, and what actions individuals could take. It culminated in a shared vision, developed through a citizens' assembly, exploring what 2050 might look like where nature and

society thrive together. The evaluation highlighted the need for greater collaboration and participation in decision-making aligning with the targets set out in the Global Biodiversity Framework (tools and solutions for implementation and mainstreaming).

SoNaRR2025 will build on these previous assessments, providing evidence around what has changed and what hasn't. The report will identify the priority challenges and key opportunities to achieve SMNR in Wales, and tackle the climate, nature and pollution crises.

## Current challenges

Four years on from the last SoNaRR, the global challenges of nature loss, climate change, pollution and waste have intensified. Human activities continue to harm the ability of the planet to provide all that we need for our well-being. UNEP's Medium-Term Strategy (2022–2025), highlights how three interconnected crises – climate change, biodiversity loss and pollution – are putting global economic and social well-being at risk, and undermine opportunities to reduce poverty and improve lives (UNEP, 2021).

The UN Environment Programme's Global Environment Outlook (GEO 6) (UNEP, 2019) highlights that "*human health is already in dire straits*" and the situation will worsen further if urgent actions are not made to protect the environment (UNEP, 2019).

The scale and cause of climate change was reiterated in 2023 by the United Nations' Intergovernmental Panel on Climate Change (IPCC) (IPCC, 2023). And the third UK Climate Change Risk Assessment (Netherwood, 2021) has highlighted risks for Wales which require increased and urgent action.

## Responding to the challenges

These challenges can and must be faced.

We, as a society, must improve the balance between exploitation and protection. In 2021, the statutory nature conservation agencies across the UK came together and set out a range of measures to enable the UK to become nature positive by 2030. They concluded that if we act now, we can achieve this. The broad responses that they identify relate to mainstreaming nature recovery, ambitious targets for protection and restoration, and sustainable use of land and sea use (Brotherton P. et al., 2021).

Crucially, we must also improve the sustainability of our economic and financial systems. The Dasgupta Review highlights that "a healthy environment and a vibrant economy can go hand in hand, and indeed must do, otherwise we will have neither" (HM Treasury, 2021). It calls for changes in how we think, act and measure economic success to protect and enhance our prosperity and the natural world. Dasgupta sets out a range of systemic changes to transition to economies that

contribute to a healthy planet. These include developing private investment approaches to support nature recovery; nature based solutions; empowering citizens by giving them the information they need to make better choices; awareness raising of nature and the benefits it provides; and equitable governance, especially with respect to just access to a healthy environment and just transition. We are making some progress on these in Wales, which we will highlight in SoNaRR2025.

### **3. How we will present SoNaRR in 2025**

We will present SoNaRR2025 as a series of web pages and as a single downloadable document. Following user feedback from the last report, we want to make it easier to follow through from key messages to the evidence underpinning those messages. We will present SoNaRR in 2025 at three different levels.

#### **Level 1 – summary**

We will focus on high level messages and conclusions based on our review and analysis. We'll use infographics and visual tools to help present key messages.

We will include suggestions towards, and the future outlook for, Wales' sustainable management of natural resources.

#### **Level 2 – the assessments and evidence**

We will describe the evidence we have used to inform the conclusions in level 1. The link between the conclusions and the evidence will be made clear.

This evidence will include an update to the all-Wales assessment against each of the four aims of SMNR – updating SoNaRR2020.

The evidence will be organised around the eight ecosystems (coastal margins, enclosed farmland, freshwater, marine, mountain, moorland and heath, semi-natural grassland, urban, woodlands ), three natural resources (air, soil, water), biodiversity and further cross-cutting evidence including invasive non-native species, pests and diseases, land and sea use change, climate change, pollution, direct exploitation, waste, landscape and energy.

The evidence will be set out using the DPSIR (Driver, Pressure, State, Impact, Response) framework. Each part of DPSIR will include an assessment of current status, past trends and future outlook. Each ecosystem and natural resource assessment will conclude in an assessment against each of the four aims of SMNR.

These DPSIR and Aims assessments will be supported by a cross-cutting Biodiversity assessment. This will support the ecosystem level assessments by

considering species-level biodiversity and associated habitat types, including those published under section 7 of the Environment Act (2016) Wales. It will reflect on new evidence that has emerged including State of Nature Wales report (Burns, F, Mordue, S, al Fulaij, N, Boersch-Supan, PH, et al., 2023), recognising that an integrated approach to biodiversity management is essential to setting us on a path towards a nature positive future.

We will include the confidence we have in the assessments and a description of the quality assurance processes we use.

We plan to use interactive infographics and visual tools to present the evidence in a clear summary and which enables users to explore further details in the particular areas they are interested in.

### Level 3 – the data and evidence sources

We will signpost to specific data sources, relevant primary literature, or evidence synthesis reports. This will include national evidence that can be used at a smaller, more local scale where available.

Figure 2 illustrates how SoNaRR2025 evidence builds and comes together, as well as the audiences it aims to inform at national and local scales. This will help demonstrate a clear line of sight between evidence and key messages.

