AGILE INITIATIVE

OXFORD MARTIN SCHOOL

UNIVERSITY OF OXFORD

The Role of Critical Natural Infrastructure in Supporting National Security

PRIORITY POLICY QUESTIONS: SUMMARY OF KEY FINDINGS

Environment and National Security: Exploring the Risk Pathways

July 2026

About

This document is one of a series of reports from the Agile Initiative's Environment and National Security: Exploring the Risk Pathways project. The Priority Policy Questions: Summary of Key Findings reports respond to questions emerging from discussions with policymakers. Designed to be concise and accessible, each provides a list of key findings, a synthesis of available scientific evidence, a graphic illustrating the pathways between environmental pressures and national security, an explanation of the implications for UK national security, a list of priority policy recommendations, and description of relevant uncertainties and evidence gaps.

The Priority Policy Questions Series

- The role of critical natural infrastructure in supporting national security
- Managing demand: energy security, food security and UK national security
- Climate risks and opportunities for maritime shipping and UK trade
- Environment-driven mobilities and UK national security
- Weaponisation of nature
- Environment and social resilience

AGILE INITIATIVE

Policy Questions

Q1

What is the evidence linking ecosystem health and biodiversity to national security, both in the UK and overseas?

Q2

What are the highest priority interventions to reduce the risks caused by loss and degradation of Critical Natural Infrastructure?

Summary

Nature is central to national security as it provides the essential goods and services that make life on Earth possible, including food, water, oxygen, a habitable climate and protection from hazards. Urgent intervention is needed to protect Critical Natural Infrastructure from unsustainable human activities.

Priority assets at risk

- **Tropical forests** and **ocean ecosystems** which sustain global carbon, oxygen and water cycles, where further degradation could trigger climate tipping points
- **Wild pollinators and pest predators** where declining populations could limit crop production globally and threaten the integrity of all land-based vegetated ecosystems
- **High grade farmland**, which is at risk from floods, droughts and soil degradation
- **Urban green infrastructure,** which is vital for climate resilience and human health and wellbeing but is under threat from development pressures

Impact on national security: Natural systems are core infrastructure on which food security, water security, public health, economic stability, and social resilience depend. Climate tipping points and loss of pollinators risk global-scale reductions in food production, leading to food price spikes, social unrest, loss of trust in governments, and competition and conflict over resources. In the UK, without intervention, reduced domestic food production due to flood and drought stress will affect most of our high-grade farmland, and communities will be harmed as stress increases on productivity and human health from overheating and flooding in urban areas.

Priority recommendations

- **Essential natural assets and systems must be recognised and protected as Critical Natural Infrastructure**.

- **Joined-up policies across government are urgently needed** including stronger protection for Critical Natural Infrastructure in planning policy, consistent agri-environment funding, and stronger action on climate, pollution, over-fishing, and data centre energy and water use.

- **The UK should maintain its global leadership role** on climate and biodiversity through i) its convening and organising power, which requires leading by example, ii) multilateral climate and biodiversity funding and iii) scientific excellence and knowledge exchange.

Uncertainties

There is strong evidence to show that urgent action is necessary to protect and restore critical ecosystems. Further research is needed on the impact of ocean ecosystem degradation on the biological carbon pump, the impact of loss of wild pollinators and pest predators on ecosystem integrity, and how to avert future climate and ecological tipping points.

Key Findings

Compounding risks from nature degradation threaten national and global security, due to the impacts on climate change, food security, water availability, societal resilience, and geopolitical conflict over limited resources (HIGH CONFIDENCE).

Critical natural systems are being degraded to the point where major ecosystems on land and at sea are showing signs of collapse (HIGH CONFIDENCE).

Ecosystem degradation leads to the release of large quantities of carbon that is currently stored in soils, vegetation and oceans (HIGH CONFIDENCE). These additional carbon emissions would increase global temperatures further (HIGH CONFIDENCE). This could **trigger climate tipping points** that pose existential risks to humanity (HIGH CONFIDENCE).

Tropical forests are at high risk of transitioning to a drier state such as savanna, reducing their ability to sequester carbon (HIGH CONFIDENCE).

Ocean ecosystems are under multiple pressures which weaken the 'biological carbon pump', potentially resulting in release of large quantities of stored carbon from the ocean (LOW CONFIDENCE).

UK food security faces compounding risks, including:

- **Declining populations of wild pollinators and pest predators** limits crop production and threatens the integrity of all land-based vegetated ecosystems (MEDIUM CONFIDENCE)
- **High grade farmland in the UK** is at high risk from floods, droughts and soil degradation (HIGH CONFIDENCE).
- **Tropical rainforest degradation reduces rainfall generation** in adjacent areas that are critical for food production, including soya for UK livestock feed (MEDIUM CONFIDENCE).

Urban green infrastructure is vital for climate resilience and human health and wellbeing but is at risk due to development pressures (HIGH CONFIDENCE).

