Adaptation and the nature emergency

September 2023

Climate Change Committee

Summary and key findings

This briefing provides advice on the linkages between climate adaptation and the nature emergency.

To complement the independent assessment of the Welsh Climate Change Adaptation Programme, the Climate Change Committee was asked to advise on the "interrelationships between climate change adaptation and the nature emergency". This briefing considers how adapting to a changing climate strongly aligns with the actions needed to address the nature emergency, and describes how synergies can be captured across policy objectives and trade-offs managed.

The key messages are:

- **Nature underpins societal wellbeing, including adaptation to climate change and economic prosperity in Wales**. It is vital that our natural habitats are healthy to ensure they provide the multitude of key benefits to people and the economy.

- **Climate change, in conjunction with the loss and degradation of natural habitats, will progressively lead to population declines in species and endanger their survival**. This will occur as their ecological requirements are compromised, their geographic range is affected, their vital life cycle events are disrupted, and the health of their habitats is eroded.

- **Nature protection and recovery, and habitat management strategies will have to consider and plan for climate impacts if they are to deliver stated aims**. Key risks to natural ecosystems from climate change should be identified so as to better understand the direction of travel and types of impacts.

- **Correctly designed nature recovery strategies can help to tackle the joint nature-climate crises**. To optimise synergies and minimise trade-offs between nature recovery, climate mitigation and climate adaptation objectives, the full impact on ecosystems of actions to address the climate and nature emergencies must be considered when designing policy measures.

- **Nature-based solutions (NbS) can be an effective tool to deliver nature recovery and build social and ecological resilience to climate change**. Lessons learned from the successes and challenges of existing interventions should be considered in the design of future NbS projects.

- **We outline eight principles for good climate adaptation planning for nature**. Integrating these principles into the adaptation planning process will support efforts to improve the health of nature and its resilience to climate change.

This briefing is set out in three sections:

1. The importance of nature to people and the economy in Wales.

2. Considering the impacts of a changing climate on nature in Wales.

3. Principles for addressing the joint nature and climate emergencies.

(a) The declaration of a nature emergency in Wales

The Senedd declared a nature emergency in 2021.

The Senedd declared a "nature emergency" in 2021 in the lead up to the United Nations Convention on Biological Diversity conference (COP15). The declaration recognised the interlinkages between the climate and nature emergencies and prioritised the need to address biodiversity loss alongside climate change.[1] It references the 17% of species studied in Wales classified as threatened with extinction and acknowledges the significant biodiversity loss caused by humans. The Senedd emphasised the need for statutory domestic targets to reverse biodiversity loss and to establish an independent environmental governance body for Wales.

(b) The state of nature in Wales

One in six monitored species in Wales is threatened with extinction.

Global biodiversity declines are at levels unprecedented in human history.[2,3] Wales is no exception, where one in six monitored species is threatened with extinction and the country has failed to reach international biodiversity goals.[4] Efforts to monitor and manage species and habitat condition are hampered by a lack of relevant of data.[5,6] What data there is presents a concerning picture. A Wales-specific IUCN Red List assessment shows that 18% of plants, 18% of lichens, 20% of fungi, 18% of mosses and 32% of mammals are now classified as at the risk of extinction.[*,7] More than one in four monitored bird species in Wales is classed as of highest conservation concern (i.e. at risk of extinction) − a doubling since 2002, while the average species' abundance of butterflies has more than halved (down 52%) since 1976.[8,9] Climate change is projected to magnify the scale and intensity of the drivers of biodiversity decline, such as habitat loss, overexploitation and threats from invasive species.

(c) Nature's contribution to economic and societal resilience in Wales

Nature provides a range of ecosystem services that deliver multiple benefits to people and the economy.

Flourishing, biodiverse natural ecosystems are not only valuable in their own right, they also provide a multitude of benefits to people and the economy (see Figure 1).[10] When healthy, our natural habitats can reduce the risk of flooding, help reduce coastal erosion, conserve and enhance natural carbon stores, improve people's health and wellbeing, maintain healthy soils to support food and fibre provision, help facilitate the supply of clean water to the public and businesses, and support the rich biodiversity that underpins ecosystem functionality and thereby sustains us.

* International Union for Conservation of Nature (IUCN).

Figure 1 Trends in the ability of nature to sustain contributions to people

Source: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (2019) *Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services,* https://zenodo.org/record/6417333.