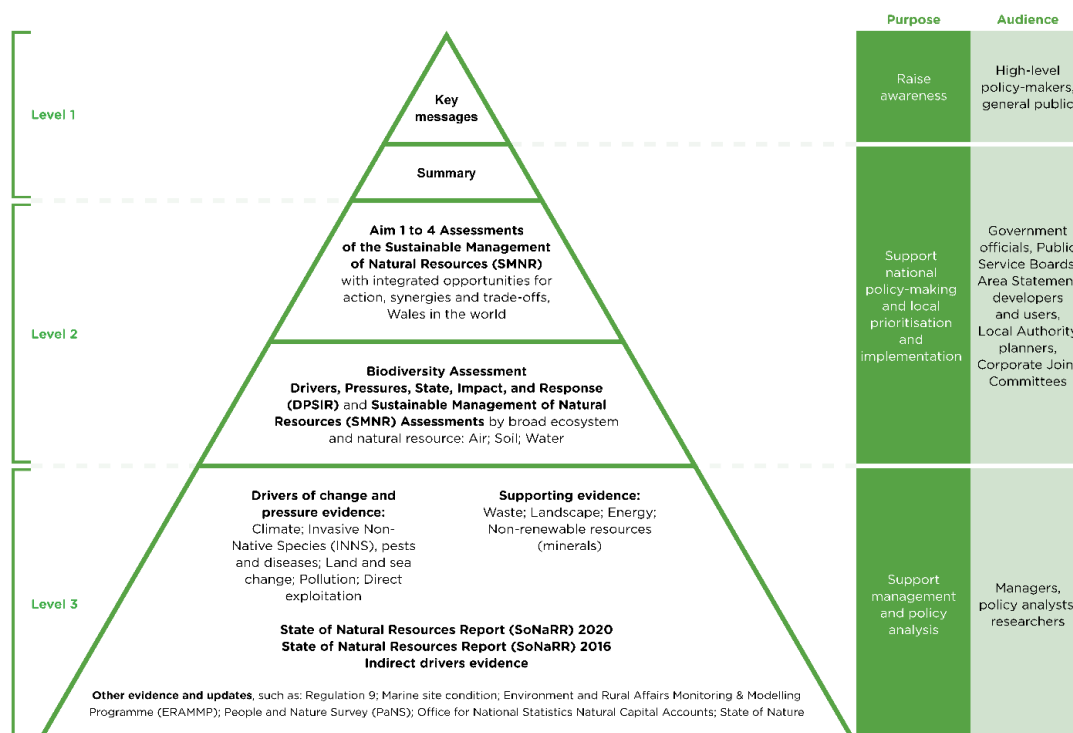


Figure 2 SoNaRR evidence building and key audiences



## 4. How we assess Wales' sustainable management of natural resources

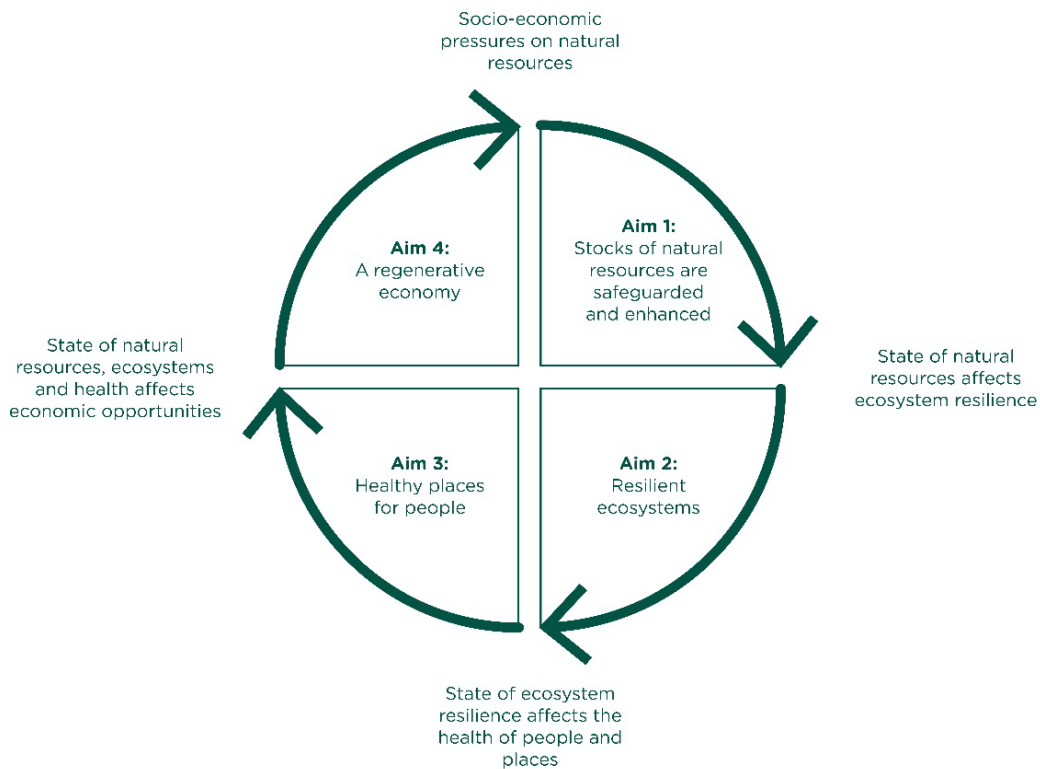
The Environment (Wales) Act 2016 says that the objective of SMNR is to maintain and enhance the resilience of ecosystems and the benefits and ecosystem services they provide. We must do this in a way that can meet the needs of present generations of people without compromising the ability of future generations to meet their needs. In this way, SMNR directly contributes to the achievement of the 7 Welsh wellbeing goals.

The SMNR objective has been broken down into four aims. In SoNaRR we use the four aims to assess Wales' management of natural resources and to identify opportunities for achieving SMNR.

### The four aims of SMNR:

1. Natural resources are safeguarded and enhanced.
2. Ecosystems are resilient to expected and unforeseen change.
3. Wales has healthy places for people, protected from environmental risks.
4. Contributing to a regenerative economy, achieving sustainable levels of production and consumption .

The aims are all interconnected and we cannot achieve SMNR without achieving all the aims (Figure 3).



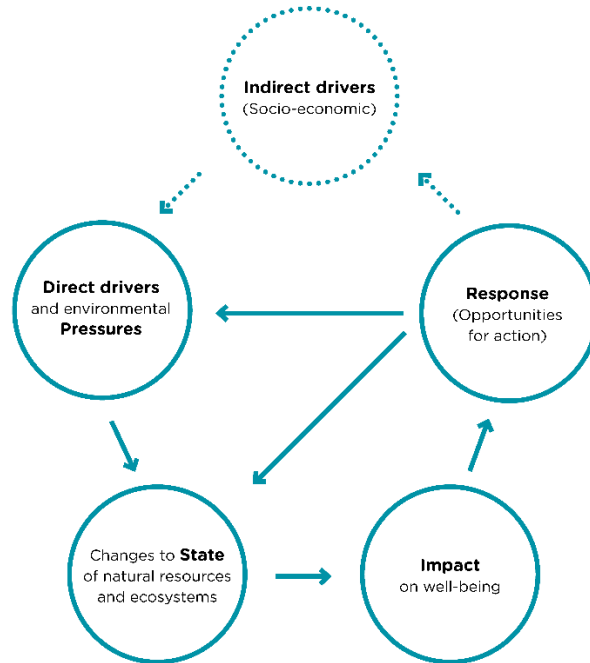
**Figure 3 The interconnected aims of SMNR illustrating the links between environmental, social / cultural and economic well-being**

## The DPSIR framework

To assess Wales' sustainable management of natural resources against these four aims, we need to be able to measure the pressures on natural resources and the state of natural resources, including ecosystem resilience. We also need to understand the benefits, or services, we get from them. And we need to better measure and understand what actions (or responses) work to help improve our management of natural resources.

In 2020 we brought these aspects together in a natural resource inventory for each ecosystem. We will build on this for SoNaRR2025, bringing together economic, environmental and social data into a single 'DPSIR' framework. We intend for this method to be used for future reports.

The measures we use to assess progress with the aims of SMNR are set within the United Nations Driver-Pressure-State-Impact-Response framework (Figure 4).



**Figure 4 DPSIR Framework adapted for SoNaRR (based on UNEP(2019, p. 13))**

In SoNaRR2025 we will carry out the DPSIR assessment for each of the eight broad ecosystems plus the three main natural resources – Air, Soil and Water.

We will use the method to:

- document the drivers and pressures on natural resources and ecosystems.
- assess the current state and trends of the natural resources and ecosystems under these pressures. This includes an assessment of ecosystem resilience.
- assess the impact of the state of natural resources and ecosystems on wellbeing, using a qualitative and quantitative assessment of ecosystem services across Wales.
- set out a range of opportunities for action (responses) to make the management of natural resources and ecosystems more sustainable.

We plan to make the evidence that describes the impact on wellbeing consistent across the Broad Ecosystems and natural resources. We will use the UN System of Environmental Economic Accounting Ecosystem Accounting ecosystem services terminology (United Nations et al, 2021), which builds on the previously used UK National Ecosystem Assessment terminology (UK National Ecosystem Assessment, 2011), to enable comparisons with similar assessments and data from across the UK.

## How SoNaRR uses the DPSIR Framework

The DPSIR assessments are at the ecosystem and natural resources level. National cross-cutting evidence about drivers of change and other themes will be used in these assessments.

### ***Drivers of change and key pressures***

- For each of the drivers of change, what does the evidence say about key pressures on the ecosystem or natural resource?
- What does the evidence say about long-term and short-term (since 2020) past trends of those key pressures on the ecosystem or natural resource?
- What does the evidence say about the future outlook of those key pressures on the ecosystem or natural resource?

### ***State including ecosystem resilience***

For natural resources (air, soil, water):

- Metrics to describe current state (quality and quantity) at the Wales scale.
- Long and short-term (since 2020) past trends.
- Future outlook at the Wales scale.