Biodiversity decline threatens financial stability[1] (HIGH CONFIDENCE). Half of global economic activity (about US$58 trillion) relies directly on nature.[2]

Evidence Synthesis

Critical natural systems are being degraded to the point of collapse. Since humans appeared on Earth, the biomass of wild mammals has declined by 82%, the extent and condition of natural ecosystems has almost halved and one in four species are now at risk of extinction.[3] This is due to habitat loss, over-exploitation (fishing, harvesting, hunting, grazing, water use), climate change, pollution and invasive non-native species.[4]

Global climate regulation: Tropical forests and oceans

Forests and oceans absorb about half of the CO_2 emissions from fossil fuels and land use[5] but this vital service is at risk.

Tropical rainforests are a priority concern: over 58% of all carbon emissions from land-use change over the last decade were from the three main rainforest nations (Brazil, Democratic Republic of the Congo and Indonesia);[5] mainly from deforestation to produce global commodities such as soy and palm oil.

Maintaining healthy and intact forests is critical to provide resilience to climate change. For example, fragmented forests are hotter, drier and more susceptible to fires; and decline of fruit-eating animals reduces seed dispersal and forest regrowth.[6] Climate change combined with deforestation is already reducing the absorption of CO_2 from the atmosphere in parts of the Amazon, and continued degradation would see large areas shift from absorbing to emitting CO_2.[5]

Ocean carbon storage is also at risk due to multiple pressures on ocean ecosystems including climate change, pollution and overfishing (especially of keystone species such as whales and krill). Oceans store 85% of the Earth's carbon[7] and absorb about 29% of the CO_2 emissions generated by human activities. Most of this dissolves directly into the water (the "solubility pump"), but some is absorbed by plankton and other marine organisms as they grow. This carbon sinks deep into the ocean and is entrained into slow-moving currents which return to the surface in upwelling zones many decades later, releasing CO_2 back into the air. Although this "biological carbon pump" is broadly at equilibrium today, large scale loss of marine life could mean that not enough CO_2 will be absorbed to replace that being released in the upwelling zones, leading to net loss of stored carbon from the ocean. These processes are complex and poorly understood.

Loss of carbon stored in forests and oceans will increase the risk of triggering climate "tipping points". Five tipping points are already at risk of being crossed today and three more will be at risk if we exceed 1.5°C of warming, expected in the next few years under current policies.[8] For example, it would increase the risk of collapse of the Atlantic Meridional Overturning Circulation (AMOC),[9] which regulates the global climate by transferring heat from the tropics to Europe but is already showing warning signs of approaching a critical transition.[10] This could lead to loss of half the area suitable for growing

wheat and maize globally, with colder winters, hotter summers and much drier and stormier conditions in much of northern Europe[11] making most forms of arable farming unfeasible in the UK.[8]

Tropical forests play a key role in rainfall generation. They receive 35% of all rainfall on land and recycle much of this back into the atmosphere via evaporation and transpiration, producing rain that sustains both the forest itself and regions down-wind. For example, the Amazon forest supplies rain to the huge La Plata Basin to the south, producing much of South America's food (including most of the UK's soy for livestock feed) and hydroelectricity.[12] Similarly, the Congo rainforest delivers rain to much of East Africa.[13]

There are wider impacts on food security and livelihoods from the pressures on ocean and forest ecosystems, including for the 3.3 billion people reliant on the ocean for nutrition and livelihoods.[14] Stress caused by food and water insecurity is likely to undermine societal resilience and adaptive capacity, leading to risks for global political stability.

Policy implications

There is an urgent need to halt further degradation of tropical forests and ocean ecosystems to prevent cascading global impacts on climate, food, water, livelihoods, societal resilience and political stability. The UK can play a key role through strong global leadership.

UK food security: Pollinators and pest predators

UK crop and livestock production is at risk from climate change. 13% of all agricultural land and about 59% of Grade 1 farmland in England is at risk of flooding from rivers and the sea,[15] with much of the rest being at risk of drought.

These risks are exacerbated by declining populations of wild pollinators and pest predators. Globally, nearly 90% of wild flowering plant species and over 75% of food crops rely fully or partly on pollination by animals, mainly insects.[16] This includes many crops which are vital for human nutrition (fruits, vegetables, pulses, nuts and oilseeds) and cash crops that underpin local or national economies, including coffee, cocoa and almonds. Animal pollination not only increases yield but also yield stability and crop quality, making food production more resilient and profitable. However, wild pollinators are in decline globally, with occurrence of bees, hoverflies and moths falling by an average of 18% between 1970 and 2020 in the UK.[17]

There is a growing reliance on managed honeybees for pollination services, but these increase the cost of food production and compete with wild pollinators, which can provide higher and more stable yields than managed honeybees alone.[18]

Similarly, many of the insects that provide pest control services are in global decline.[19] **In the UK, distribution of crop pest predators decreased by 34%** from 1970 to 2020 (including ants, beetles, hoverflies, dragonflies and wasps).[18] This increases reliance on expensive and environmentally damaging pesticides.

