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Understanding the role of biodiversity in the climate, food, water, energy, transport and health nexus and enhancing cross-sectoral policy coherence through evidence synthesis in Europe

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To halt or reverse biodiversity loss, it is critical to understand the complex interdependencies between biodiversity and key drivers and sectors to inform the development of holistic policies and actions. We conducted a literature review on the interlinkages between biodiversity and climate change, food, water, energy, transport and health (“the biodiversity nexus”). Evidence extracted from 194 peer-reviewed articles was analysed to assess how biodiversity is being influenced by and is influencing the other nexus elements. This process involved generating a Causal Loop Diagrams (CLD) of the nexus interactions evidenced in each article. Out of the 354 interlinkages between biodiversity and the other nexus elements, 53 % were negative, 29 % were positive and 18 % contained both positive and negative influences. The review highlighted the complexity and context-dependency of interlinkages within the biodiversity nexus but clearly demonstrates the importance of biodiversity in underpinning resilient ecosystems and human well-being in ensuring a sustainable future for people and the planet. We further explored this context dependency and complexity through analysing the mechanisms behind the nexus interactions. An archetype approach was used to cluster the impact relationships of the nexus interactions in each article by the type and complexity of impact/influence, accompanied by a ShinyApp that helped identify archetypes. The archetypes spanned uni-directional, bi-directional with balancing or reinforcing feedback loops, and multidirectional with cascading or compounding impacts. We used these archetypes to analyse the impact/influence mechanisms across realms (terrestrial, freshwater, marine, multi) and direction of impact (positive, negative, mixed). In addition, biodiversity metrics were clustered and analyzed using the disaggregation of realms, sectors, and direction of impact and evaluated against the monitoring framework of the Kunming-Montreal Global Biodiversity Framework and the Sustainable Development Goals on their alignment. Based on synthesis of these analyses, policy recommendations were made for each of the seven sectors that reflect the complexity and context dependency of nexus interlinkages to support policy coherence across the biodiversity nexus.