For the eight broad ecosystems (coastal margins, enclosed farmland, freshwater, marine, mountain, moorland and heath, semi-natural grassland, urban, and woodlands):

*Resilience: What does the state of natural resources and their management mean for the resilience of the ecosystem?*

- An assessment of ecosystem resilience – using the attributes from the Environment (Wales) Act 2016 (diversity, extent, condition and connectivity).
- Where evidence is available, an assessment of long and short-term (since 2020) trends of each of the attributes.
- Where evidence is available, an assessment of future outlook for each of the attributes.

*Impact on well-being: What does the state of natural resources, the resilience of ecosystems and their management mean for the supply of benefits to people in Wales?*

- Where evidence is available, a quantitative and qualitative assessment of the benefits provided by the ecosystems and natural resources.
- Where evidence is available, an indication of what has changed since 2020 and what the future outlook is for those benefits.

### ***Opportunities for Action: What are the options for more sustainable management?***

- An update on the 2020 Opportunities for action.
- Identification of any new opportunities.

SoNaRR uses the DPSIR evidence to assess Wales' sustainable management of natural resources. The assessment will be against the 4 aims of SMNR at ecosystem, natural resource and all-Wales level.

## **Using evidence from Area Statements**

The [Area Statements](#) process gathers new evidence about the challenges, risks and opportunities for sustainable management of natural resources. There are seven area statements covering Wales and our marine environment.

These Area Statements support the place-based approach to SMNR embedded in the Natural Resources Policy for Wales. This place-based approach to SMNR provides important evidence on the specific relationships between people, communities and local natural resources and ecosystems. This includes on actions that have been taken to implement SMNR.

## **5. Challenges**

The UN Environment Programme's situational analysis for their Medium-Term Strategy (2022-2025) highlights the world is facing three major environmental challenges: biodiversity and nature loss, climate change and pollution and wastes (UNEP, 2021). The main drivers of these interconnected challenges are all largely linked to human activity and unsustainable patterns of consumption and production. As illustrated in Figure 3, tackling these challenges in an integrated way is essential if we are to improve the health of the environment, people and the economy. This, in turn, will provide a foundation for delivering sustainable development in Wales and delivering on Wales' well-being goals, associated milestones and their indicators.

### **Nature loss**

#### **Global assessments**

Environmental pressures are driving global biodiversity declines at rates not previously encountered in human history. The rate of species extinctions is accelerating.

In 2019, the International Science-Policy Platform on Biodiversity and Ecosystem Services published a global assessment of biodiversity. It estimated that around 1 million animal and plant species across the world are now threatened with extinction. Many could be extinct within decades. Globally, the average abundance of native species in most major land-based habitats has fallen by at least 20%, mostly since 1900 (IPBES, 2019a).

Nature plays an essential role in providing food, energy, medicines and genetic resources. If changes aren't made now, the negative impact on biodiversity, ecosystems functions and many of nature's beneficial contributions to people will continue to 2050 and beyond.

A second global assessment is currently in the planning stages, to be considered by the IPBES plenary in 2028.

## Wales assessments

The 2023 [State of Nature report](#) confirms that the UK's wildlife is continuing to decline. For Wales, *“since monitoring of 380 Welsh species began in 1994, the numbers of those species has declined on average by 20%”* (Burns, F, et al., 2023).

The Wales State of Nature report uses evidence from the last 50 years and shows that *“on land and in freshwater significant and ongoing changes in the way we manage our land for agriculture, and the effects of climate change, are having the biggest impacts on our wildlife”*.

*“At sea, and around our coasts, the main pressures on nature are pollution, climate change, over exploitation (historic fisheries), invasive species and marine development”*.

Overall, 40% of Wales' surface and ground water bodies achieved good or better overall status in 2021. This is still low but does represent an improvement of 3% from 2015 and an 8% improvement from 2009 (National Well-being indicator 45 (Welsh Government, 2022a)) (NRW, 2021a).

The decline in wildlife and the condition of the environment are not only a nature concern. As IPBES (2019b) identifies, this also effects nature's contributions to people and their well-being.

However, there are some success stories which show that we can make a difference if we take action. The 2023 State of Nature report (Burns, F, et al., 2023) highlights that bats in Wales show an average increase of 76% since 1998, thanks to increased protection of the places they live.

# Climate change

## Global assessments

In 2018, the Intergovernmental Panel on Climate Change warned that the world must reach global net-zero greenhouse gas emissions by 2050 to avoid the consequences of warming above 1.5 degrees C (IPCC, 2018).

It said that limiting warming to 1.5 degrees C was still possible and, if achieved, would reduce risks to biodiversity, ecosystems, food systems, water and human wellbeing .

In 2023, the IPCC said *“Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming, with global surface temperature reaching 1.1°C above 1850-1900 in 2011-2020. Global greenhouse gas emissions have continued to increase, with unequal historical and ongoing contributions arising from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production across regions, between and within countries, and among individuals (high confidence). (IPCC, 2023, p. 4)”*

UN analysis in 2024 warns that we must achieve a 43% reduction in global greenhouse gases compared to 2019 by the end of this decade. Despite the need to substantially cut emissions, national action plans will only deliver a 2.6% decrease in global emissions by 2030 (UNFCCC. Secretariat, 2024).

There is now an urgent need for a global response across governments, business and society to mitigate risks to nature, food systems, water and human well-being. Climate change is driving species to move location three times faster than predicted (Chen et al., 2011). Ecosystem services these habitats provide us with - like flood defence and carbon dioxide removal - will also be lost.

## Wales assessment

Wales has made great strides in reducing greenhouse gas emissions, with estimated emissions reducing from 56 Million Tonnes of CO<sub>2</sub> equivalent (MtCO<sub>2</sub>e) in 1990 to 36 MtCO<sub>2</sub>e in 2022 (National well-being indicator 41 - (Welsh Government, 2022a)). However, given the global trajectory of increasing greenhouse gas emissions, Wales still needs to adapt to the risks it faces from climate change. The third UK Climate Change Risk Assessment has highlighted associated risks in Wales with respect to the natural environment, flooding, infrastructure, people's health and cultural heritage. These require increased and urgent action (Netherwood, 2021).

# Pollution and waste

## Global assessments

Pollution of our air and atmosphere, waters and soils presents significant risks to human health and nature. The UN Environment Programme's Global Environment Outlook (GEO 6) highlights that human health is in dire straits if urgent actions are not taken to protect the environment. Target 7 of the CBD Kunming-Montreal Global Biodiversity Framework specifically sets out a binding commitment in Wales to Reduce Pollution to Levels That Are Not Harmful to Biodiversity by 2030 (CBD, 2022).

## Wales assessment

Air pollution has a significant effect on public health and ecosystems. Of the 44 air quality management areas in Wales, one air quality management area is designated due to the risk of PM<sub>10</sub> particulate matter levels exceeding the daily 24-hour mean air quality objective for PM<sub>10</sub>. The other 43 air quality management areas are designated where nitrogen dioxide (NO<sub>2</sub>) levels exceed or risk exceeding the air quality objectives for NO<sub>2</sub> (Welsh Government, 2024a). Average concentrations of NO<sub>2</sub> pollution in the air have reduced from 14 ug/m<sup>3</sup> in 2007 to 8 ug/m<sup>3</sup> in 2022 (National well-being indicator 4 (Welsh Government, 2022a)). In 2020, 70.1 % area of acid sensitive habitats in Wales and 99.1 % area of nutrient nitrogen sensitive habitats exceeded the critical loads for acidification and eutrophication (JNCC, 2023).