Encouragingly, **England's pollinator strategy may have helped to increase the occurrence of some wild bees** that pollinate crops, through agri-environment funding for hedgerows and wildflower strips,[20] and the banning of three neonicotinoid pesticides that kill bees.[21]

However, **wild pollinators are also vital for wider ecosystems beyond cropland**. A third of all flowering plants (including trees, shrubs and wildflowers) will not produce seeds without pollinators, with many depending on specific pollinators adapted to their flower shape.[22] Pollinator diversity therefore underpins ecosystem resilience by preserving overall plant diversity and productivity.

Policy implications

To maintain affordable and reliable supplies of crops which are vital for human nutrition and to sustain ecosystems and their services, it is vital to act to conserve populations of wild pollinators and pest predators in the UK and globally.

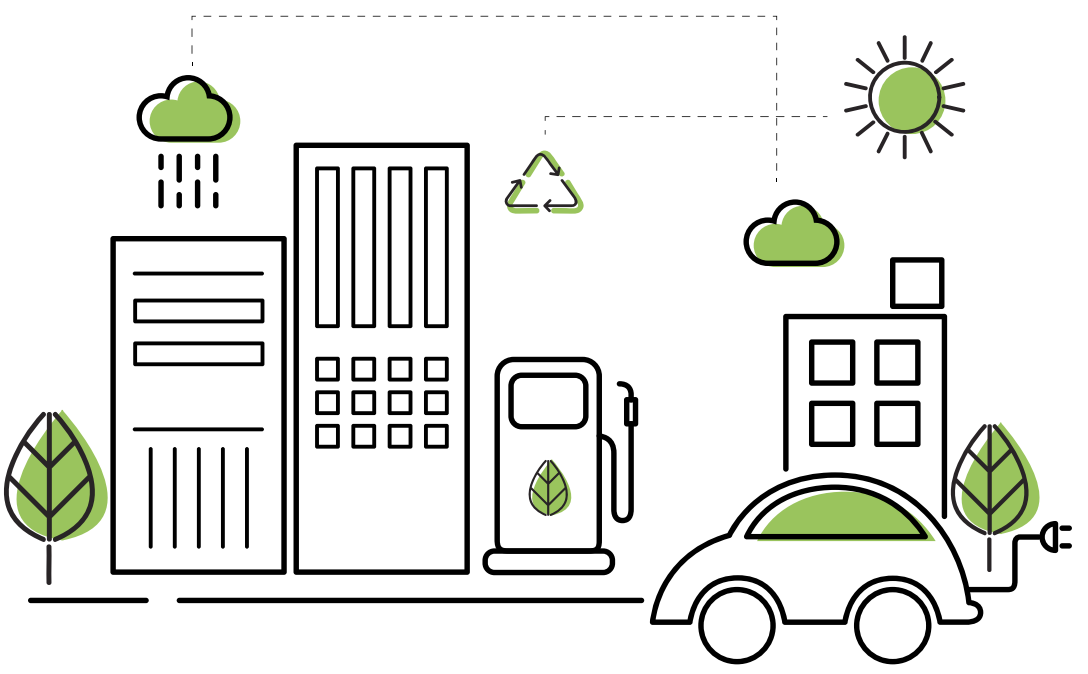
Local climate resilience: urban green infrastructure

By 2050, a third of homes in the UK could be at risk of flooding and **92% at risk of overheating** under 2°C of warming, or 100% under 4°C. **Green infrastructure can play a key role in climate resilience**. Parks and other green spaces, urban trees, green roofs and walls and sustainable drainage systems can cost-effectively reduce flooding and provide shade and cooling.[23] They also support human health and well-being through providing opportunities for recreation, social interaction, and nature connection,[24] helping to build societal resilience.

However, green infrastructure is under threat from development.[32] Recent changes to planning policy have exempted over 90% of all developments from the requirement to deliver biodiversity net gain, disproportionately affecting deprived communities[25] who are left in "nature poverty", without access to green space for recreation, stress reduction, and cooling during heatwaves.

Policy implications

Planning policy needs to be strengthened to protect existing green spaces and ensure that climate-resilient green infrastructure is built into all new developments.



