SCIENZE A SISTEMA PER LA SOSTENIBILITÀ
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Food webs: a key to biodiversity maintenance

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Food webs represent the structure of biodiversity and involve understanding the organization of biological communities across trophic levels, trophic specialization and degree of omnivory. Pathways of energy flow within food webs contribute to ecosystem stability (resilience) and vulnerability (resistance) to species extinction and invasion.

Crucial Novelty Of Research

Understanding Ecosystem Dynamics: Studying diet and Food webs is crucial for comprehending the complex interactions structuring ecosystems. These interactions determine the flow of energy and nutrients through different trophic levels, from primary producers to top predators. By stable isotope analysis, it was possible to obtain information on the mechanisms underlying the stability and persistence of biological communities under different conditions of natural and anthropogenic pressure.

Consistent with Optimal and trophic niche theories, trophic plasticity has been found to be a key mechanism that allows species to adapt to variation in resource availability due to natural and anthropogenic pressures.

Climate Change Responses:

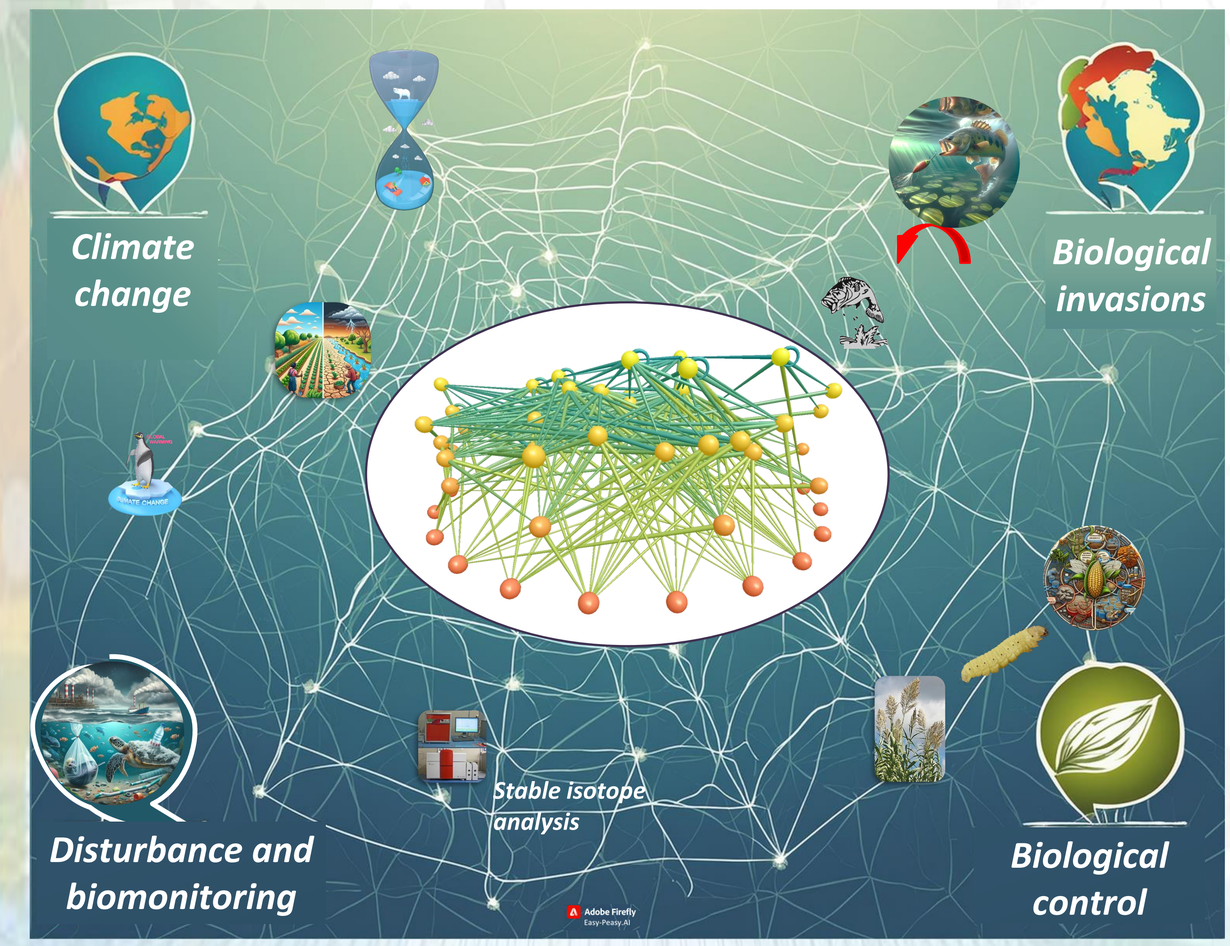
Understanding how changes in food availability due to climate change affect the trophic dynamics helps predict the resilience and adaptability of ecosystems to changing environmental conditions.

Anthropogenic disturbances and pollutant transfer:

By identifying the trophic pathways and tracking contaminant flows along trophic levels, it was possible to describe and biomonitor potential or actual impacts on species persistence.

Front Mar Sci, 2020, 7, 594454 ; *Sci Rep*, 2022, *12*(1), 2125

Freshw Biol, 2018, 63.9: 1130-1142 ; *Water* 2023, *15*(21), 3796



Appl Sci 2020, *10*(8), 2756 ; *Environ Sci Pollut Res* 2021, 28(8), 9898-9912 ; *Sci Total Environ*, 2023, 885: 163875

Agr Ecosyst Environ, 2022, 329: 107868 ; *Biology* 2022, *11*(12),1805

Impact of Invasive Species:

By investigating the diet and trophic positions of invasive species and the food web structures, it was possible to evaluate the impacts on native species and their biotic resistance to invaders.

Effectiveness in Biological control

Identifying natural enemies within food webs allowed us to obtain information useful for implementing strategies to control parasite populations in agricultural and natural ecosystems.

Main Conclusions

Studying food webs allows us to understand mechanisms underlying biodiversity responses to climate change, biological invasions, the accumulation and transfer of pollutants, and pest dynamics in biological control, at various spatial, temporal and biological scales. By analysing interactions among different trophic levels and energy flows within ecosystems, we can predict how anthropogenic disturbances and climate change affect the resistance and resilience of biological communities. It helps develop effective strategies for biodiversity conservation and sustainable ecosystem management.

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