Pollution is identified as a significant water management issue in the Western Wales River Basin and the Dee River Basin, in particular pollution from wastewater, towns and cities, transport, rural areas and abandoned mines (NRW, 2022a, 2022b). There is a similar picture in the Severn River Basin (Environment Agency, 2022). Through SoNaRR 2025 we will develop a more unified evidence base to better understand the implications of pollution with respect to the sustainable management of Wales' water resources.

SoNaRR 2020 highlighted that land affected by contamination can pose a risk to both human health and the wider environment. In Wales, the most common contaminants are benzo(a)pyrene, lead and arsenic, all of which were identified at over 60% of contaminated land sites (NRW, 2021b). Wales uses many resources for activities in business and industry, farming and food production, home and office, and this impacts on the natural environment. As also highlighted in SoNaRR 2020, when waste is generated, it can be detrimental to ecosystems, nature and the well-being of the population, especially where it is not managed appropriately at authorised waste sites or is managed through illegal activities (NRW, 2021c).



Recent estimates of household waste not recycled per person per year were 172kg in 2022-23, revealing this remains a significant challenge. (National well-being indicator 15 - (Welsh Government, 2022a)). Whilst much still needs to be done to overcome waste pressures from all sources, progress is being made. For example, the amount of household waste not recycled was 217kg in 2012-13. (National well-being indicator 15 - (Welsh Government, 2022a)).

## The economy

Whilst economic development has created huge benefits for society, it has also placed substantial demands on nature, driven by our need to use natural resources, convert land for various uses and use the environment as a sink for our wastes and pollution. The Dasgupta Review (HM Treasury, 2021) commissioned by the HM Treasury highlights “A healthy environment and a vibrant economy can go hand in hand, and indeed must do, otherwise we will have neither”. The World Economic Forum Global Risks Report (2024) identified extreme weather, changes to earth systems, nature loss / ecosystem collapse and natural resource shortages as the top 4 risks to the economy over the next 10 years. Pollution comes in as the tenth<sup>10<sup>th</sup></sup> highest risk.

## Wales assessment

In 2018, the global environmental footprint of commodities annually consumed within Wales was 12.3 million global hectares (National well-being indicator 14 - (Welsh Government, 2022a)). This is less than the 17.0 million global hectares reported in 2004.

The global environmental footprint is the area of land needed to meet the natural resource required in the production of these commodities and to assimilate the waste from their production and consumption. Despite a reduction in footprint over the last 20 years, these economic demands are unsustainable. If the entire population of the world lived like Wales, humanity would require 2.08 Earths (Welsh Government, 2024a).

## 6. Responding to the Challenges

These challenges can be solved. The responses we need to make with respect to the nature, climate change and pollution challenges we face are broadly known (see below). However, these challenges are also intertwined. As such, SoNaRR2020 called for integrated action to address the nature and climate emergencies, proposing green infrastructure and transition to a circular economy as two strategic ways to respond to these challenges. The Wales Natural Resources Policy (Welsh Government, 2017) sets out related responses of delivering nature-based solutions

and increasing renewable energy and resource efficiency, alongside taking a place-based approach, as the national priorities for SMNR. Since 2020, the importance of integrated responses to environmental and human health, embedding the value of nature in decision-making and transitioning to nature positive economies that finance nature recovery have been recognised. Delivering these types of responses will play a big part in addressing the challenges we face (Brotherton P. et al., 2021)

## Nature loss

The UK and Wales committed to being nature positive by 2030 via the Leaders' Pledge for Nature (2020), and to take urgent action to halt and reverse biodiversity loss by 2030 via the Convention on Biological Diversity.

In 2021, the statutory nature conservation agencies across the UK came together and set out key points to be nature positive by 2030. They concluded that if we act now, we can achieve this. The broad responses they identify are needed relate to mainstreaming nature recovery, ambitious targets for protection and restoration, and sustainable land and sea use ((Brotherton P. et al., 2021).

The key changes they (Brotherton P. et al., 2021) identify are needed for nature protection and restoration comprised: improved protected area management; habitat conservation outside of protected areas; and habitat restoration to create and strengthen nature networks.

Via its biodiversity deep dive, Wales also sets out a range recommendations to deliver on the Leaders' Pledge for Nature and CBD Target 3 commitment to protect 30% of land and sea area for nature by 2030 (referred to as 30 by 30) (Welsh Government, 2022b). Expert groups have focussed on establishing robust monitoring and evidence frameworks for 30 by 30; recommending processes and criteria for recognising, monitoring and reporting on other effective area-based conservation measures (OECMs); and unlocking the potential of Designated Landscapes to deliver more for nature and 30 by 30.

SoNaRR2025 will support Wales' approach to Nature Recovery, align with the Global Biodiversity Framework, and inform statutory users such as national Natural Resources Policy and Area Statements.

## Climate change

A crucial way to mitigate the further impacts of climate change is to reduce and avoid the release of carbon emissions into the atmosphere (Auditor General for Wales, 2022). In 2019, the UK committed to achieving Net Zero greenhouse gas emissions by 2050, with Wales committing to this same target in 2021 (Welsh Government, 2021b). This is set to be achieved via a mix of emissions reductions and offsetting, for instance via Nature based Solutions such as tree planting (Burnett et al., 2024).

In 2021, Wales set out its targets for the pathway to achieving net zero by 2050, including achieving a 63% reduction by 2030 and a 89% reduction by 2040 (Welsh Government, 2021c). Prior to this are 5-yearly carbon budget targets, setting out carbon reductions between 2016 and 2030.

Wales achieved the first carbon budget (2016-2020) with a 28% reduction in greenhouse gas emissions compared to 1990 levels (Climate Change Committee, 2023a). The current second carbon budget (2021-2025) commits to a reduction of 37% of emissions (Welsh Government, 2021d).

The Welsh public sector has more ambitiously committed to reach net zero by 2030, through a range of priority areas, including land use and procurement (Welsh Government, 2021e). Wales' Pledge Campaign has resulted in 139 pledges to reduce carbon emissions from businesses, communities and schools, along with the public sector (Welsh Government, 2022c).

Despite the progress towards net zero, Wales needs to adapt to the risks it faces from climate change. Welsh Government published *Prosperity for All: A Climate Conscious Wales* (PfACCW) in 2019. It includes eight areas of action to build resilience to climate risks, with a progress report released by the Climate Change Committee (CCC) in 2023 (Climate Change Committee, 2023b). This includes adapting nature and the rural economy and protecting seas and coasts. The report identified progress in planning for around a third of associated climate resilience outcomes. However, of the 61 risks and opportunities for climate change adaptation in Wales, approximately half of these still need urgent action. The lack of available data for more than 50% of adaptation outcomes prevents a thorough assessment of progress (Climate Change Committee, 2023b). In October 2024, Welsh Government published an update to PfACCW, the Climate Adaptation Strategy for Wales as the second National Adaptation Plan (Welsh Government, 2024b). This follows on from PfACCW and aims to take a systems-based approach to climate resilience, presenting 15 cross-sector adaptation plans.

## Wales' greenhouse gas emission targets

The Environment (Wales) Act 2016 required us to reduce gross greenhouse gas emissions by at least 80% by 2050. Following advice from the UK Committee on Climate Change, the Welsh Government accepted the recommendation that Wales should achieve 95% emission reduction by 2050 (Climate Change Committee, 2020) and to achieve net zero greenhouse gas emissions by 2050 (Welsh Government, 2021f).

Welsh Government's priority is to reduce emissions from fossil fuel power generation. It has set targets to generate enough electricity from renewable sources to meet 70% of Wales' electricity needs by 2030. In 2021, 55% of energy generation was from renewables (Welsh Government, 2023b). This increased to 59% in 2022

(Welsh Government, 2023c). In 2022, it was estimated that territorial greenhouse gas emissions from Wales totalled 35.7 million tonnes of carbon dioxide (CO<sub>2</sub>) equivalent, a fall of 36% compared to base year (1990 for carbon dioxide, methane and nitrous oxide; 1995 for the fluorinated gases) (BEIS, 2024; Welsh Government, 2024c).