Enhancing and maintaining the health and functionality of natural habitats in Wales is also fundamental to the government's ability to meet its overarching policy objectives. This relates not only to environmental goals, but also societal and economic objectives, including Net Zero, economic growth and societal resilience.

Improving the health of nature is key to the Government meeting its high-level policy objectives, including for climate.

- **Nature plays a crucial role in supporting climate objectives**. Restoring and maintaining healthy peatland and native woodlands can contribute to Net Zero by reducing emissions and enhancing carbon removal and storage. If designed correctly, such measures can also help build climate resilience through safeguarding ecosystem services provided by nature, such as flood mitigation and water filtration (see Box 1).

- **Economic prosperity is strongly dependent on nature**. Primary production industries like farming, forestry and fisheries rely on healthy ecosystems and species to provide key natural inputs. For instance, healthy soils enhance crop and tree production, while healthy seas support thriving fish populations.

- **Nature enhances urban environments, while reducing their vulnerability to climate change impacts**. By integrating nature into urban planning, the quality of urban environments can be improved for both people and nature, while building resilience to the impacts of climate change. This can be achieved through creating green and blue infrastructure within towns and cities, which bring a range of benefits. For instance, urban trees not only contribute to carbon uptake and air purification but also soak up excess water and reduce the 'urban heat island effect'.

- **Nature improves our health and well-being**. There is strong scientific evidence that natural green space plays a vital role in supporting human health and wellbeing.[11] Access to nature improves our physical and mental health by reducing stress, providing green spaces for exercise and recreation, improving air quality, and offering shade on sunny days. Ensuring a healthy and resilient natural environment It will be key to meeting the statutory duties under the Well-being of Future Generations (Wales) Act 2015.

Box 1
Synergies and trade-offs between nature conservation and climate policy

The climate and nature crises are closely intertwined, and one cannot effectively be resolved without addressing the other. Consequently, efforts taken to tackle these urgent issues often yield synergistic outcomes. This means that actions benefiting nature can also contribute to climate resilience and mitigation. However, it is important to acknowledge that pursuing multiple objectives simultaneously inevitably introduce tensions, and potential trade-offs will require careful management.

A good illustration of synergy can be found in the context of riverine tree planting. Using a diverse range of native tree stocks can provide habitat and food to local biodiversity, mitigate against climate risks such as flooding and higher water temperatures, while simultaneously increasing carbon sequestration and storage capability.

Nonetheless, actions supporting nature will not always automatically align with short-term climate objectives and vice versa. For example, climate mitigation measures, such as promoting extensive tree and bioenergy crop planting, can inadvertently harm biodiversity and undermine ecosystem functionality if located in the wrong place. In particular, relying on fast-growing, non-native conifers may yield quick carbon sequestration gains but at the expense of resilience and the broader array of benefits offered by native broadleaved trees, such as supporting biodiversity and healthy soils. Additionally, failing to consider the appropriate selection and placement of tree species in the context of a changing climate, and using single species rather than diverse plantations, will very likely lead to long-term challenges regarding permanence.

To optimise synergies and minimise trade-offs among nature recovery, climate mitigation, and climate adaptation objectives, it is crucial to adopt a holistic, systems-based approach by thoroughly assessing the potential impacts and interdependencies of actions taken to address the climate and nature emergencies on ecosystems and the communities dependent upon them. This holistic approach should be considered when designing policies.

(a) Risks to nature from climate change

Nature faces a multitude of impacts from changing climatic conditions.

The increasing exposure of species worldwide to climate change leads to range shifts as well as changes in life cycles and population dynamics. This coupled with habitat loss and degradation disrupts ecological communities and undermines the health and stability of ecosystems. Climate change is projected to be an increasingly significant driver of biodiversity loss in the coming decades, resulting a range of effects including:[12,13]

- **Loss of habitats**. Climate change will significantly change or destroy certain habitats. For example, climate risk of sea-level rise to coastal habitats and species in Wales is projected to increase from medium currently to high in the future. The National Habitats Creation Programme has projected Welsh habitats could lose 4,663 ha by 2105.*[,14]

- **Distributional shifts in species**. Climate change is driving many species to move away from the equator or upslope as they track their preferred ecological niche.† Warming seas will alter marine species' distributions as they move to waters with preferred temperatures – or, if they don't, could face extinction. Analyses show the northern range margins of 77 southerly distributed bird species in Britain have shifted northwards by an average of 13.5 km during the study period.‡[,15] In some cases, however, an expansion and/or shift in range could enhance species richness and contribute to community adaptation to climate change.[16]

- **Life cycle disruption (phenological change)**. Climate change is disrupting the timing of key lifecycle events. Many species, including some birds, amphibians and butterflies, are now breeding earlier in the UK compared to the 1970s.[17,18,19] This will lead to ecological mismatches, where, for instance, plants may flower earlier but pollinators may not align with this change, causing population declines and increasing the risk of local extinctions.

