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RESEARCH FOR GRAND CHALLENGES

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Joint network analysis by social and natural science

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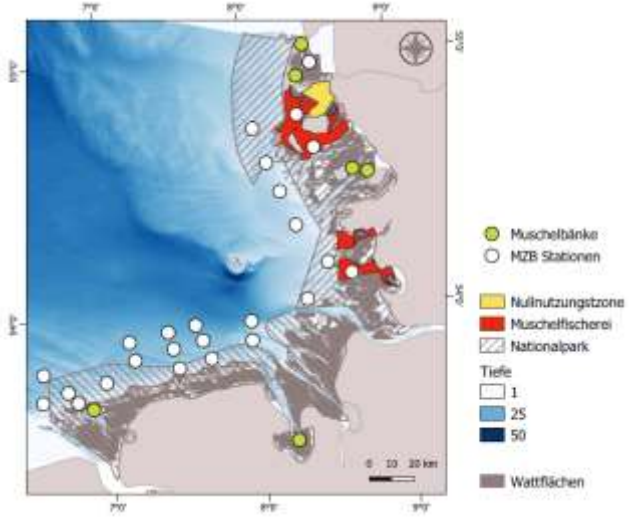
iSeal – Trans- and interdisciplinary social-ecological network analysis based on long-term monitoring, experimental data and stakeholders' assessment

(1) Use of **networks** for the integrative modelling of social-ecological systems

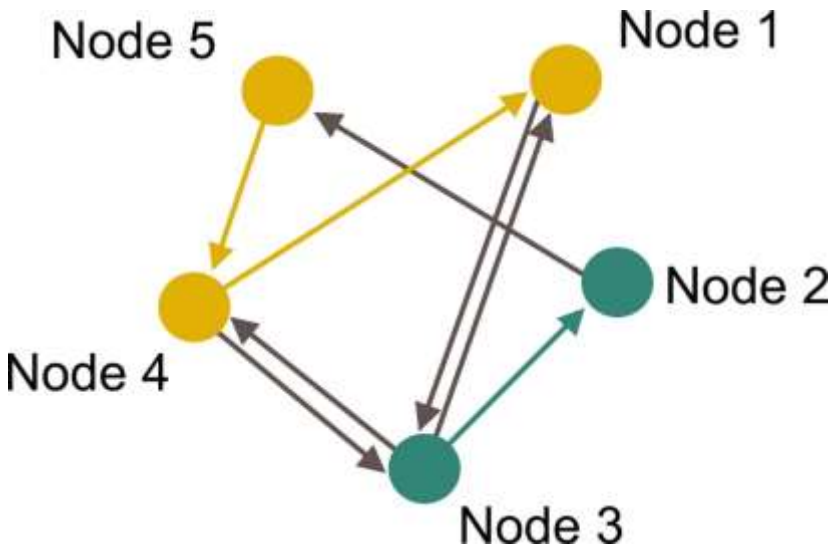
(2) Selection of indicators that respond to **scientific and strategic criteria**

(3) **Co-definition** (scientists and stakeholders) of indicators and ecosystem management strategies

Study area – Wadden Sea National Parks of Schleswig-Holstein and Lower Saxony



Use of networks to integrate social and ecological variables



Variables (nodes)