## Pollution and waste

Across the UK, a number of ongoing actions are identified by devolved nations to reduce a range of pollution sources that are impacting on people and nature. Tackling atmospheric ammonia and nitrogen deposition, diffuse water pollution, and marine plastics is identified as one of the key changes needed to be nature positive ((Brotherton P. et al., 2021).

In response to concerns about air quality and noise pollution, the Environment (Air Quality and Soundscapes) (Wales) Act 2024 came into force on the 14 February 2024. The 2024 Act seeks to improve the quality of our air environment and reduce the effects of pollution on human health, nature and the economy. It creates a framework for setting better standards for air quality and a requirement for a national strategy on soundscapes. The importance of natural soundscapes in maintaining people's connection with nature is a key message emerging from the draft plan (Welsh Government, 2023d).

One of the ways Wales is addressing the waste challenge is via the Beyond Recycling Strategy. The strategy sets targets to reduce waste by 26%, send zero waste to landfill, reduce food waste by 50% and increase recycling to 70% by 2025. By 2030 the target is to reduce waste by 33% and food waste by 60% (Welsh Government, 2021g).

## Integrated Action

The challenges around nature loss, climate change, pollution and waste cannot be tackled in isolation. They need an integrated response capable of shifting social, economic and environmental systems in a more sustainable direction. Accordingly, all parts of society must work together to overcome the challenges Wales faces. This requires that these challenges are embedded into decision-making across government, businesses and society to deliver the changes needed. To support this, indicators are needed that go beyond simply measuring the state of natural resources, to revealing their contribution to a range of well-being objectives. The process of embedding these cross-cutting issues is often referred to as 'mainstreaming' (Smith, 2021).

Targets 14 to 23 of the CBF GBF set out targets for implementation and mainstreaming of biodiversity into decision-making. The UK also committed to mainstreaming biodiversity into relevant sectoral and cross-sectoral policies at all

levels via commitment 7 of the Leaders' Pledge for Nature. Mainstreaming of nature and biodiversity is well reflected in Welsh Government aspirations for decision-making. Embedding a response to climate change and nature loss in everything the government does features as 1 of 10 well-being objectives against which the government has assessed progress in its annual report for 2024 (Welsh Government, 2024d). Wales' Climate Change Risk Assessment also highlights that Welsh Government should embed adaptation into its plans for Net Zero, future well-being and increasing biodiversity (Climate Change Committee, 2023b).

## Plan for a Healthy Planet and Healthy People

The health sector is a priority area for integrated action on nature loss, climate change and pollution. Recognising the relationships between the environment and health, the Leaders' Pledge for Nature commitment 8 also calls for countries to "Integrate a 'One-Health' approach in all relevant policies and decision-making processes at all levels that addresses health and environmental sustainability in an integrated fashion." Embracing this 'One-Health' approach in decision-making reinforces the links between the health of our planet and human well-being.

Brotherton P., et al. (2021) identify the following key opportunities to embed a One-Health approach in the UK:

- Integrating green and blue infrastructure into developments on land. This includes deploying Nature-based Solutions by default and use of greenspace standards to improve access to nature.
- Integrate outcomes for nature into developments on land and at sea, ensuring access to nature is improved, and delivering a wide range of health and other benefits.
- Securing environmental gains alongside built development through the planning system.
- Enabling contact with nature, so that it becomes part of everybody's daily experience. Social prescribing in Wales is one way to encourage this (Public Health Wales, n.d.).

## Embedding the value of nature in decision-making

Taking account of the value of nature is key to successfully mainstreaming nature into decision-making (Brotherton P., et al., 2021). This is reflected in Target 14 of the CBD GBF(CBD, 2022). The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) released its values assessment in 2022 (Pascual et al., 2023), which aims to influence better decisions on the management of nature.

The IPBES values assessment highlights that development decisions have, typically, prioritised the market-based values of nature (e.g., the contribution of nature to the agricultural, forestry and extractives sectors). The impact of this being poor consideration of how changes in nature impact on people's quality of life and the wider benefits from nature that are not traded in markets (e.g., recreation, climate and pollution regulation and cultural identity). In 2023, the ONS produced a first set of natural capital accounts for Wales (Office for National Statistics, 2023). These provide national level estimates on the value of these multiple benefits, which can support better decision-making with respect to SMNR.

These type of market and non-market benefits from nature are characterised as 'instrumental' values by IPBES (2022), reflecting a view of nature as an asset that contributes to well-being. Another key recommendation from IPBES (2022) was the need to better recognise the value that people place on their connections with nature. IPBES characterise these as 'Relational Values'. Considering local relational, as well as instrumental, values is crucial to avoiding jeopardising SMNR activities in place. This place-based approach is embedded in the Natural Resources Policy for Wales. Presenting evidence on relational values, alongside the instrumental and intrinsic (e.g., existence) values can help align policy goals and place-based SMNR interventions. This will serve to strengthen the link between SoNaRR and NRW's Area Statements.

Businesses are also increasingly looking to integrate nature-related considerations with other objectives. The Task Force for Nature-related Financial Disclosures (TNFD) is supporting businesses and finance to integrate nature into decision making. It sets out guidance for businesses and finance for reporting and acting on their nature-related dependencies, impacts, risks and opportunities. At the time of writing, 21 organisations headquartered in the UK had adopted the TNFD for 2025 (Taskforce on Nature-related Financial Disclosure, 2024). This is indicative of progress towards the GBF Target 15, which calls for businesses to assess, disclose and reduce biodiversity-related risks and negative Impacts (CBD, 2022).

## **A regenerative economy to finance nature recovery**

As highlighted by Dasgupta (HM Treasury, 2021), the economic transition we need calls for changes in how we think, act and measure economic success to protect and enhance our prosperity and the natural world. In response to these concerns, the UK and other G7 nations have committed to the transition to nature positive economies via the G7 Alliance on Nature Positive Economies (2023).

Dasgupta (2021) also sets out a range of systemic changes to transition to nature positive economies that contribute to a healthy planet. These include Nature based

Solutions; green finance; empowering citizens; education; and equitable governance, especially with respect to just access to a healthy environment and just transition.

## Nature-based Solutions.

Nature based Solutions (NbS) are a priority intervention for SMNR in Wales (Welsh Government, 2017). The United Nations defines these as actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems which address social, economic and environmental challenges effectively and adaptively (UNEA, 2022). Brotherton et al. (2021) identify the potential for NbS to align action for nature and climate change and that adopting NbS by default over 'grey infrastructure' is one of the key changes needed to be Nature Positive by 2030. They describe a number of programmes underway across the UK to deliver nature-based solutions for climate change mitigation and adaptation. These include peatland restoration, afforestation and increased tree planting. In Wales, the Natural Resources Policy continues to drive NbS uptake via improved rural and urban green infrastructure through Planning Policy Wales, Future Wales: the national plan 2040, and proposed Green Infrastructure Assessments.

It should be noted that whilst NbS offer great promise for addressing the nature and climate challenges simultaneously, perverse consequences that damage nature and people's well-being from their deployment must be avoided. They must also be designed with projected climate change in mind to be viable over the long-term (Brotherton P. et al., 2021).