The challenges of mitigating and adapting to climate change must not be assessed in isolation from meeting other sustainable development goals. These challenges are interconnected and often exacerbate each other, creating new risks and uncertainties for both people and nature.

(b) Planning for climate change to ensure nature is resilient

An adaptive approach is needed to plan for current and future climate change in Wales.

Understanding the extent to which climate change is (and could in the future be) driving biodiversity loss in Wales is an important prerequisite to developing an adaptive approach to building the resilience of nature under a changing climate. This requires conservation management plans to include consideration of the impact on species and ecosystems of current and future climate risk. A rigorous process of monitoring and evaluation should be embedded within plans to assess the effectiveness of adaptation actions.

* Assuming current rates of SLR continue.

† Refers to species shifting to higher elevations, particularly montane species.

‡ Study period covers the British Trust for Ornithology's 1988–91 and 2007–11 atlases.

The plans could include the following steps:

- **Identify climate risks to nature**. Effective planning for climate change first requires the identification of associated risks so as to better understand the direction of travel and types of impacts. Areas identified as at risk should be assessed in terms of both level of vulnerability and scale of exposure. The third UK Climate Change Risk Assessment outlines key risks to nature in Wales.[20]

  – Evidence presented in the 'Living with Environmental Change' biodiversity report card can also be used to assess how climate change effects terrestrial and freshwater species and habitats in Wales. The last report card was published in 2015.[21]

The Welsh Government should include explicit recognition of climate risks to natural ecosystems in all existing frameworks and adaptation plans.

- **Embed climate change considerations into all plans**. Adaptive conservation management plans should include explicit recognition of the risks to natural ecosystems from climate change. These should consider the Lawton Review principles (bigger, better, more and connected habitats) for adapting nature to the challenges of a changing climate. Plans should be SMART – specific, measurable, attainable, relevant and time-bound. A good plan will have clearly stated outcomes that are appropriate in the context of the short-term and long-term effects of climate change. These plans should be implemented across all layers of the Welsh Government to ensure that there is a unified approach.

  – Wales is yet to introduce a legally binding requirement to reverse biodiversity loss through statutory targets. The Welsh Government has committing to supporting the 30 by 30 target, through which it will develop nature networks and enhance the role of protected areas to create more resilient landscapes.* The Nature Recovery Action Plan sets out adaptation actions to maintain and enhance ecological networks in Wales. The update to the State of Nature report will be crucial in understanding whether the plan is successful in its aims.[22,23]

- **Establish and undertake monitoring and evaluation**. Measuring the effectiveness of actions against changing climate risks is vital to assess how the health of nature and the services it provides change over time. This should be supported by the development of baseline datasets for biodiversity and ecosystems services, supported with sophisticated metrics to inform how nature is responding to climate change. This will enable adaptation actions (and associated responses) to be evaluated and adjusted as needed.

The most recent assessment of terrestrial and freshwater habitats and species show that around half of features are in an unknown condition.

  – The most recent assessment by Natural Resources Wales (NRW) shows that around half of the features assessed within terrestrial and freshwater habitats under statutory protection are in an unknown condition. The assessment of marine protected sites shows an improved knowledge base with only 9% in an unknown condition. Additional data are required to support NRW to fully assess the health of these systems.[24,25] NRW has also provided extensive information on nature in Wales through the State of Natural Resources reports; these build on the DECCA framework for ecosystem resilience (Diversity, Extent, Condition, Connectivity and Aspects of ecosystem resilience).[26]

* Aims to protect 30% of terrestrial, freshwater, coastal and marine areas by 2030.

- **Create an enabling environment for nature recovery**. Key enablers play a critical role in supporting delivery, although not all may be adaptation-specific. Clear adaptation goals and sustainable investment are essential, providing the framework for skills, jobs, and policies needed to achieve adaptation plans. This helps businesses select metrics aligned with national objectives to assess their adaptation progress. Enabling good governance is also vital, involving stakeholders in a just transition for nature and climate.

