Nature-based Positivity: Protecting Critical Habitats and Natural Resources in a Changing Climate

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Introduction

Biodiversity loss and climate change are inseparable issues. Rising global temperatures, shifting rainfall patterns, and the increasing frequency and severity of extreme weather events are accelerating species decline and degrading habitats (IPCC, 2023). The IPCC warns that, even at 1.5 °C warming, already threatened wetland ecosystems such as peatlands, salt marshes, and coral reefs face further irreversible loss (IPCC, 2022a). Meanwhile, the degradation of biodiversity further destabilises the climate system. Deforestation, peatland drainage, and coastal wetland erosion release vast amounts of stored carbon, and, together with species loss, reduce the resilience of ecosystems to climate shocks and decrease their capacity to deliver ecosystem services essential to our wellbeing and economies. Safeguarding biodiversity is therefore not only a matter of conservation but also a critical strategy for climate mitigation and adaptation, as well as for the future well-being of humanity.

Climate and Biodiversity in Ireland

Ireland reflects these global pressures, with 85% of EU-protected habitat types in "unfavourable" condition, decline in many species groups (Department of Housing, Local Government, and Heritage, 2024; NPWS, 2019; EEA, 2025), and almost half of Irish waterways in unsatisfactory ecological condition (EPA, 2025). Furthermore, the interaction of human-driven climate change with other direct human pressures on the environment is amplifying biodiversity loss:

- *Peatlands:* droughts and atmospheric warming are accelerating the drying of bogs, releasing stored carbon and undermining one of Ireland's most important natural carbon sinks. Despite Ireland holding 8% of the world's blanket bogs, just 1% remain active, placing both biodiversity and climate stability at risk. Restoration is urgently required under the EU Nature Restoration Regulation (European Commission Representation in Ireland, 2021; Thompson, 2022; Irish Peatland Conservation Council, 2025).
- *Water stress and pollution:* an increase in the frequency of intense rainfall events enhances nutrient runoff from agricultural landscapes, thereby exacerbating eutrophication and hypoxia in rivers, lakes, and estuarine systems (IPCC, 2023), which reduces aquatic biodiversity. Eutrophication from nitrogen-based fertilisers and wastewater affects 40% of Ireland's rivers and 20% of estuarine waters, driving algal blooms and oxygen loss (Schindler, 2004; Freiberg, 2023; Toner et al., 2025).
- *Coastal and marine ecosystems:* rising sea temperatures, ocean acidification, and deoxygenation are placing pressure on fish, shellfish, and seabirds, driving a northward shift of marine species typical of Irish waters (Nolan *et al.*, 2023). Human activities, including coastal development, habitat modification, and pollution, together with sea-level rise, are eroding vital breeding, feeding, and nursery grounds, weakening biodiversity and the resilience of coastal systems (IPCC, 2023).
- *Species decline:* birds, plants, and pollinators are increasingly threatened by habitat destruction and degradation, pollution, over-exploitation and the spread of invasive species, as well as increasing pressures from climate change. Over 26% of Irish bird species are Red Listed, with climate-driven shifts in migration patterns and breeding timing further exacerbating population declines (NPWS, 2019; EPA, 2021a; Department of Housing, Local Government, and Heritage, 2024).

The combined effects of biodiversity loss and climate change create a feedback loop: climate change accelerates ecosystem decline, while degraded ecosystems release more carbon and provide less resilience against increased temperatures and extreme weather.

National and European Responses
Ireland's commitments under the EU Green Deal and Clean Industrial Deal frameworks—including the EU Biodiversity Strategy for 2030, EU Nature Restoration Law, Soil Monitoring Law, Nature Directives, Water Framework Directive, Marine Strategy Framework Directive, Farm to Fork Strategy, Food Waste Reduction Targets, Blue Economy policies, the National Biodiversity Action Plan, the National Adaptation Framework, and others—include measures such as:

- **Peatland and coastal wetland restoration** to re-establish natural carbon sinks and biodiversity hotspots.
- **Sustainable water management** to reduce nutrient pollution and strengthen aquatic ecosystems against climate stress.
- **Marine and coastal protection** to build resilience to sea-level rise and ocean warming.
- **Circular economy pathways** under the EPA's 2021–2027 programme to reduce waste, resource use, and associated greenhouse gas emissions (EPA, 2021b).
- **Reforestation and afforestation** with native species to enhance carbon sequestration and habitat connectivity.
- **Agroecological and regenerative farming** practices that improve soil health, increase biodiversity, and store carbon.
- **Urban greening and green/blue infrastructure** to mitigate heat, manage stormwater, and enhance urban biodiversity.
- **Habitat restoration and connectivity** projects for rivers, hedgerows, and woodlands to strengthen ecosystem resilience.
- **Pollinator and species-specific conservation** initiatives to safeguard declining wildlife and maintain ecosystem services.