Green finance is increasingly being proposed to finance NbS and nature recovery. Brotherton et al (2021) highlight the potential of standards to encourage confidence in nature investment. In particular, how the woodland carbon code and peatland carbon code have helped to encourage investment in nature restoration to secure voluntary carbon offsets. As an example, in Wales the Peatland Sustainable Management Scheme Project (2017-2020) used the Peatland Carbon Code to validate the carbon benefit of five sites, provide a simple guide to the Code and so help in restoring over 1200ha of damaged peatlands (Brotherton et al., 2021).

## Circular economy

A circular economy is a fundamental characteristic of a regenerative economy. A circular economy means keeping resources and materials in use for as long as possible and avoids all waste (Welsh Government, 2021g). This will significantly reduce carbon emissions, other pollutants and over-exploitation of natural resources. Achieving a circular economy is fundamental to achieving the Natural Resources Policy's priority of increasing renewable energy and resource efficiency.

This will keep more materials cycling within the economy, reducing demand for natural resource inputs and wastes associated with their processing.

## 7. Evidence needs

### New evidence for SoNaRR2025

SoNaRR2025 will use some key new Wales-wide evidence to update the assessments. These include:

- 2023 State of Nature and State of Nature Wales Reports (Burns, F, et al., 2023)
- 2021 Bunce woodland survey (Smart et al., 2024)
- Water Framework Directive Regulations Cycle 3 Interim Classification (2025)
- The Conservation of Habitats and Species Regulations 2017, Section 9A report for Wales (2025)
- 2025 Marine feature condition assessments
- 2024 Environment and Rural Affairs Monitoring & Modelling Programme (ERAMMP) report (forthcoming)
- People and Nature Survey for Wales (NRW and Natural England, 2024)
- 2024 Farm Practices Survey (Welsh Government) (forthcoming)
- UK natural capital accounts: 2024 (Office for National Statistics, 2024) and detailed summary in 2023 (Office for National Statistics, 2023)

### Progress on evidence needs from previous reports

We have reviewed the evidence needs identified in our previous reports.

Some of the earlier identified needs are no longer required. Some gaps have been filled and in other cases work is planned or has begun.

The evidence needs that we are identifying are undergoing external review to help us find suitable evidence that we are not currently aware of.

### An update on the evidence needs we identified in 2020

Most SoNaRR2020 evidence needs were within the themes ecosystem resilience, biodiversity, land use and soil, climate change, healthy places and regenerative



economy. Around half of the SoNaRR2020 evidence needs have seen some progress, examples include:

1. We didn't know whether all the protected sites (SAC, SSSI, SPA, Ramsar) of Wales were resilient. The Baseline Monitoring Review (NRW, 2023b) for terrestrial and freshwater features has produced data, but found approximately 50% of features were classed as 'unknown' due to insufficient data. Overall, it is still unclear what the change has been since the baseline review. This will be an important evidence base for reporting on emerging nature targets, in particular any that contribute to the GBF Target 3: conserve and effectively manage 30% of land, waters and seas (CBD, 2022).
2. Defra funded an update to the economic impact of INNS on GB (Eschen et al., 2023) which updates information about the financial impact of INNS on the economy of GB and each devolved administration including Wales.
3. We wanted to know what the synergies and trade-offs of energy are with the Well-being of Future Generation Act (WFGA) Goals. The Local Authority Energy Plan drafting process has drawn clear links between energy themes and the 7 WFGA goals, through involvement of Public Service Board members and Councillors, and direct mapping of final energy propositions to the 7 goals.
4. A new NRW report on the extent and condition of shingle within Wales' coastal margins will improve knowledge of erosion / accretion rates and inform management.
5. The Coastal squeeze project: 'Understanding the likely scale of deterioration of Marine Protected Area features due to coastal squeeze'. The project aims to improve the understanding of the location, timing and likely scale of habitat loss occurring in Welsh MPAs due to coastal squeeze. This is required to plan effectively for restoration and recreation of habitat features lost through coastal squeeze, and as such maintain the coherence of the Marine Protected Area network (Oaten et al., 2024a, 2024b).
6. Welsh Government reports will help inform policy direction through better understanding of the area where nutrients may be applied in Wales. (Rollett and Williams, 2022a, 2022b).
7. The New NRW flood map incorporates surface water flood risk.
8. Modelling has been carried out as part of the study into private water abstractions which identified potential abstraction hotspots. The assessment of how many and where exempt water abstractions are taking place will inform water companies as to the extent and quantity of where future supplies

may be required. Climate change is likely to increase the vulnerability of exempt abstractors.

9. Two NRW reports provide improved advice on how Wales Marine Protected Area network can contribute to the protection and enhancement of blue carbon. (Robbins et al., 2022a, 2022b).

We have identified limited evidence to improve our assessment of habitat extent and condition, and the impacts of various environmental pressures, including climate change and pollution. Specific remaining evidence needs include:

#### 1. **Condition and Trends of Habitats and Species:**

- **Semi-Natural Grassland:** Condition of grassland habitats outside statutory sites, trends in species diversity.
- **Woodlands:** Condition of ancient woodlands and genetic diversity of tree species in Wales.

#### 2. **Impact of Land Use and Management Practices:**

- **Mountain, Moorland, and Heath:** Impact of mowing on blanket bog and dwarf scrub heath.
- **Semi-Natural Grassland:** Impact of tree planting on shallow peats and organo-mineral soils, and the effect of different management regimes on ecosystem services like carbon storage and water regulation.
- **Soil Quality:** How has land use and land management changes impacted on soils?

#### 3. **Pollution and Environmental Pressures:**

- **Soil Quality:** Trends in contaminants such as PCBs and their potential impact on ecosystem services.
- **Water Quality:** Impact of new and emerging chemical contaminants on water quality and ecology, and the combined impact of chemical pollutants on human health and ecology.
- **Marine Areas:** What is the impact of offshore renewable energy on the marine ecosystem and how do we mitigate negative impacts?

#### 4. **Climate Change Impacts:**

- **Urban Areas:** Impact of climate change on human health, particularly heatwaves, and the adequacy of permeable surfaces and water retention features under future climate scenarios.
- **Coastal Margins:** Where could saltmarsh be managed to protect and enhance flood defences and how long does it take for coastal habitats

to recover after storm events? Is habitat 'rollback' actually occurring as a response to sea level rise and erosion and if it is, where is it occurring and to what extent?

- **Freshwaters:** How can we measure the resilience of freshwater-dependent ecosystems to climate change?

#### 5. **Monitoring and Data Collection:**

- **General Ecosystem Resilience:** Need for comprehensive monitoring strategies to assess ecosystem resilience across landscapes.
- **Urban Areas:** Trends in species associated with urban environments, and the quality of publicly accessible green space.

Please note that we have not been able to undertake a full systematic evidence review to inform SoNaRR2025. We may therefore have missed some suitable evidence to fill these evidence needs.

The full list of SoNaRR2020 evidence needs can be found on our [website](#). If you are aware of evidence that could help us with future assessments, please get in touch. SoNaRR@naturalresourceswales.gov.uk .

## Identifying new evidence needs

Our subject experts are identifying new evidence needs throughout the process of gathering evidence and writing their assessments. These will be reviewed by external experts to assist with filling any gaps and developing coherent evidence questions. These will then be prioritised along with existing evidence needs for presentation in the final report. This will communicate current and future priorities to staff, stakeholders and evidence partners.

Examples of a few emerging evidence needs:

1. How will species distributions alter in Wales with climate change? Changes to dispersal, distributions and climate envelopes of key species in Wales, also including those species moving into areas they previously did not inhabit.
2. Are there multiple benefits to be gained from climate change adaptation and mitigation interventions?
3. What are the trends in sustainable land management practices in Wales and the outcomes they provide for climate, nature and people and their contribution to pollution reduction?
4. What are the above and below ground carbon sequestration rates of different agroforestry systems and the benefits and trade-offs for nature and people relevant to the Welsh context?

