Stakeholder perspectives on sustainable coastal development: A Baltic coast case study

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COASTAL — Collaborative Land-Sea Integration Platform

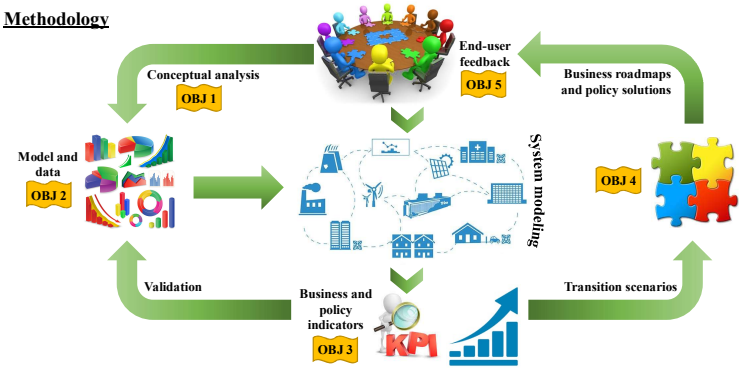
Project description

COASTAL project argues that coastal and rural regions and their related economic activities operate as a coupled system. Economic development in coastal areas can contribute to rural development as addressed by the Guidelines for Rural Development, providing ecosystem goods and services and business opportunities applicable in the hinterland as well. However, coastal ecosystems are not only under increasing pressure from coastal related activities such as fisheries, aquaculture, energy production, tourism, and shipping, but also land-based human activities with a base in rural areas, such as forestry and agriculture sectors. Existing research and policy still primarily address issues from either a coastal- or rural-based perspective, making it ill-adapted to support effective land-sea integration at the local, regional and macro-regional scale. As a result, rural and coastal development does not yet fully benefit from local and scientific knowledge due to the fragmentation of research efforts, the lack of harmonization of data, and methodological differences in land- and sea-based research approaches. In addition there is insufficient communication between researchers, planners and local actors to take an integrated approach further.

Objectives

- OBJ 1. Engaging local and regional business entrepreneurs, stakeholders, and scientific experts in a multi-actor process for knowledge exchange to identify stakeholder motivations and challenges, suggest solutions to improve coastal-rural synergy, and develop qualitative understanding of the coastal-rural interactions affecting business and policy strategies;
- OBJ 2. Quantifying the physical, socio-economic and environmental coastal-rural interactions, based on available data and models, and make this knowledge applicable in a System Dynamics framework for policy analysis and business support;
- OBJ 3. Analyzing and comparing alternative actions to derive business road maps and policy guidelines aimed at improving coastal-rural synergies and development, considering different spatial and temporal scales;
- OBJ 4. Delivering scenarios to explore the driving conditions and transition pathways that explore barriers and motivators for coastal and rural development;
- OBJ 5. Disseminating and exploiting the project outcomes to local, regional, national, European levels, including global conservation and development networks.

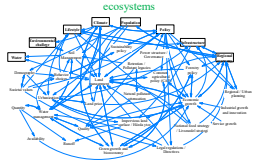
Methodology



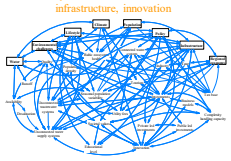
CLD and FCM

Six sectoral workshops have been held to co-create mind maps for land-sea interactions and identify key physical, socio-economic and environmental connections for this development. Combining their outcomes and assigning relative weights between [-1,+1] to connections, the unified Fuzzy Cognitive Map for the Norrström/Baltic Sea case is obtained.

SW1.Green growth , terrestrial-freshwater ecosystems

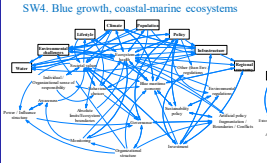


SW2. Industry, water-wastewater and solid waste infrastructure, innovation



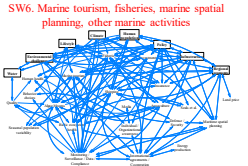
SW3. Urban-rural communities, land spatial planning

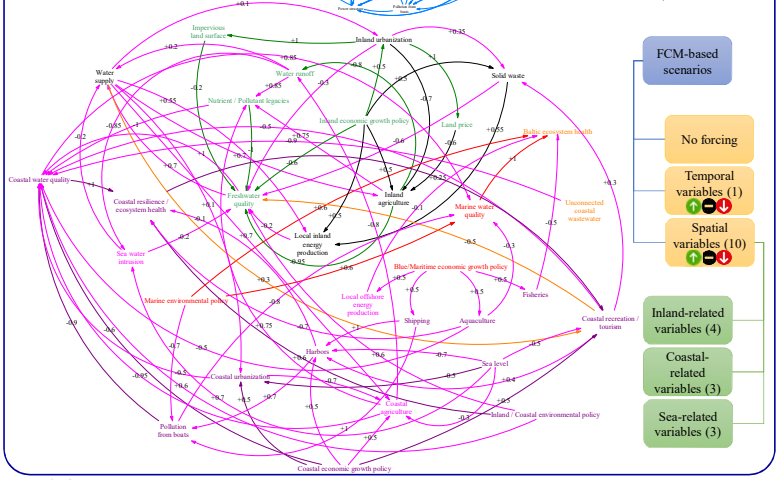
SW4. Blue growth, coastal-marine ecosystems