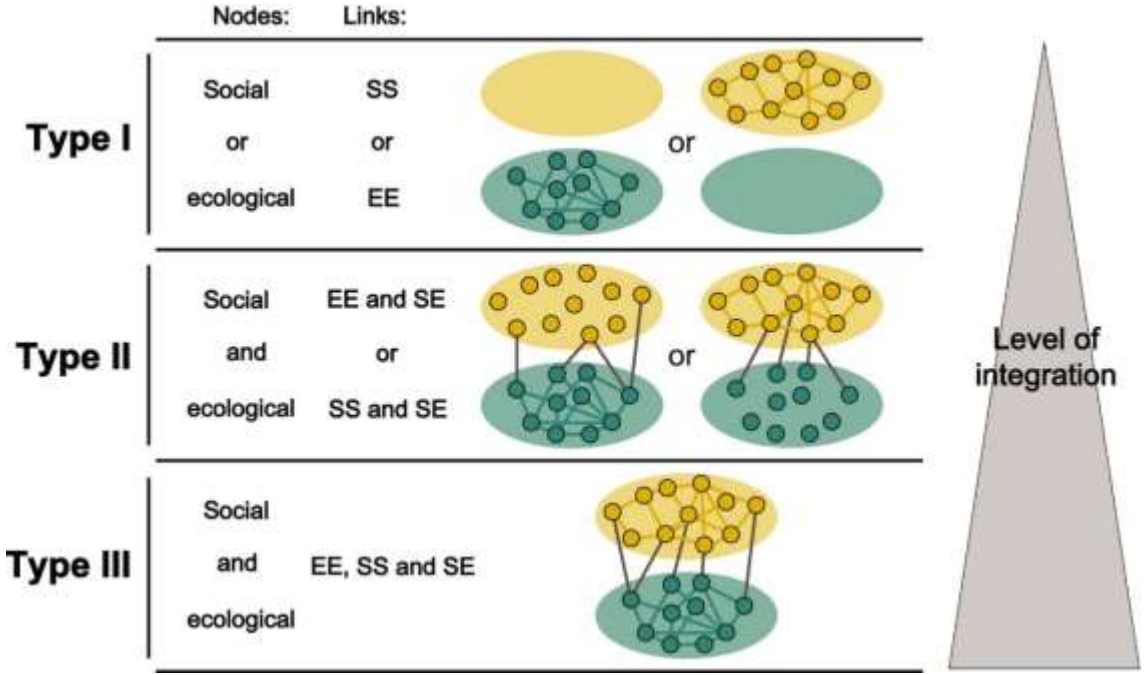
Green – ecological
Yellow – social

Interactions (links)

Green – ecological-ecological
Yellow – social-social
Grey – ecological-social

Kluger et al. (2020) People and Nature 2, 1100-1116

Different levels of integration of the social and/or ecological realm



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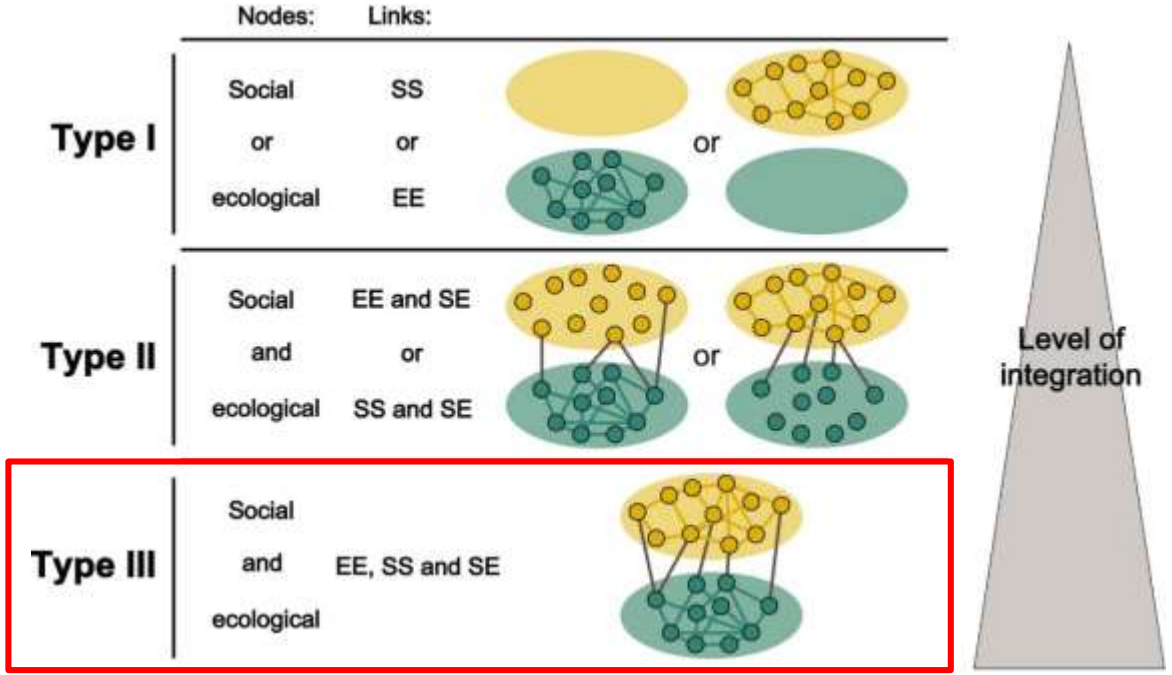

Kluger et al. (2020) People and Nature 2, 1100-1116

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Ecological networks

Time series data and mesocosm experiments

Scientific criteria for the indicators calculated using Ecological Network Analysis (ENA)