## References

- Auditor General for Wales, 2022. Public Sector Readiness for Net Zero Carbon by 2030: Evidence Report. Audit Wales.
- BEIS, 2024. Greenhouse Gas Inventories for England, Scotland, Wales & Northern Ireland: 1990-2022 | National Atmospheric Emissions Inventory.
- Brotherton P., T., McGuckin, S., Ormerod, S., Osowska, F., Sizeland, P., Stuart, E., Walmsley, C., Waters, R. & Wilkinson, S., Anderson, H., Galbraith, C., Isaac, D., Lawton, J., Lewis, M., Mainwaring-Evans, 2021. Nature Positive 2030 – Evidence Report. JNCC, Peterborough.
- Burnett, N., Hinson, S., Stewart, I., 2024. The UK's plans and progress to reach net zero by 2050 (Research Briefing No. 9888). House of Commons Library.
- Burns, F, Boswell, J, Boyd, RJ, Bradfer-Lawrence, T, de Ornellas, P, de Palma, A, de Zylva, P, Dennis, EB, Foster, S, Gilbert, G, Halliwell, L, Hawkins, K, Haysom, KA, Holland, MM, Hughes, J, Jackson, AC, Mancini, F, Mathews, F, McQuatters-Gollop, A, Noble, DG, O'Brien, D, Pescott, OL, Purvis, A, Simkin, J, Smith, A, Stanbury, AJ, Villemot, J, Walker, KJ, Walton, P, Webb, TJ, Williams, J, Wilson, R, Gregory, RD, Mordue, S, al Fulaij, N, Boersch-Supan, PH, 2023. State of Nature 2023. the State of Nature partnership.
- CBD, 2022. Global Biodiversity Framework: 2030 Targets (with Guidance Notes) [WWW Document]. URL <https://www.cbd.int/gbf/targets> (accessed 11.20.24).
- Chen, I.-C., Hill, J.K., Ohlemüller, R., Roy, D.B., Thomas, C.D., 2011. Rapid Range Shifts of Species Associated with High Levels of Climate Warming. *Science* 333, 1024–1026. <https://doi.org/10.1126/science.1206432>
- Climate Change Committee, 2023a. Progress Report: Reducing emissions in Wales. Climate Change Committee.
- Climate Change Committee, 2023b. Adapting to climate change: Progress in Wales. Climate Change Committee.
- Climate Change Committee, 2020. Advice Report the path to a net zero wales. Climate Change Committee.
- Convention on Biological Diversity, 1992.
- Ein Bro - Our Vale, 2023. The Vale of Glamorgan Public Service Board Well-being Plan 2023-2028.
- Ein Bro - Our Vale, 2022. A View of the Vale of Glamorgan - An Assessment of Current and Future Well-being [WWW Document]. URL <https://sway.cloud.microsoft/E2aJI1MxUhMAYPYU?ref=Link&loc=play>
- Environment Agency, 2022. Severn River Basin Management Plan summary and cross border catchments (England and Wales) [WWW Document]. Gov.uk. URL <https://www.gov.uk/government/publications/severn-river-basin-management-plan-summary-and-cross-border-catchments-england-and-wales/severn-river-basin-management-plan-summary-and-cross-border-catchments-england-and-wales> (accessed 11.19.24).
- G7 Alliance on Nature Positive Economies, 2023. Terms of Reference: G7 Alliance on Nature Positive Economies [WWW Document]. URL <https://g7anpe.com/> (accessed 11.18.24).
- HM Treasury, 2021. Final Report - The Economics of Biodiversity: The Dasgupta Review. HM Treasury.
- IPBES, 2019a. Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Zenodo. <https://doi.org/10.5281/ZENODO.6417333>

- IPBES, 2019b. Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Zenodo. <https://doi.org/10.5281/ZENODO.6417333>
- IPCC, 2023. Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC, Geneva, Switzerland.
- IPCC, 2018. Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.
- JNCC, 2023. UKBI - B5a. Air pollution. Area affected by acidity and area affected by nitrogen [WWW Document]. URL <https://jncc.gov.uk/our-work/ukbi-b5a-air-pollution/#background-table-b5a-ii-percentage-area-of-sensitive-uk-habitats-exceeding-critical-loads-for-acidification-and-eutrophication-by-country-for-2020>
- Leaders' Pledge for Nature, 2020. Leaders' pledge for nature: United to reverse biodiversity loss by 2030 for sustainable development [WWW Document]. Leaders' Pledge for Nature. URL [https://www.leaderspledgefornature.org/wp-content/uploads/2021/06/Leaders\\_Pledge\\_for\\_Nature\\_27.09.20-ENGLISH.pdf](https://www.leaderspledgefornature.org/wp-content/uploads/2021/06/Leaders_Pledge_for_Nature_27.09.20-ENGLISH.pdf) (accessed 10.30.23).
- Netherwood, A., 2021. Summary for Wales (CCRA3-IA). UK Climate Risk. URL <https://www.ukclimaterisk.org/publications/summary-for-wales-ccra3-ia/> (accessed 3.14.24).
- NRW, 2023a. Nature and Us - a national initiative on the future of the Welsh natural environment [WWW Document]. URL <https://naturalresources.wales/about-us/what-we-do/our-projects/nature-projects/nature-and-us-natur-a-ni-1/?lang=en>
- NRW, 2023b. Protected sites baseline assessment 2020 [WWW Document]. URL <https://naturalresources.wales/evidence-and-data/research-and-reports/protected-sites-baseline-assessment-2020/?lang=en>
- NRW, 2022a. Dee River Basin Management Plan 2021 - 2027 Summary.
- NRW, 2022b. Western Wales River Basin Management Plan 2021 - 2027 Summary.
- NRW, 2021a. WFD Cycle 3 baseline 2021 Classification Frequently Asked Questions.
- NRW, 2021b. The Second State of Natural Resources Report (SoNaRR2020) : Land use and soil, SoNaRR2020.
- NRW, 2021c. The Second State of Natural Resources Report (SoNaRR2020) Assessment of the achievement of sustainable management of natural resources: Resource Efficiency Waste.
- NRW, 2020. The Second State of Natural Resources Report (SoNaRR2020) [WWW Document]. URL <https://naturalresources.wales/evidence-and-data/research-and-reports/state-of-natural-resources-report-sonarr-for-wales-2020/?lang=en>
- NRW, Natural England, 2024. PaNS Wales; PaNSW People and Nature Survey for Wales, 2021-People and Nature Survey for Wales, 2021-2022: Open Access. <https://doi.org/10.5255/UKDA-SN-9300-1>
- Oaten, J., Finch, D., Frost, N., 2024a. Understanding the likely scale of deterioration of Marine Protected Area features due to coastal squeeze: Volume 1 – Methodology (No. 789). Natural Resources Wales, Bangor.

