RestREco
Restoring Resilient Ecosystems

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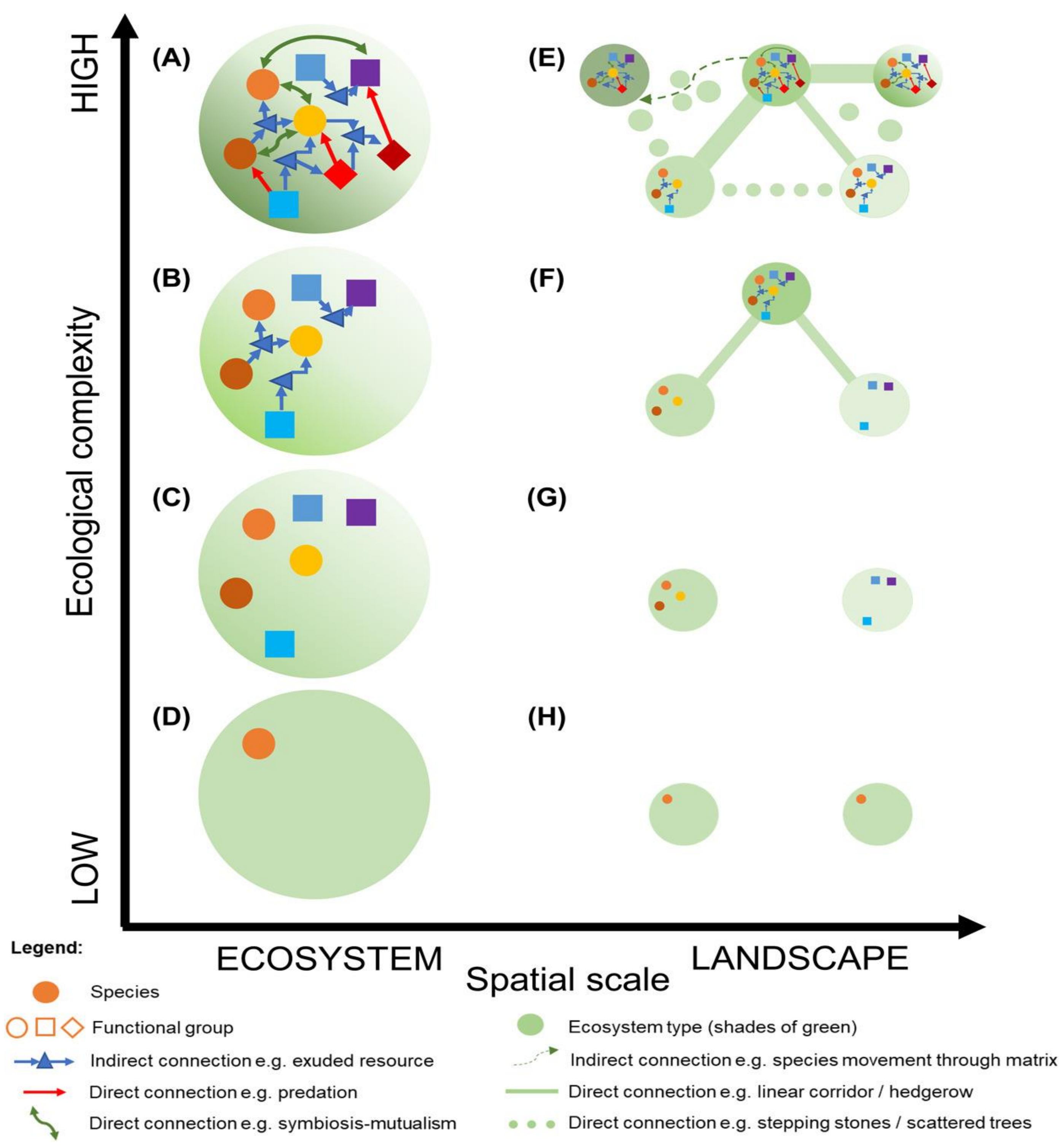
The need and urgency for ecosystem restoration is widely recognised. How best to achieve and evaluate that restoration remains challenging and disputed.

The £2M Restoring Resilient Ecosystem (RestREco) project aims to deliver a step change in restoration science. We advocate a new mindset for setting ecological restoration targets that goes beyond current legal frameworks rooted in historical reference systems.
RestREco seeks to influence UK Protected Site reform and inform GBF National Biodiversity Strategies and targets such as 30x30 to help set a new restoration paradigm. Rather than the traditional mindset of attempting to re-create specific reference species lists, we consider ecological complexity, multi-functionality and resilience as the fundamental goals for successful restoration projects.

Current approaches to restoration management tend towards prescribed and widely adopted approaches, such as agri-environment schemes. Such prescriptions, in the face of large scale habitat loss, over-exploitation, disease and pests, pollution and climate change can encourage homogeneous communities in the pursuit of a particular idealised target community. **Complexity** at landscape scale may be better supported by less prescriptive endpoints, which could give greater emphasis on natural trajectories of community assembly and facilitate greater beta diversity in community structure between restored sites. In order to support functional connectivity and embed restored habitats at landscape scale, greater consideration may also need to be given to landscape contexts and proximity to source populations.



A conceptual **diagram of ecological complexity across spatial scales**. Locally within an ecosystem or habitat patch (A–D) and across a landscape (E–H). Ecological complexity advances up the y-axis. For example, (A) shows a complex ecosystem with high species richness, varied functional groups and many species interactions; whilst (D) shows an ecosystem with low complexity, comprising low species richness, minimal functional groups and no species interactions. (E) shows a complex landscape with high (within and between) habitat/ecosystem diversity, high β and γ species diversity, varied functional groups, many species interactions and high connectivity between patches; whilst (H) shows a simple landscape with low habitat/ecosystem diversity, a depauperate regional species pool (i.e. low β and γ species diversity), few functional groups and species interactions and limited connectivity between patches.

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Restoring for complexity involves many of the same restoration activities as traditional restoration, albeit not necessarily targeted at a particular species or communities. Translocation of key species may be important for re-establishing processes thought to be missing (e.g. grazers, predators) or acting as hubs for trophic interactions (e.g. keystone species like beavers).

Next steps: 2024 is the final year of field-testing measures of biodiversity, architecture and multifunctionality at different stages of transition from a degraded state. We are looking to identify determinants and measures of complexity, and seek signals of emergent properties, especially resilience to perturbation.

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