Implications for UK National Security

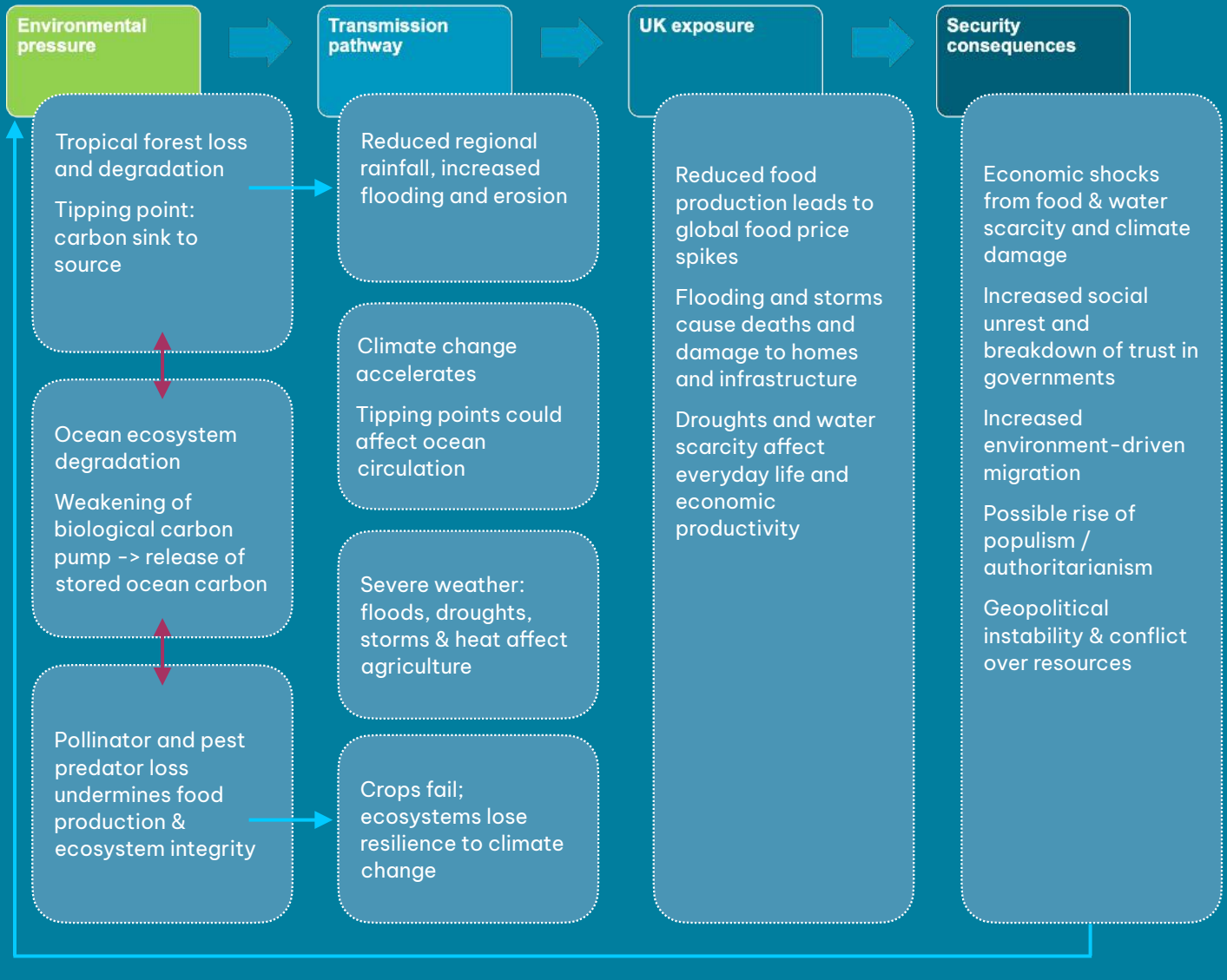
- **Forest and ocean degradation could lead to cascading impacts** for global climate and regional rainfall patterns, triggering further climate and ecological tipping points. **This could be exacerbated by loss of wild pollinators** creating cascading risks for entire ecosystems and their services, including loss of carbon storage.[26] These impacts would cause **widespread food and water insecurity**, leading to economic shocks, and escalating geopolitical competition and instability.

The UK is vulnerable to global pollinator decline. If pollinators go extinct globally, the average crop price will almost triple.[27] Combined with the loss of food production from high grade land in the UK, this could lead to severe food scarcity, especially for the most nutritious foods.

Strong governance and global leadership are urgently needed to mitigate these risks to national and global security. It is also vital to **invest in climate resilience** in the UK. **Nature-based solutions** offer cost-effective options to improve agricultural resilience (e.g. agroforestry for cooling and shading livestock) and protect people from floods and heatwaves (e.g. urban green infrastructure and saltmarsh creation for coastal protection), reducing the need for high-cost and resource-intensive options such as sea walls and air conditioning.

Causal Pathway

This diagram shows how degradation of critical natural systems creates cascading risks for climate, food and water security, leading to economic shocks, social instability and conflict over limited resources. Governance determines the level of impact. Weak environmental governance can enable further ecosystem degradation, including through environmental crime which can fund the activities of violent and extremist organisations and organised crime groups. Strong governance can protect and restore Critical Natural Infrastructure and systems, enable investment in climate and ecological resilience, such as through urban green infrastructure, agroecology and other nature-based solutions, and build societal resilience, turning cascading risks into cascading benefits.