- Oaten, J., Finch, D., Frost, N., 2024b. Understanding the likely scale of deterioration of Marine Protected Area features due to coastal squeeze: Volume 2 – Results & Discussion. (No. 789). Natural Resources Wales, Bangor.
- Office for National Statistics, 2024. UK natural capital accounts: 2024 [WWW Document]. Office for National Statistics. URL <https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/uknaturalcapitalaccounts/2024>
- Office for National Statistics, 2023. UK Natural Capital Accounts: 2023 - detailed summary [WWW Document]. Office for National Statistics, Economy, Environmental accounts. URL <https://www.ons.gov.uk/economy/environmentalaccounts/datasets/uknaturalcapitalaccounts2023detailedsummary> (accessed 1.4.24).
- Pascual, U., Balvanera, P., Anderson, C.B., Chaplin-Kramer, R., Christie, M., González-Jiménez, D., Martin, A., Raymond, C.M., Termansen, M., Vatn, A., Athayde, S., Baptiste, B., Barton, D.N., Jacobs, S., Kelemen, E., Kumar, R., Lazos, E., Mwampamba, T.H., Nakangu, B., O'Farrell, P., Subramanian, S.M., van Noordwijk, M., Ahn, S., Amaruzaman, S., Amin, A.M., Arias-Arévalo, P., Arroyo-Robles, G., Cantú-Fernández, M., Castro, A.J., Contreras, V., De Vos, A., Dendoncker, N., Engel, S., Eser, U., Faith, D.P., Filyushkina, A., Ghazi, H., Gómez-Baggethun, E., Gould, R.K., Guibrinet, L., Gundimeda, H., Hahn, T., Harmáčková, Z.V., Hernández-Blanco, M., Horcea-Milcu, A.-I., Huambachano, M., Wicher, N.L.H., Aydın, C.İ., Islar, M., Koessler, A.-K., Kenter, J.O., Kosmus, M., Lee, H., Leimona, B., Lele, S., Lenzi, D., Lliso, B., Mannetti, L.M., Merçon, J., Monroy-Sais, A.S., Mukherjee, N., Muraca, B., Muradian, R., Murali, R., Nelson, S.H., Nemogá-Soto, G.R., Ngouhou-Poufoun, J., Niamir, A., Nuesiri, E., Nyumba, T.O., Özkaynak, B., Palomo, I., Pandit, R., Pawłowska-Mainville, A., Porter-Bolland, L., Quaas, M., Rode, J., Rozzi, R., Sachdeva, S., Samakov, A., Schaafsma, M., Sitas, N., Ungar, P., Yiu, E., Yoshida, Y., Zent, E., 2023. Diverse values of nature for sustainability. *Nature* 620, 813–823. <https://doi.org/10.1038/s41586-023-06406-9>
- Public Health Wales, n.d. Social Prescribing [WWW Document]. URL <https://phw.nhs.wales/services-and-teams/primary-care-division/social-prescribing/>
- Robbins, K., Armstrong, S., Frost, N., 2022a. Understanding how management of the Welsh MPA network can contribute to the protection and enhancement of blue carbon (No. Report No: 630). Natural Resources Wales, Bangor.
- Robbins, K., Armstrong, S., Williamson, D., Frost, N., Hull, S., 2022b. The Blue Carbon Potential of the Marine Protected Area Network in the Welsh Marine Environment (No. 631), NRW Evidence Report. Natural Resources Wales, Bangor., Bangor.
- Rollett, A., Williams, J., 2022a. An assessment of the current landbank in Wales (No. SPEP202- 21/10), 2020-21 Soil Policy Evidence Programme. Welsh Government and Natural Resources Wales.
- Rollett, A., Williams, J., 2022b. Constraints to nutrient recovery and recycling to agricultural land in Wales (No. SPEP2020- 21/10). Welsh Government.
- Smart, S.M., Walker, C., Sier, A.R.J., Seaton, F., Kirby, K.J., Wood, C.M., 2024. Fifty years of change across British broadleaved woodlands: A resurvey and analysis of the “Bunce” sites 1971-'01-'21. UK Centre for Ecology & Hydrology 110p.

Smith, F., 2021. The Welsh Government's use of policy tools for mainstreaming equalities. Wales Centre for public Policy.

Taskforce on Nature-related Financial Disclosure, 2024. TNFD Adopters [WWW Document]. Taskforce on Nature-related Financial Disclosures. URL [https://tnfd.global/engage/tnfd-adopters-list/?\\_sfm\\_adoption\\_year=2025&\\_sfm\\_hq-country=United%20Kingdom%20of%20Great%20Britain%20and%20Northern%20Ireland%20\(the](https://tnfd.global/engage/tnfd-adopters-list/?_sfm_adoption_year=2025&_sfm_hq-country=United%20Kingdom%20of%20Great%20Britain%20and%20Northern%20Ireland%20(the)

UK National Ecosystem Assessment, 2011. The UK National Ecosystem Assessment: Synthesis of the Key Findings.

UNEA, 2022. Resolution adopted by the United Nations Environment Assembly on 2 March 2022 5/5. Nature-based solutions for supporting sustainable development.

UNEP, 2021. For people and planet: the UNEP strategy for 2022-2025.

UNEP, 2019. Global Environment Outlook 6. UNEP.

UNFCCC. Secretariat, 2024. Nationally determined contributions under the Paris Agreement. Synthesis report by the Secretariat (Synthesis reports).

United Nations et al, 2021. System of Environmental-Economic Accounting—Ecosystem Accounting (SEEA EA). White cover publication, pre-edited text subject to official editing. Available at: <https://seea.un.org/ecosystem-accounting>.

Welsh Government, 2024a. Wellbeing of Wales: 2024.

Welsh Government, 2024b. Climate Adaptation Strategy for Wales. Welsh Government.

Welsh Government, 2024c. Written Statement: Publication of Emissions Data for 2022 [WWW Document]. URL <https://www.gov.wales/written-statement-publication-emissions-data-2022#:~:text=The%20territorial%20emissions%20data%20released,compare%20to%20base%20year%5B1%5D>

Welsh Government, 2024d. Welsh Government Annual Report 2024.

Welsh Government, 2024e. Environment (Air Quality and Soundscapes) (Wales) Act 2024. Statute Law Database.

Welsh Government, 2023a. The Agriculture (Wales) Act 2023: Introducing the Sustainable Land Management Framework.

Welsh Government, 2023b. Consultation Document. Review of Wales' Renewable Energy Targets.

Welsh Government, 2023c. Energy generation in Wales: 2022.

Welsh Government, 2023d. Noise and Soundscape Plan for Wales 2023-2028. Welsh Government.

Welsh Government, 2022a. Wellbeing of Wales: national indicators [WWW Document]. URL <https://www.gov.wales/wellbeing-wales-national-indicators>

Welsh Government, 2022b. Biodiversity deep dive: recommendations.

Welsh Government, 2022c. All Wales Plan 2021-2025: Working Together to Reach Net Zero. Welsh Government, Cardiff.

Welsh Government, 2021a. Future Wales: The National Plan 2040.

Welsh Government, 2021b. Wales commits to net zero by 2050, but sets out ambitions to get there sooner [WWW Document]. Wales commits to net zero by 2050, but sets out ambitions to get there sooner. URL <https://www.gov.wales/wales-commits-net-zero-2050-sets-out-ambitions-get-there-sooner> (accessed 11.18.24).

Welsh Government, 2021c. Climate change targets and carbon budgets [WWW Document]. URL <https://www.gov.wales/climate-change-targets-and-carbon-budgets>

Welsh Government, 2021d. Net Zero Wales Carbon Budget 2 (2021 to 2025). Welsh Government.

Welsh Government, 2021e. Net zero carbon status by 2030: A route map for decarbonisation across the Welsh public sector.

Welsh Government, 2021f. CLIMATE CHANGE, WALES The Environment (Wales) Act 2016 (Amendment of 2050 Emissions Target) Regulations 2021.

Welsh Government, 2021g. Beyond Recycling: A strategy to make the circular economy in Wales a reality. Welsh Government.

Welsh Government, 2019. Welsh National Marine Plan.

Welsh Government, 2017. Natural Resources Policy.

World Economic Forum, 2024. The Global Risks Report 2024.

END