SW5. Coastal tourism, recreation, harbors, other coastal activities

SW6. Marine tourism, fisheries, marine spatial planning, other marine activities





FCM-based scenarios

- No forcing
- Temporal variables (1)
- Spatial variables (10)
- Inland-related variables (4)
- Coastal-related variables (3)
- Sea-related variables (3)

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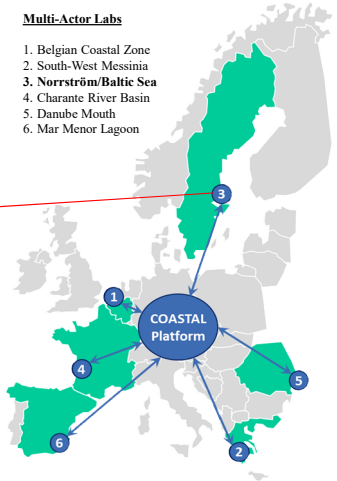
Results

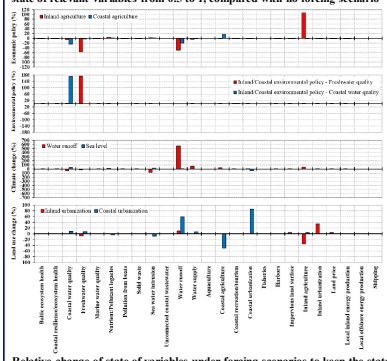
Considering the Swedish Northern Baltic Proper coast, actors with land, sea and coastal perspectives are involved to collaboratively explore the potential of cross-sectoral cooperation for sustainable coastal development. Six sectoral workshops have been held to co-create mind maps for land-sea interactions and identify (and eventually model) key physical, socio-economic and environmental connections for this development. We here report the mind maps and insights provided for the interlinked land-coast-sea processes, and discuss their implications for further modelling of the coastal system and the opportunities and barriers for its sustainable development locally and regionally.

Multi-Actor Labs

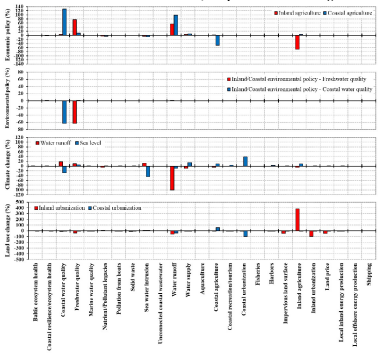
1. Belgian Coastal Zone
2. South-West Messinia
3. **Norrström/Baltic Sea**
4. Charante River Basin
5. Danube Mouth
6. Mar Menor Lagoon



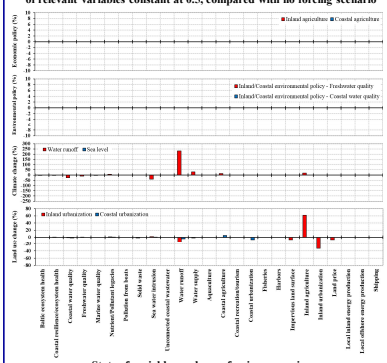
Relative change of state of variables under forcing scenarios to increase the state of relevant variables from 0.5 to 1, compared with no forcing scenario



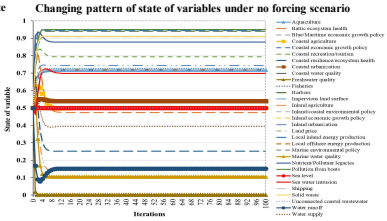
Relative change of state of variables under forcing scenarios to decrease the state of relevant variables from 0.5 to 0, compared with no forcing scenario



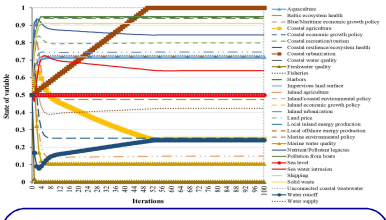
Relative change of state of variables under forcing scenarios to keep the state of relevant variables constant at 0.5, compared with no forcing scenario



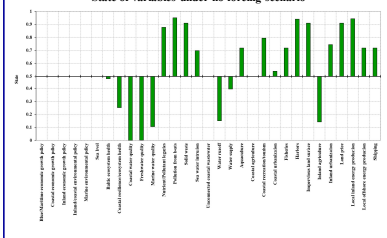
Changing pattern of state of variables under no forcing scenario



Example- Changing pattern of state of variables under forcing scenario to increase the state of coastal urbanization from 0.5 to 1



State of variables under no forcing scenario



The main issues identified in the Norrström/Baltic Sea case are:
(i) Legacy versus currently active loading of nutrients/pollutants (cross-time impact mixing);
(ii) Cross-scale nature of the case study; and
(iii) International variability along the Baltic Sea coast.

Conclusion

All participating stakeholders in the sectoral workshops are invited to a Multi-Actor Lab workshop in September, to discuss the following aspects: (i) Are the simplified and unified causal loop diagram, its interaction implications, and evaluated scenarios relevant / recognizable / realistic? (ii) How to use / what to learn from the map and scenario analysis? and (iii) What is the most relevant and important scenarios to analyze?

The project will be followed by: (i) Stock-flow system dynamics modeling – Learning from / Testing results and implications based on available data, mechanistic models; and (ii) Identifying problems, scenarios and roadmaps to coastal solutions and mitigation of risks.