Simplification of a benthic ecological network in response to climate change stress

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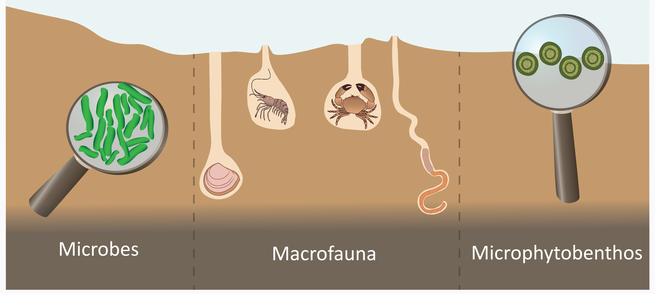
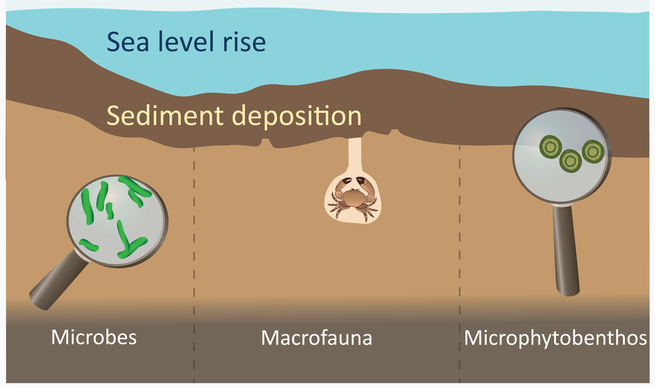
Background

- Intertidal benthic sediments produce **important ecosystem functions** such as **nutrient cycling** and **primary production**
- This forms an **ecological network** between the community, the surrounding sediment environment, and the ecosystem functions produced



The Problem

- **Climate change** is creating stressors such as **sea level rise** and terrigenous **sediment deposition**
- These **stressors** can impact benthic communities, altering ecological networks and **reducing resilience**



Research Aim

Assess changes in benthic ecological network architecture in response to combined sea level rise and terrigenous sediment deposition

Simulating Climate Change Stress

Sea level rise
- **In situ mesocosms**
- Convert intertidal to subtidal

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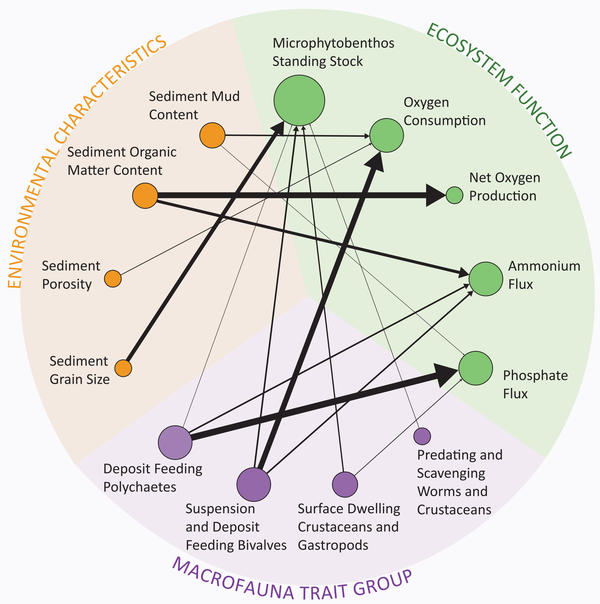
Sediment Deposition
- Collect sediment from catchment
- Deposit **3mm layer**

Results

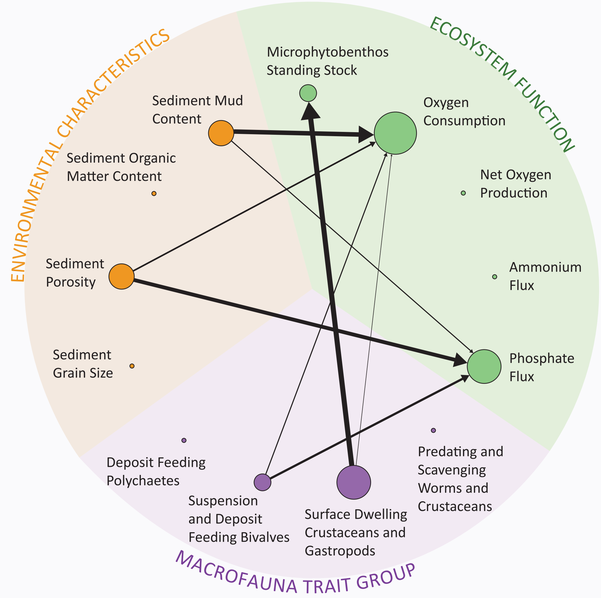
- Networks were built using **multiple regression** models for each function
- We observed **simplification of the network** in response to stress
- Simplification refers to a reduction in the **number of nodes** present in the network, the **number of connections** between nodes, and overall **network model strength**
- This represents a **loss of resilience**, and further stress could push the ecosystem to a tipping point

Network Metric	Ambient Sediment	Sea level Rise + Sediment Deposition
Number of Nodes	13	7
Number of Connections	15	8
Network Strength (average model adjusted R2 value)	0.86	0.35

Ambient Sediment Network



Sea Level Rise + Sediment Deposition Network



Legend