These measures directly link climate action with biodiversity restoration, positioning Ireland to meet both national and international obligations.

Trinity College Dublin's Role
Trinity College Dublin (TCD) is advancing biodiversity and climate resilience through research, education, campus operations, and by facilitating collaborations among stakeholders. Trinity's Sustainability Strategy recognises that climate change and biodiversity loss need to be addressed in an integrated way and has several initiatives to do so, including the Decarbonisation Plan, Biodiversity Plan, Campus Travel Plan and Food Plan. Key targets of the TCD Strategy include:

- *Nature Positive by 2030 and Net-zero by 2040:* TCD aims for a 51% GHG reduction by 2030, embedding nature-positive management and nature-based solutions across campus. (Trinity College Dublin, 2024a).
- *Circular economy in practice:* Campus-wide waste reduction and reuse initiatives to minimise ecosystem disruption and reduce emissions (Trinity College Dublin, 2025).
- *Climate, biodiversity, and water research*: TCD has a range of research expertise, centres and projects at the nexus of climate and biodiversity research, including:
    - The Co-centre for Climate + Biodiversity + Water, which researches solutions for preventing and living with climate change, protecting and restoring ecosystems, developing sustainable economies, and improving quality of life.
    - The Trinity Water Centre drives transdisciplinary research to deliver innovative solutions for global water and climate challenges, advancing water security, sustainability, and societal well-being.
    - The Climate Gateway connects research, policy, and community action to lead Ireland's shift toward climate resilience and decarbonisation.

    - The Trinity AIB Climate Hub unites researchers to tackle urgent global challenges — from climate stability and biodiversity loss to ecosystem resilience and water sustainability.
    - The Future Cities Research Centre brings together researchers across disciplines to drive just, sustainable, and resilient urban transitions through collaboration with communities, policymakers, and industry.
    - Peatland restoration research projects such as *RePEAT* (mapping peatlands) (RePEAT, 2025) and *WET-PEAT* (restoration with Bord na Móna, EPA, and University of Galway) (Peatlands & People, 2022), address both biodiversity loss and carbon release, advancing Ireland's capacity to restore important terrestrial carbon sinks.
    - Farmland restoration research projects such as ReFarm (implementing on-farm nature restoration measures) and RestPoll (restoring pollinators on farmland) contribute to win-win actions for climate and nature on Irish farmland.
- *Pollinator conservation:* pollinator research at Trinity College Dublin stimulated the development of, and continues to inform, the All-Ireland Pollinator Plan (AIPP). Trinity's own campus pollinator plan, following the AIPP's approach, aims to contribute to halting and reversing pollinator decline by embedding biodiversity into research, education, and land management. Beyond protecting food security and access to healthy diets, pollinator restoration delivers significant climate co-benefits: pollinator-rich and biodiverse meadows and hedgerows enhance carbon sequestration, strengthen ecosystem resilience changes in climate, and support climate-adaptative agriculture by improving plant health and productivity without chemical dependence. As such, pollinator-focused actions contribute directly to NbS and long-term resilience.

TCD's integrated approach demonstrates how academic institutions can act as catalysts for systemic solutions to the interlinked climate and biodiversity crises. Together, these initiatives enhance resilience, support food security, and align Ireland with COP30 priorities on nature-based solutions, the Global Biodiversity Framework, and climate justice. (National Biodiversity Data Centre, 2021; Trinity College Dublin, 2024a).

Recommendations
To safeguard biodiversity, strengthen Ireland's leadership, and deliver on COP30 priorities, Ireland must emphasise the climate–biodiversity feedback loops:

1. *Scale up Nature-based Solutions (NbS):* restore peatlands, wetlands, and coastal habitats as cost-effective tools for climate adaptation and mitigation, in line with policy obligations.
2. *Integrate NbS into infrastructure projects and engage with the private sector:* for example, link biodiversity restoration with renewable energy development (e.g., offshore wind farms) to reduce costs and maximise resilience (Ding & McLaren, 2025).
3. *Strengthen circular economy pathways:* expand EPA and SEAI support for a circular biobased economy, renewable technologies, and nutrient recycling to reduce waste and emissions.
4. *Embed biodiversity in education and research:* expand modules, community partnerships, and living labs to mainstream biodiversity and eco-literacy across society.
5. *Leverage Ireland's leadership at COP30:* showcase national and academic initiatives, positioning Ireland as a model for nature-positive climate action.

Conclusion
Ireland faces profound biodiversity challenges, yet it also holds unique opportunities to lead globally through restoration, circular economy innovation, and nature-based solutions. By acting decisively now, supported by robust research, education, and policy integration, Ireland can become a nature-positive nation by 2030, delivering climate resilience for both people and nature.

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