Intervention point: Governance determines protection for critical natural infrastructure, climate resilience of infrastructure and agriculture, and societal resilience to risk

Policy Recommendations

Recognise key natural assets and systems as Critical Natural Infrastructure alongside assets in sectors such as defence, energy, health, transport and water. Critical Natural Infrastructure must be incorporated into national resilience planning, national security assessment, and infrastructure investment decisions.

Continue with strong policies to phase out fossil fuels as these are the main driver of climate change, which is destabilising critical natural systems. By continuing to show strong global leadership, including the commitment to Net Zero emissions and the ban on exploiting new oil and gas fields, the UK can help to reinforce multilateral action in the face of backsliding by some political actors. However, greater focus is needed on resource efficiency, including through shifts in consumer decisions on energy use, transport, aviation and diets.[28]

Protect remaining intact ecosystems both at home and abroad. Ecosystems take decades to centuries to recover from disturbance, and any further losses to stored carbon cannot be restored in the short window of time available to avoid tipping points.[29] Key measures include ending import of the products of illegal deforestation in line with the Glasgow leaders' declaration on forests and land use,[30] sponsoring the Tropical Forests Forever Facility, ending overfishing, banning bottom trawling in Marine Protected Areas, and protecting oceans from sewage, agricultural and microplastic pollution.

Strengthen Critical Natural Infrastructure globally via international engagement on Multilateral Environmental Agreements and nature finance activities, Official Development Assistance funding for overseas climate and biodiversity initiatives, and action on sustainable commodity supply chains. In particular, UK contributions to the Global Environmental Facility need to be restored and maintained. The UK could also show **leadership on addressing global pollinator and pest predator decline**, building on the success of our agri-environment schemes and pollinator action plan.

Strengthen agri-environment funding for climate-resilient farming, pollinators and pest predators. Higher and more consistent funding is urgently needed for scrubby and flower-rich habitats to support pollinators and pest predators, and for agroforestry, healthy soils and natural flood management to boost resilience to floods, droughts and heatwaves.

Investigate how to reduce overstocking of managed honeybees to protect wild bees.

Avoid loss of grade 1 and 2 farmland to development or afforestation by strengthening the current planning policy requirement in England to use lower grade farmland "if available".[31]

Build local climate resilience through nature-based solutions. Strengthen protection for existing green space in the

planning system,[32] ensure that new developments include high-quality green infrastructure that meets the Natural England GI Standards, mandate use of multifunctional Sustainable Drainage Systems (SuDS) in all new developments and major retrofits in England by implementing Schedule 3 of the 2010 Flood and Water Management Act and include strategically placed shade trees in all new developments.

Increase investment in Natural Flood Management schemes, wetland restoration and managed realignment as a cost-effective route for tackling the growing flood risk to UK houses, infrastructure and farmland.

Tighten planning rules to prevent building of houses and infrastructure on floodplains. The current wording in the draft revised NPPF allows building of houses, schools, hospitals and other infrastructure (including data centres) on floodplains if an emergency evacuation plan is in place. In England, 30% of the new homes built in 2024 were in locations at risk of flooding by 2050.[33]

Align climate and biodiversity policies to avoid climate actions that damage critical ecosystems. This includes mining of the seabed or in tropical forests to provide critical minerals needed for batteries and renewable energy, and risky geoengineering options such as iron fertilisation of the oceans to stimulate plankton growth[34], sinking large amounts of seaweed,[35] and extraction of biomass from natural forests to use for bioenergy or BECCS.[36]

Invest in a circular economy approach, sustainable supply chains and demand management to reduce pressures on ecosystems. Greater re-use and recycling can help reduce demand for mineral and metal extraction from oceans and forests; shifting to more sustainable plant-rich diets, can reduce forest loss for soy and cattle farming; sustainable energy use and transport patterns can reduce fossil fuel emissions, and 80% of the water supply deficit in the next 10 years could be met through efficiency standards, behaviour change in household and businesses, and fixing water leaks,[37] reducing the need and cost of new water supply infrastructure. These actions also have **co-benefits for health and wellbeing**, helping to build societal resilience.

Tackle the growing environmental risks from data centres. In the UK, plans for 71 new data centres would use 20 GW of electricity, over half of the current UK total (37 GW). The Artificial Intelligence industry has publicly stated that roll-out of data centres to meet their energy needs require fossil fuels and is incompatible with climate targets. Data centres also pose severe risks to water supplies and ecology in many areas. Communities in the USA report steep increases in water and energy bills and destruction of wildlife habitat following large-scale roll-out of huge data centres without local consultation. These risks now pose an existential threat to global sustainability that must be urgently tackled.