  – NRW has published a practical guide for stakeholders involved in implementing environmental policies and undertaking activities that bolster ecosystem resilience. The guide explains the framework behind designing Resilient Ecological Networks (RENs) that build on the principles of sustainable management of natural resources (SMNR). The guide clearly states that developing RENs for environmental management involves a cross-section of stakeholders in the planning and design process and aligns their collaborative approach with those outlined in the Well-being of Future Generations Act 2015. The guide also outlines nine principles of the SMNR to maintain and enhance ecosystem resilience and biodiversity in accordance with the Environment (Wales) Act 2016.[27]

(c) Options for adaptation interventions in nature

There are a range of intervention options for adaptation in nature, such as riverine planting and restoring coastal and freshwater habitats.

To build the resilience of natural ecosystems to the effects of climate change, adaptative interventions should aim to protect and restore habitats, provide diverse conditions, and improve connectivity between areas. The framework of Resist-Accept-Direct (RAD) is also a well-established adaptative management approach that is helping to steer conservation action. The approach classifies climate adaptation options into three strategies along a continuum with increasing acceptance of ecological change.[28,29] In extreme situations, active intervention via translocations and reintroductions may be necessary for species that cannot track their preferred climate niche. Carefully designed and implemented nature-based solutions (NbS) can offer cost-effective approaches to respond to the joint nature-climate crises (See Box 2). Examples include:

- **Restoring and protecting coastal habitats** such as sand dunes or saltmarsh to create habitat for wildlife, whilst providing benefits to humans such as reducing storm surge flooding, protecting carbon stores, and attracting visitors to boost the local economy.

- **Expansion of diverse woodlands and hedgerows** with native species to provide habitat and supporting biodiversity, while helping to mitigate soil erosion, improve carbon storage, and reduce flood risk downstream.

- **Restoring and maintaining peatlands** to provide habitat for plants and wildlife, while supporting their ability to deliver co-benefits such as improved soil and water quality, biodiversity, and carbon sequestration and storage capacity.

- **Restoring rivers, floodplains and wetlands** to improve native biodiversity, while creating co-benefits to humans such as slowing the flow of floodwater and encouraging water infiltration to recharge depleted underground aquifers.

- **Implementing agroforestry** (trees on pasture or among crops) to help protect and replenish soils, sequester carbon, diversify farm income, while providing shade, habitat and shelter for nature, crops and livestock.

Box 2
Examples of joint nature recovery and climate resilience projects

There are many examples within Wales and elsewhere of effective interventions that support nature recovery and build the resilience of natural ecosystems to climate change. Learning from the successes and challenges of these interventions should be considered in the design of future projects.

Restoring peatland habitats in Wales. NRW is leading on Wales's first National Peatland Action Programme. The initiative aims to help deliver the Welsh Government's Peatland Policy ambition.*,30 It was designed to coordinate land interventions and policy to reduce fragmentation of peatland restoration efforts across Wales. The Programme focuses on six priority themes: peatland erosion, drainage, the sustainable management of blanket peatlands and lowland peatlands, the restoration of forested peatlands, and the gradual restoration of the highest carbon-emitting peatlands. It incorporates actions required in Wales's national adaptation plan that address both the climate and nature emergencies, recognising that the good condition of peatlands has significant benefits for biodiversity, water quality and carbon sequestration and storage. Over 1,650 ha of peatlands were restored in the first two years of the Programme, exceeding the annual restoration target of 600 to 800 ha.[31]

Coastal realignment in West Sussex. The project in Medmerry, West Sussex is one of the largest open coast managed realignments in Europe. Its objective is to improve the condition of coastal habitats and reduce vulnerability of local communities to annual flood risk. Interventions have included the creation of 183 ha of intertidal saltmarsh and mudflat habitat and 263 ha of other priority habitats, as well as enhancing 3,402 ha of protected sites from 'unfavourable' to 'recovering' condition. The project reduced annual risk of flooding from 100% to 0.1%, estimated as a £78 million cost saving.† Other benefits were estimated to be worth £90 million over 100 years, mainly in terms of the 'existence value' of the biodiversity on the site.[32]

Restoration of seagrass in North and West Wales. Swansea University are working with a range of NGOs, UK governments and other stakeholders to develop strategies for seagrass restoration in the UK. The project is managed by WWF Cymru and aims to restore 10 ha of seagrass meadow in Anglesey and the Llyn Peninsula. The team has planted two ha meadows of seagrass at a pilot site in Dale and is planning to plant over five million seagrass seeds by 2026.[33] Globally, seagrass captures carbon up to 35 times faster than tropical rainforests.[34] If degraded, however, seagrass becomes a source of emissions rather than a sink.[35] Other co-benefits to humans from seagrass restoration include support to the local fishing industry through its provision of important habitat for marine biodiversity, including fish stocks.

