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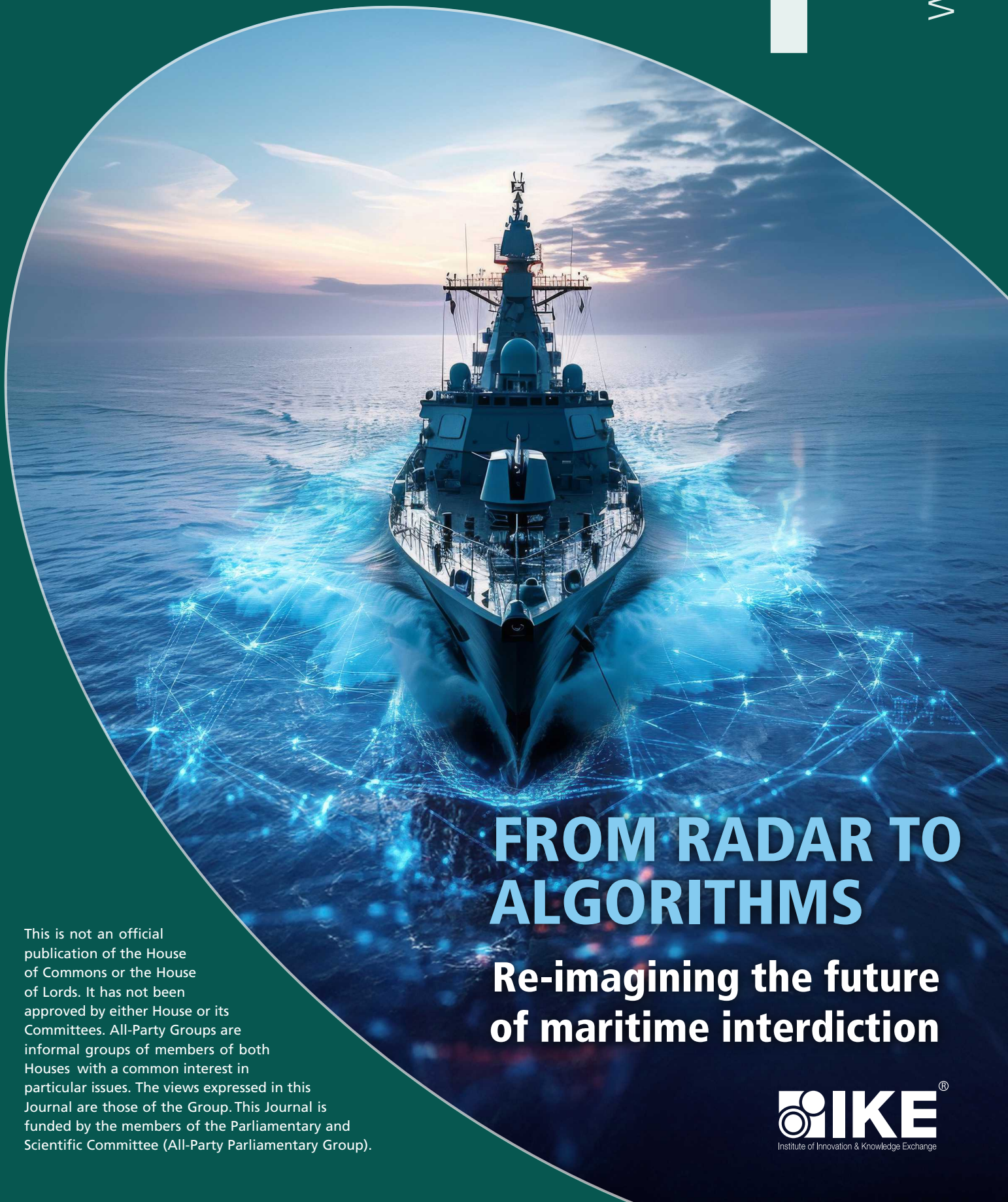

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The invisible majority:

Microbes must be central to conservation and policy

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Without protecting microbial biodiversity, the UK cannot achieve net zero, ensure resilient food systems, or control antimicrobial resistance (AMR)

Microbes are the invisible foundation of life – and the missing link in the UK's climate, biodiversity, and health strategies. They regulate soil fertility, food security, water quality, climate resilience, and human health, yet remain absent from most conservation and policy frameworks.