(1) Theory – indicators should have a firm theoretical basis

(2) Sensitivity – trends of indicators should be sensitive and responsive to stress factors (e.g. warming)

(3) Measurability – indicators need to be routinely measurable and have historical time-series available

Shin et al. (2012) Reviews in Fish Biology and Fisheries, 22, 835-845

Holistic assessment of ecosystem health with indices from Ecological Network Analysis (ENA)

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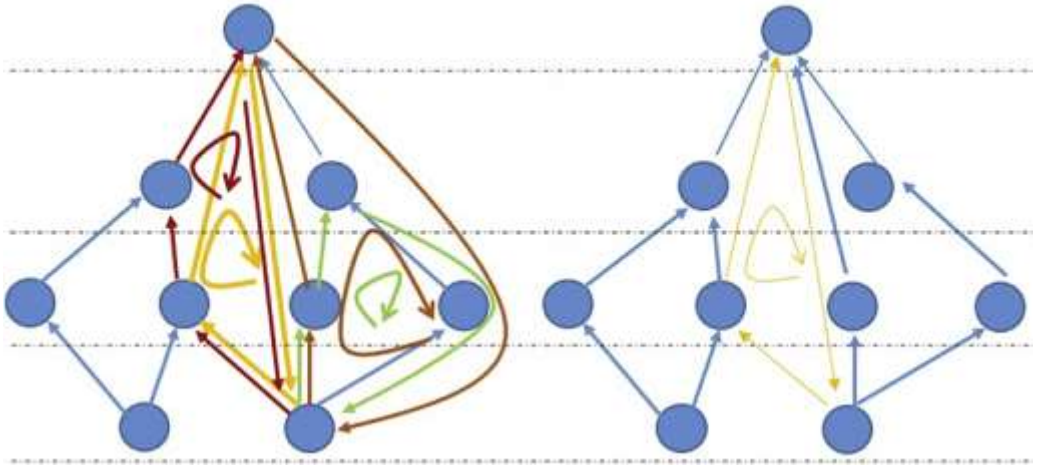
High cycling