Recommendation	Lead depts	Time	Evidence	Complexity	Dependencies / trade-offs
Recognise key natural assets & systems as Critical Natural Infrastructure	Cabinet Office, HM Treasury, MHCLG, Defra, Natural England, Environment Agency, DBT, DESNZ	0-2y	HIGH	LOW	Political will
Strengthen policies to phase out fossil fuels	Cabinet Office, HM Treasury, DESNZ, MOD	0-2y	HIGH	MEDIUM	Tackle disinformation; enhance public understanding
Strengthen protection for tropical forests	Defra, FCDO, DBT, HM Treasury	0-2y	HIGH	MEDIUM	Business engagement
Strengthen protection for ocean ecosystems (pollution and overfishing)	Defra, FCDO, HM Treasury	0-2y	HIGH	MEDIUM	Vested interests (fishing, water, plastics)
Strengthen multilateral climate and biodiversity funding	HMT, FCDO, Defra, DESNZ	0-2y	HIGH	LOW	Funding availability
Strengthen agri-environment funding for pollinators, pest predators & climate resilience	Defra, HM Treasury	0-2y	HIGH	LOW	Funding availability
UK leadership on pollinator action	Defra, FCDO, Natural England	0-2y	HIGH	LOW	Vested interests (pesticides)
Protect high grade farmland from development or afforestation	MHCLG, Defra	0-2y	HIGH	LOW	Vested interests (developers, forestry)
Protect existing urban green infrastructure (GI) and create high quality GI in new developments	MHCLG, Natural England, Environment Agency	0-2y	HIGH	LOW	Vested interests (developers)
Align climate and biodiversity policies to avoid damaging trade-offs	DESNZ, Defra, MHCLG, Environment Agency	0-2y	HIGH	LOW	Joined-up governance
Accelerate circular economy action to reduce pressure on natural resources	DBT, Defra, DESNZ, DSIT	0-2y	HIGH	MEDIUM	R&D, business engagement
Tackle data centre risks from energy and water use and habitat loss.	CO, MHCLG, DSIT, DBT, DESNZ, Defra	0-2y	HIGH	HIGH	Vested interests (AI industry)

Uncertainty and Priority Evidence Gaps

- Current evidence on the need for urgent action to protect and restore critical ecosystems is strong. Further research is needed but this should not delay action.

Key issues include

- The impact of ocean ecosystem degradation on the biological carbon pump
- The impact of loss of wild pollinators and pest predators on ecosystem integrity and associated social and economic effects
- Early warning indicators and mitigation strategies on climate and ecological tipping points.

References

[1] NGFS 2023. Nature-related financial risks: a conceptual framework to guide action by central banks and supervisors. *Network for Greening the Financial System*. https://www.ngfs.net/sites/default/files/medias/documents/ngfs_conceptual-framework-on-nature-related-risks.pdf

[2] Evison, W. et al. 2023. Managing nature risks: From understanding to action (strategy+business). *PwC*. www.pwc.com/managing-nature-risks

[3] IPBES 2019. Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. *IPBES Secretariat*. https://doi.org/10.5281/zenodo.3553579

[4] IPBES 2024. Thematic assessment report on the underlying causes of biodiversity loss and the determinants of transformative change and options for achieving the 2050 vision for biodiversity of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. *IPBES Secretariat*. https://doi.org/10.5281/zenodo.11382215

[5] Friedlingstein et al. 2026. Global carbon budget 2025. *Earth System Science Data* 18(5): 3211–3288. https://doi.org/10.5194/essd-18-3211-2026

[6] Brodie, J. F. et al. 2025. Defaunation impacts on the carbon balance of tropical forests. *Conservation Biology* 39(1): e14414. https://doi.org/10.1111/cobi.14414

[7] Calculated from the values in Figure 2 of the Global Carbon Budget 2025, Friedlingstein et al 2025.

[8] Lenton, T. M. et al. 2023. The global tipping points report 2023. *University of Exeter*. file:///Users/timothyclack/Downloads/GTP-Introduction-071223.pdf

[9] Ritchie et al. 2020. Shifts in national land use and food production in Great Britain after a climate tipping point. *Nature Food* 1(1): 76–83. https://doi.org/10.1038/s43016-019-0011-3

[10] Boers, N. 2021. Observation-based early-warning signals for a collapse of the Atlantic Meridional Overturning Circulation. *Nature Climate Change* 11(8): 680–688. https://doi.org/10.1038/s41558-021-01097-4

[11] Jackson, L. C. et al. 2015. Global and European climate impacts of a slowdown of the AMOC in a high resolution GCM. *Climate Dynamics* 45(11): 3299–3316. https://doi.org/10.1007/s00382-015-2540-2