In July 2025, the International Union for Conservation of Nature (IUCN) launched the Species Survival Commission's Microbial Conservation Specialist Group (MCSG) to close this gap. Drawing on global microbiological, ecological, and traditional-knowledge expertise, the MCSG will craft tools, targets, and policies to include microbes explicitly in biodiversity governance.

Under the IUCN, this coalition will help set conservation priorities for the invisible 99% of life. Microbes are finally earning a place in environmental strategy and treaties. The UK, with its scientific leadership and policy innovation, can help shape this global shift by embedding microbial criteria into domestic conservation frameworks and influencing upcoming UN and IUCN resolutions.

Mapping and protecting microbial life

The MCSG aims to map threatened microbial life worldwide and develop microorganism-specific Red List criteria that assess resilience and ecological function, not just population size. Its goal is to embed microbial criteria within the IUCN Red List and Red List of Ecosystems, so microbes are assessed alongside plants and animals (Lennon et al. 2025; Gilbert et al. 2025). This marks the first formal inclusion of microbes in IUCN frameworks, representing a historic shift that could see microbial metrics featured in global biodiversity and restoration plans by 2030.

The UK is positioned to lead microbial conservation action globally. By embedding microbes into biodiversity, climate, and health frameworks, the UK can safeguard food supplies, accelerate Net Zero progress, reduce healthcare costs, and expand its bioeconomy.

> Policy opportunity:
> Make microbes central to the UK's conservation and climate strategies, by treating soils, waters, and the microbiome as national assets.

Soil, food security, and climate

The science is unequivocal: a healthy ecosystem depends on microbes. A 2024 report highlights that soil microbial communities underpin soil health, food security, resilience to climate change, and biodiversity (Neale et al. 2024). Soil bacteria and fungi drive nutrient cycling, build organic matter, store carbon, and protect plants from stress and disease. Their activity boosts crop yields and stabilizes soils during drought, directly supporting UK food supply and Net Zero goals.

The UK Parliament's Soil Health inquiry already lists "microbiomes" among biological factors determining soil function. Regenerative agricultural studies confirm that keeping living roots in the ground, through cover crops and integrated livestock, improves soil organic matter, structure, nutrient availability, and biodiversity (Handelsman 2021). These translate into measurable gains in productivity and resilience.

The emergence of microbial biofertilisers (living formulations of microbes that enhance plant growth and soil function) illustrates both economic and environmental potential (Beattie et al. 2024). In Brazil, these technologies have already been demonstrated to save billions annually while reducing greenhouse-gas emissions (Telles at al. 2023). Microbial solutions are not aspirational but proven, scalable interventions.

The lesson for the UK is clear: agricultural and land-use policies must conserve soil microbes. Practices such as no-till farming, agroforestry, and microbial amendments enrich soil biodiversity, yielding climate resilience and better harvests. In contrast, monocultures and heavy agrochemical use collapse soil microbiomes, undermining productivity. Protecting microbial life is thus central to Britain's climate adaptation and nature-recovery strategies. Investing in soil microbiome health is not niche, it's essential for food security, carbon sequestration, and the "30 by 30" nature-positive agenda.

A 'One Health' imperative

Microbes also anchor the One Health paradigm linking ecosystem, animal, and human wellbeing. As the MCSG emphasizes, microbes are 99% of life and determine health and disease risks for the other 1%. Healthy microbiomes in soil, water, and built environments suppress pathogens, reduce AMR, and limit disease spread. Rich aquatic

communities outcompete harmful bacteria, cutting antibiotic use in aquaculture. Microbial-rich diets and exposure to biodiverse environments support beneficial human gut and skin bacteria, improving immunity and mental health.