Low cycling

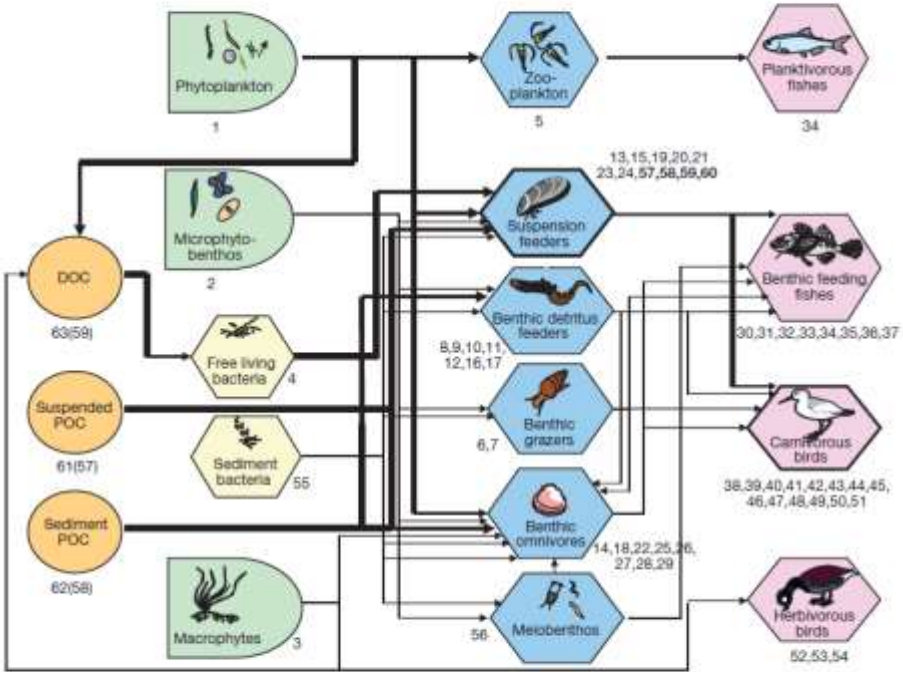


OSPAR COMMISSION

Protecting and conserving the North-East Atlantic and its resources

Safi et al. (2019) Ocean & Coastal Management 174, 116-130

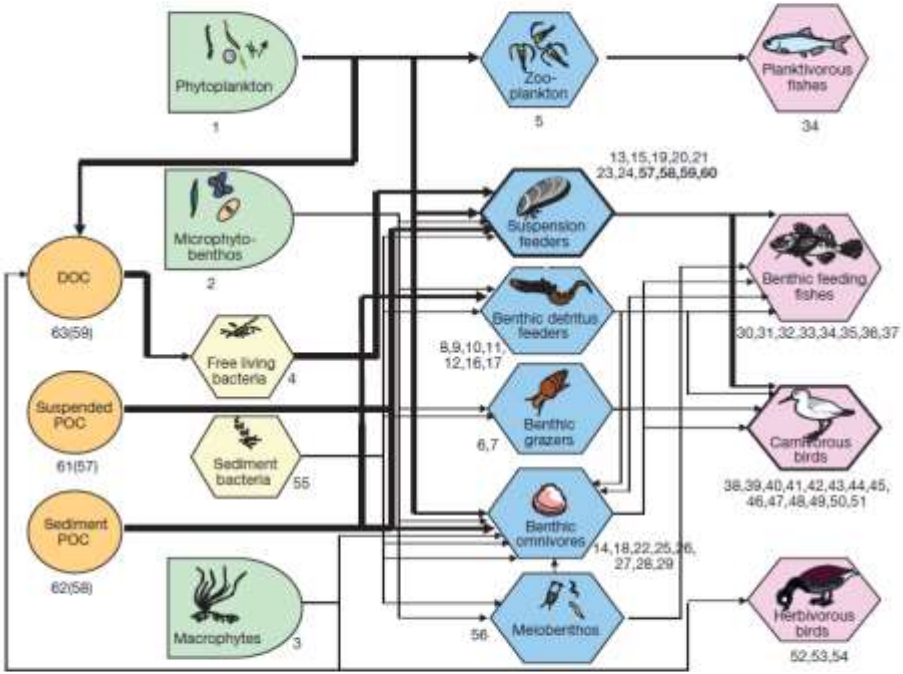
Holistic assessment of ecosystem health with indices from Ecological Network Analysis (ENA)



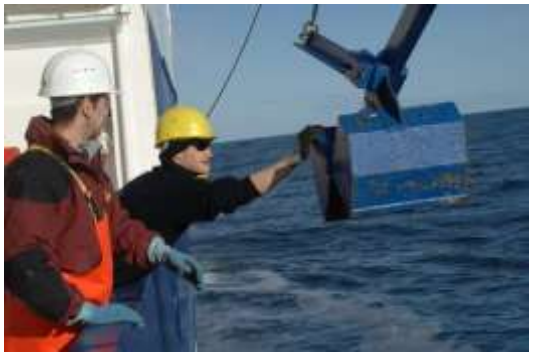
AWI mesocosm facility in Sylt

Baird et al. (2012) Marine Ecology Progress Series 462, 143-161

Holistic assessment of ecosystem health with indices from Ecological Network Analysis (ENA)



North Sea Benthos Observatory



Baird et al. (2012) Marine Ecology Progress Series 462, 143-161

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Social-ecological networks

Participatory approach and social-ecological networks of Type III

Strategic criteria for the indicators calculated using Ecological Network Analysis (ENA)

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(1) Tractability – indicators should be small in number and tractable for a range of ecosystems

(2) Public awareness – the meaning of the indicators and their link to stress factors should be intuitively understood by the general public

(3) Coordination – the selection of indicators must be linked to international frameworks and projects (e.g. MSFD)

Shin et al. (2012) Reviews in Fish Biology and Fisheries, 22, 835-845

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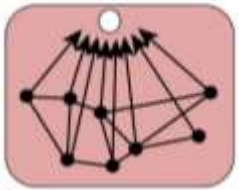
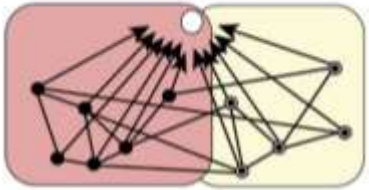
The extended peer community – from the integration options to a joint prioritizazion



Interdisciplinary
- Crosses disciplinary boundaries
- Development of integrated knowledge



Transdisciplinary
- Crosses disciplinary and sectorial boundaries
- Common goal setting
- Develops integrated knowledge for science and society

Stakeholder Participants
Discipline
Goal, Shared Knowledge
Academic Knowledge
Conventional Knowledge