[12] Molina, R. D. et al. 2019. Forest-induced exponential growth of precipitation along climatological wind streamlines over the Amazon. *Journal of Geophysical Research: Atmospheres* 124(5): 2589–2599. https://doi.org/10.1029/2018JD029534; Posada-Marín, J. A. et al. 2026. The transboundary precipitation shed of a non-transboundary watershed: emerging challenges for water resources management. *Water Resources Management* 40(3): 110. https://doi.org/10.1007/s11269-025-04450-w; Posada-Marín, J. A. et al. 2026. The transboundary precipitation shed of a non-transboundary watershed: emerging challenges for water resources management. *Water Resources Management* 40(3): 110. https://doi.org/10.1007/s11269-025-04450-w

[13] Finney, D. L. et al. 2020. The effect of westerlies on East African rainfall and the associated role of tropical cyclones and the Madden–Julian Oscillation. *Quarterly Journal of the Royal Meteorological Society* 146(727): 647–664. https://doi.org/10.1002/qj.3698

[14] Teshome, M. 2024. Charting the systemic and cascading impacts of climate change on marine food systems and human health. *BMJ Global Health* 8(Suppl. 3): e014638. https://doi.org/10.1136/bmjgh-2023-014638

[15] Environment Agency 2025. National assessment of flood and coastal erosion risk in England 2024. *GOV.UK*. https://www.gov.uk/government/publications/national-assessment-of-flood-and-coastal-erosion-risk-in-england-2024/national-assessment-of-flood-and-coastal-erosion-risk-in-england-2024

[16] IPBES 2016. The assessment report on pollinators, pollination and food production: summary for policymakers. S.G. Potts et al (eds.). *Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. https://files.ipbes.net/ipbes-web-prod-public-files/spm_deliverable_3a_pollination_20170222.pdf

[17] State of Nature Partnership 2023. State of nature 2023. *State of Nature Partnership*. https://stateofnature.org.uk/wp-content/uploads/2023/09/TP25999-State-of-Nature-main-report_2023_FULL-DOC-v12.pdf

[18] IPBES 2016. The assessment report on pollinators, pollination and food production: summary for policymakers. S.G. Potts et al (eds.). *Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. https://files.ipbes.net/ipbes-web-prod-public-files/spm_deliverable_3a_pollination_20170222.pdf

[19] Cardinale, B. J. et al. 2026. Nature's role in national security. *Nature-Based Solutions* 9: 100330. https://doi.org/10.1016/j.nbsj.2026.100330.

[20] Powney, G. D. 2019. Widespread losses of pollinating insects in Britain. *Nature Communications* 10(1): 1018. https://doi.org/10.1038/s41467-019-08974-9

[21] Defra 2025. Press release: government rakes action to protect bees from pesticides. *GOV.UK*. https://www.gov.uk/government/news/government-takes-action-to-protect-bees-from-pesticides

[22] J.G. Rodger, J.M. et al. 2021. Widespread vulnerability of flowering plant seed production to pollinator declines. Science Advances 7(42): eabd3524. https://doi/10.1126/sciadv.abd3524

[23] Choi, C. et al. 2021. The climate benefits, co-benefits, and trade-offs of green infrastructure: a systematic literature review. *Journal of Environmental Management* 291: 112583. https://doi.org/10.1016/j.jenvman.2021.112583

[24] Smith, A. et al. 2023. Embedding nature recovery in the Levelling-up and Regeneration Bill: Agile Initiative research brief. *Agile Initiative*. https://www.agile-initiative.ox.ac.uk/wp-content/uploads/2023/03/LevelUp_Policy_Brief_v5.pdf

[25] Laville, S. 2026. England's poorest areas face deepest cuts to green space under planning law changes, report funds. *The Guardian*. https://www.theguardian.com/environment/2026/jun/04/englands-poorest-communities-face-deepest-cuts-green-space-planning-law-changes-report-warns

[26] Rafferty, N. E. and Cosma, C. T. 2024. Sustainable nature-based solutions require establishment and maintenance of keystone plant-pollinator interactions. *Journal of Ecology* 112(11): 2432-2441. https://doi.org/10.1111/1365-2745.14353

[27] Uwingabire, Z. and Gallai, N. 2024. Impacts of degraded pollination ecosystem services on global food security and nutrition. *Ecological Economics* 217: 108068. https://doi.org/10.1016/j.ecolecon.2023.108068

[28] CCC 2025. Progress in reducing emissions – 2025 report to Parliament. *Climate Change Committee*. https://www.theccc.org.uk/publication/progress-in-reducing-emissions-2025-report-to-parliament/

[29] Locke, H. et al. 2026. Nature positive: halting and reversing biodiversity loss toward restoring Earth system stability. *Frontiers in Science 4*. https://doi.org/10.3389/fsci.2026.1609998

[30] NGO Forest Coalition 2026. MPs and peers send an open letter calling for regulations on forest risk commodities. *APPG on Global Deforestation/ NGO Forest Coalition*. https://ngoforestcoalition.org/2026/04/27/mps-and-peers-send-an-open-letter-calling-for-regulations-on-forest-risk-commodities/