Conserving microbial diversity is therefore a public-health measure. It aligns with the UK's AMR strategy and disease-prevention goals. Integrating microbial stewardship into environmental and health policies (e.g. Environmental Land Management schemes, and NHS One Health initiatives) could yield major benefits: protecting ecosystems while reducing healthcare costs.

UK leadership and global influence

Achieving the UK's net-zero and nature-positive commitments requires mobilizing every available tool, including the microbial world. British institutions are already taking the lead in the development and integration of these microbial technologies.

Applied Microbiology International (AMI) coordinates six global advisory groups on microbiology and the UN Sustainable Development Goals (Neale at el. 2024), and research at Rothamsted, Quadram, and UK farmer networks are pioneering microbiome-informed agriculture. Also, DEFRA's Soil Health report and the 2024 Westminster Soil Conference both highlighted microbiomes as key to sustainability. As a founding partner in global microbial conservation, the UK's expertise can have an outsized influence. By championing the MCSG and related initiatives, agencies like DEFRA, UKRI, and Innovate UK can shape international conventions, from upcoming UN biodiversity targets to IUCN resolutions.

Funding and policy signals from Britain can catalyse global microbial innovation. Government strategies, including Bioeconomy and Industrial Innovation, should explicitly reference microbial technologies. Environmental and agricultural frameworks (Environmental Land Management, Nature Recovery Network, Farm to Fork) should include microbiome metrics to monitor ecosystem health. Doing so would unite net-zero, nature recovery, and One Health agendas under one evidence-based framework.

Policy actions for a microbial future

To realise these opportunities, the UK should act decisively on five fronts:

Integrate microbes into conservation targets and monitoring. Partner with the IUCN MCSG to adopt microorganism-specific Red List criteria and ecosystem assessments. Ensure microbial indicators are embedded in the UK biodiversity strategy. By 2030, microbial metrics should stand alongside those of plants and animals for UK conservation.

Invest in microbial science and innovation. Increase research funding for soil, urban, and aquatic microbiome science, and align grants with the national bioeconomy by investigating the translational potential and technology readiness of proposed research. Microbes must be seen as engines of net-zero, nature recovery, and green economic growth.

Embed microbial health in agriculture and environmental policy. Revise the Sustainable Farming Incentive and nature-recovery schemes to reward practices that build soil microbial biodiversity, e.g., cover cropping, reduced tillage, and microbial biostimulants. Create incentives similar to carbon credits that recognise soil and water microbiome health.

Adopt a One Health, microbiome-centric approach. Incorporate soil and water microbiome monitoring into the UK's AMR action plan and pandemic preparedness. Promote collaboration between DEFRA, DHSC, and research councils to translate microbial science into applied policy. Public-health campaigns should highlight microbiome-friendly behaviours: clean water, healthy diets, and reduced antibiotic overuse.

Engage across sectors and education. Establish expert panels to brief ministers on microbial conservation and restoration action, ensuring evidence-based decisions. Many innovations are delayed by outdated risk perceptions. Expert engagement will close this gap and accelerate responsible innovation. Include microbial literacy in parliamentary discussions and public education so the invisible majority of life becomes visible in policymaking.

The case for UK leadership

The UK now has a unique opportunity to lead globally by embedding microbes into environmental policy. Science in Parliament and AMI stand ready to convene experts and translate research for ministers and MPs. Policymakers should engage with the MCSG by inviting briefings, funding joint projects, and ensuring that upcoming frameworks explicitly recognise microbes. Doing so will safeguard the ecosystem services microbiomes provide, such as fertile soils, clean air, healthy food, and disease prevention, while accelerating progress on climate, nature, and health goals.

Conclusion

Microbes are the invisible allies of climate, food, health, and biodiversity policy. By acting now, the UK can strengthen resilience, lower health and food costs, and pioneer a new global frontier in conservation and innovation. Protecting the microbial majority is not only sound science – it's smart policy for a sustainable future.

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