Morton et al. (2015) Ecology and Society 20, 5

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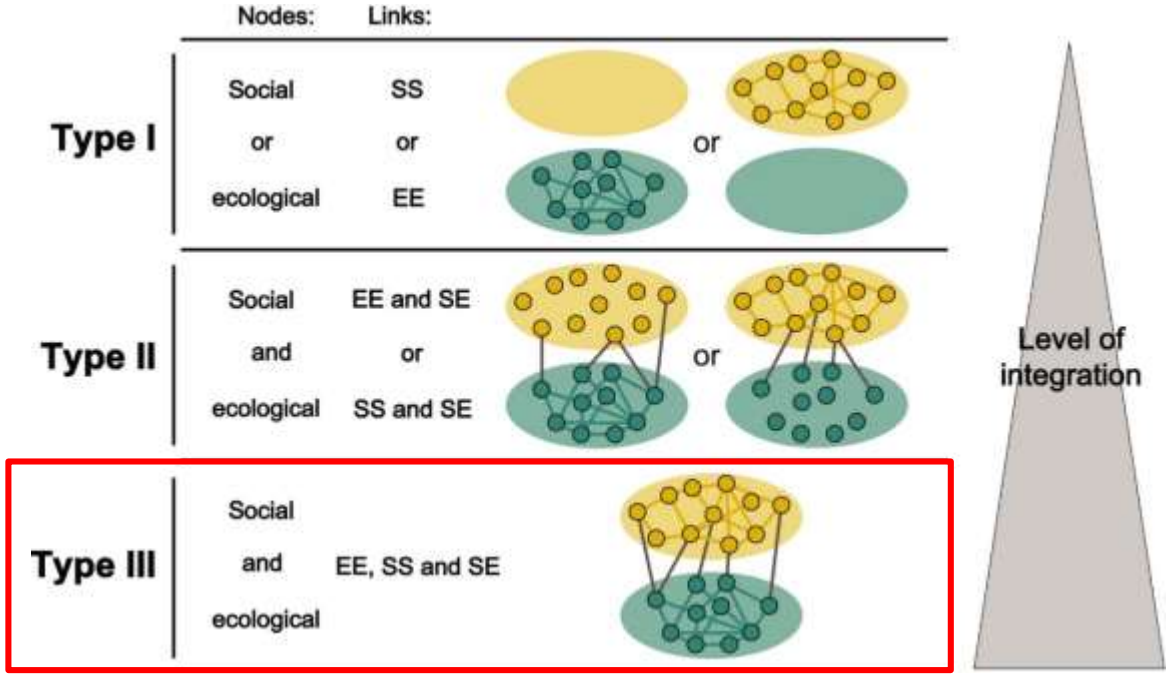