[31] Smith, A. and Chapman, K. 2026. Aligning the draft National Planning Policy Framework with the Land Use Framework or England. *Leverhulme Centre for Nature Recovery*. https://naturerecovery.ox.ac.uk/outputs/planning-for-nature/

[32] Smith, A. and Chapman, K. 2026. Aligning the draft National Planning Policy Framework (NPPF) with the Land Use Framework (LUF). *Leverhulme Centre for Nature Recovery*. https://naturerecovery.ox.ac.uk/outputs/briefing-aligning-planning-policies-for-nature/

[33] Aviva 2026. Proportion of new homes built in flood areas rises to one in nine. *AVIVA*. https://www.aviva.com/newsroom/news-releases/2026/02/proportion-of-new-homes-built-in-flood-areas-rises-to-one-in-nine/

[34] Tagliabue, A. 2023. Ocean iron fertilization may amplify climate change pressures on marine animal biomass for limited climate benefit. *Global Change Biology* 29(18): 5250–5260. https://doi.org/10.1111/gcb.16854

[35] Chopin et al. 2024. Deep-ocean seaweed dumping for carbon sequestration: questionable, risky, and not the best use of valuable biomass. *One Earth* 7(3): 359–364. https://doi.org/10.1016/j.oneear.2024.01.013

[36] Searchinger, T. D. 2026. Decades of increased emissions from forest-fuelled BECCS. *Nature Sustainability* 1–12. https://doi.org/10.1038/s41893-026-01817-8

[37] CCC 2026. A well-adapted UK: the fourth independent assessment of UK climate risk (CCRA4-IA). *Climate Change Committee*. https://www.theccc.org.uk/wp-content/uploads/2026/05/A-Well-Adapted-UK-CCRA4-IA-784y9813-3094039i85t59yhfufoub24f2bipdj1.pdf

[38] Gabbatiss, J. 2026. Emissions from the new data centres set to drive the UK's AI "revolution" could be hundreds of times higher than government estimates, according to analysis by Carbon Brief. *Carbon Brief*. https://www.carbonbrief.org/analysis-co2-from-uk-data-centres-could-be-hundreds-of-times-higher-than-thought/

[39] Giordano, E. 2026. Europe must choose between AI and climate goals, data center lobby says. *Politico*. https://www.politico.eu/article/europe-choose-ai-climate-goals-data-center-chief-warns/

[40] Williams, Z. 2026. 'We're up against forces that have all the money in the world': Erin Brockovich on her battle against AI datacentres. *The Guardian*. https://www.theguardian.com/environment/2026/jun/29/were-up-against-forces-that-have-all-the-money-in-the-world-erin-brockovich-on-her-battle-against-ai-datacentres

Suggested Citation

Smith, A., Bator, J., O'Callaghan-Brown, Clack, T., Seddon, N., Malhi, Y., and Slim, H., T. 2026. The role of critical natural infrastructure in supporting national security. *Agile Initiative/ Oxford Martin School*.

Environment and National Security Project Team

Clack, T. (Principal Investigator), Smith, A. Ingram, J., Zurek, Fawcett, T., M, Hall, J., Keith, M., Schwanen, T., Slim, H., Singh, I., Wilhelm, K., Seddon, N., Malhi, Y., Behrens, P., Fankhauser, S., Shearing, P., Sen, A., Baroud, H., Steiner, A., Veríssimo, D., Selisny, L., Wetzer, T., Bator, J., O'Callaghan-Brown, T., Archer-Brown, E., Lumma, J., McCook, A., Bond, I., Randazzo, T., Salihoğlu, A., Antonaccio, V., Bounds, M., Chung, J., Khan, N. and Curry, A.

Acknowledgements

The Environment and National Security: Exploring the Risk Pathways is an Agile Initiative research project. The Agile Initiative is supported by the Natural Environment Research Council as part of the Changing the Environment Programme (NERC grant reference number NE/W004976/1).

The project team are immensely grateful for input from numerous government departments, statutory organisations and military services. These include (in alphabetical order): British Army, Cabinet Office, Climate Change Committee, Defra, DESNZ, Dstl, Environment Agency, FCDO, HM Treasury, Met Office, MOD, MHCLG, Natural England, Royal Navy and UKHSA. Thank you to the Agile Initiative team and School of Anthropology and Museum Ethnography for critical project support. Dan Seddon provided design services.

Get In Touch

timothy.clack@anthro.ox.ac.uk
agile@oxfordmartin.ox.ac.uk

https://www.agile-initiative.ox.ac.uk/sprints/environment-and-national-security

UKRI Natural Environment Research Council

AGILE INITIATIVE | OXFORD MARTIN SCHOOL | UNIVERSITY OF OXFORD