Green finance initiatives to restore native UK rainforest. Aviva is funding a new £38 million programme through the Wildlife Trusts to restore and expand native temperate rainforest in the west of the UK and Isle of Man; the investment is part of Aviva's wider Climate-Ready initiative and will support nature restoration schemes with adaptation, mitigation and biodiversity benefits. One site scheduled to be restored to woodland is at Bryn Ifan, Gwynedd in North Wales. Interventions include a mix of native planting and natural regeneration over 40 hectares. Oak, birch, alder and other broadleaf species will be planted and the site will, over time, connect up further vulnerable fragments of rainforest, which are strongholds for rare mosses, lichens and species of conservation concern in the UK such as the pied flycatcher. Working with the local communities, other actions covered in the project included the implementation of nature-friendly farming practices.[36]

* To ensure that "all peatlands with semi-natural vegetation are subject to favourable management/restoration (a minimum estimated area of 30,000 ha)" and that at least 25% of the most modified areas of peatland is restored by 2025.

† Present value over 100 years.

3. Principles for addressing the joint nature & climate emergency

We outline eight principles for jointly addressing the nature and climate emergencies.

The Welsh Government has an essential role to play in enabling nature to adapt to climate change, with added co-benefits for people too. Integrating the principles set out below into the next set of adaptation planning will strengthen the framework for climate risk assessments and adaptation action.

1. **Set out a vision and supporting strategy for a healthy, resilient natural environment in Wales**. The next national adaption plan in 2024 is a key opportunity to set out the vision for what adaption in Wales should achieve and should include a framework of associated targets. It is important that due regard is given to the multiple ways people understand and value nature to help ensure equitable distribution of the benefits it provides, including those for climate resilience. It must detail how policies will harmonise action to address the joint climate and nature crises, optimising synergies and minimising trade-offs. The vision should mainstream adaptation as a part of the forthcoming Biodiversity Strategy for Wales and delivery of the Nature Networks Programme.

2. **Support nature to adapt to climate change**. This includes: making space for nature and the ecological processes underpinning ecosystem health; creating opportunities for species to disperse across landscapes; restoring and connecting habitats; and enhancing the diversity and condition of native species and habitats, where appropriate.

3. **Reduce other pressures on nature**. Through reducing habitat loss, reversing degradation, minimising pollution, preventing unsustainable use, controlling pests and diseases, and working to eliminate invasive non-native species.

4. **Identify suitable nature-based solutions (NbS) to support climate and nature goals**. NbS interventions can include: restoring coastal ecosystems and native vegetation in catchments to improve biodiversity and moderate peak flows; bringing nature into cities; and adapting agroforestry to build soil health in agricultural lands.

5. **Monitoring and evaluation**. This must be supported with targets for nature, improved baseline data and a comprehensive suite of quantitative metrics to monitor and evaluate the effectiveness of adaptive interventions.

6. **Access to sustainable funding**. Government alone is unable to cover the costs of enhancing the resilience of nature to climate change. Plans for the new Sustainable Farming scheme indicate funding for measures that support the land's ability to adapt to changing climate conditions. However, greater participation by private investment, including through blended financing routes, is needed to help bridge the funding/financing gap, stimulated by the right incentives. Environmentally harmful subsidies must be repurposed or replaced by subsidies and other incentives that encourage environmentally sustainable practices.

7. **Collaboration and cooperation**. Interventions must work with stakeholders via a participatory process to develop locally meaningful and effective adaptation strategies. Projects should incentivise and secure local participation in the design, implementation and monitoring of interventions.

8. **Green jobs and skills**. Create a detailed plan and supporting policies that ensure there are sufficient workers with the skills needed to deliver a nature-positive, Net Zero and climate-resilient future. This includes, trialling new approaches to upskilling in sectors where climate and nature actions will require new skills.

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Adaptation and the nature emergency
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