Nature-based Solutions to Mitigate Environmental Challenges: A Systems Thinking Approach for Integrated Understanding of Human-Nature Interactions

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Nature-based solutions for environmental challenges

Urban areas increasingly face challenges associated with dynamic interactions between human and nature systems. These challenges can be addressed by sustainable management of coupled human-nature systems that are being stablished and progressed in urban areas.

Nature-based solutions (NbSs), as cost-effective actions, are used to protect, sustain, and restore natural or engineered ecosystems for potentially increasing their services delivery to humans. Being inspired and supported by nature systems, NbSs provide human well-being and biodiversity benefits and address coupled environmental-social-economic challenges.

Wetlands and their ecosystem services

This study develops an integrated understanding of human-nature interactions, by investigating wetland functions and their values in Stockholm region, a European densely populated urban area. Wetlands integrate natural and anthropogenic processes and help cities adapt to changes by enhancing their resilience to environmental and social challenges.

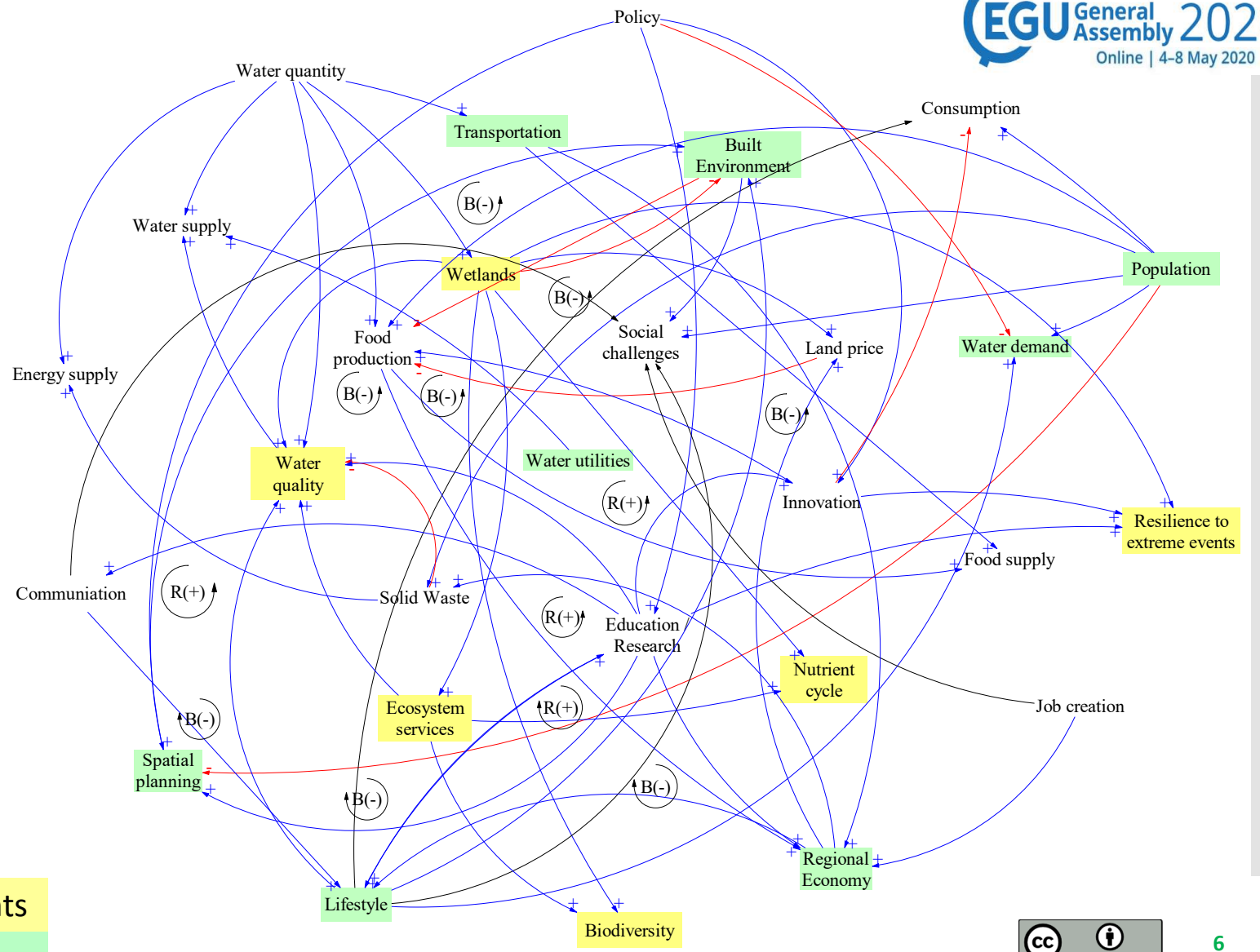
Combining local and scientific knowledge

i. What are the underlying system dynamics and interactions between urbanization and wetland regulating ecosystem services as coupled human-nature systems?

ii. How do these dynamics affect synergies and trade-offs in achieving Sustainable Development Goals (SDGs)?

Participatory mapping and mind map development

Causal Loop Diagram (CLD)



Wetland-related system components

Urban-related system components

Summary

- Key system components and drivers are identified based on the CLD.
- The effectiveness and roles of wetlands in spatial planning and urban development for Stockholm region are evaluated based on dynamic assessments.
- Wetlands support achieving the Environmental Objectives of Sweden, with regards to providing clean air, mitigating climate change impacts, rich diversity of plans and animals, and good quality of groundwater.
- Wetlands support achieving the Sustainable Development Goals (SDGs) and their specific targets, such as SDG 11 (convenient access to open green and public spaces), SDG 13 (resilience to extreme events), and SDG 15 (restoration, conservation and sustainable use of inland natural resources).
- The results provide insights on potential transition pathways toward sustainable urbanization by identifying opportunities and barriers in Stockholm region.

Thank you

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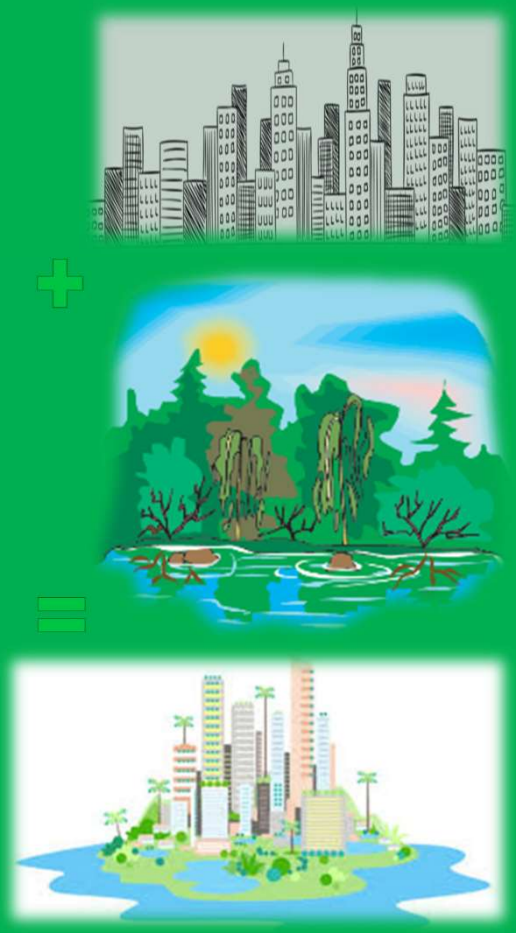

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