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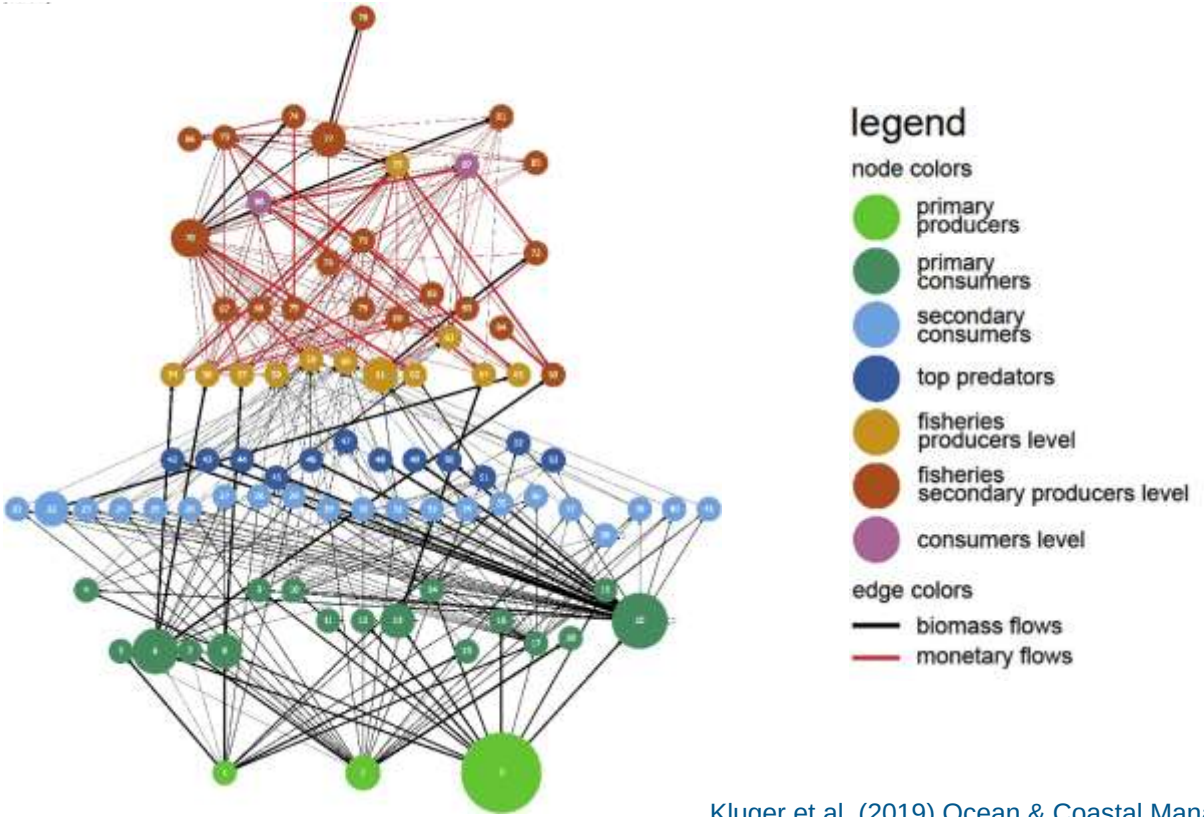
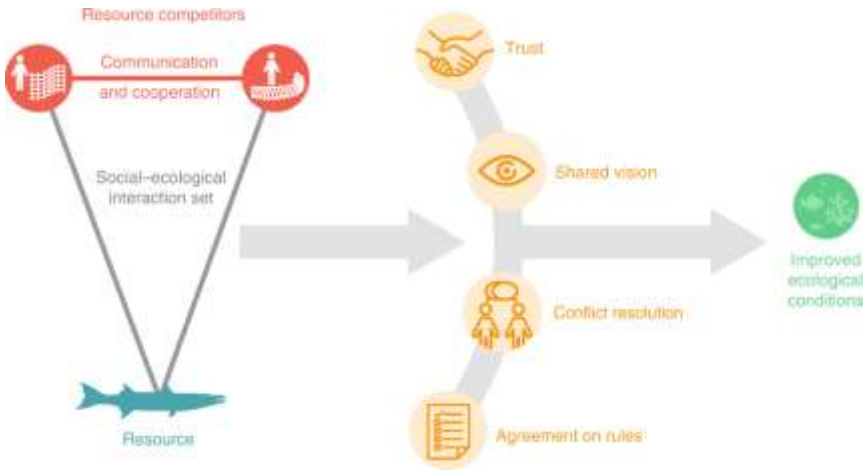
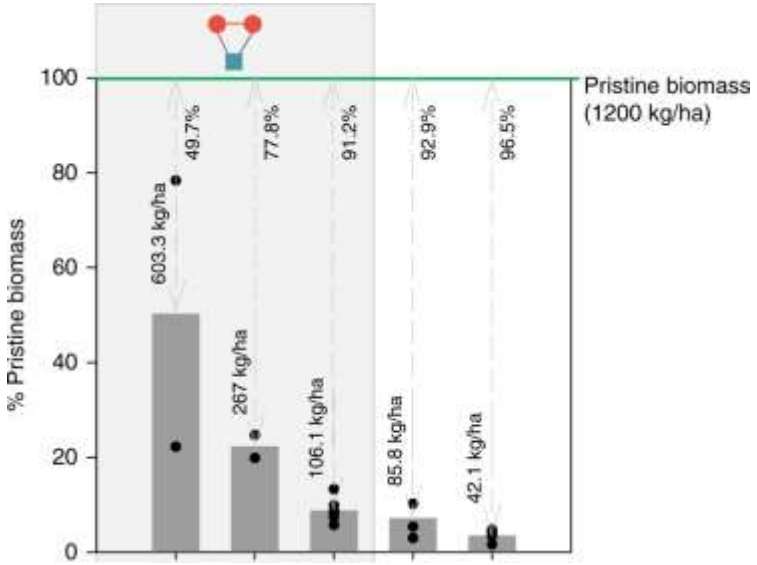
Quantitative analysis of the socio-ecological networks in Wadden Sea National Parks



Kluger et al. (2019) Ocean & Coastal Management 179, 104861

Quantitative analysis of the socio-ecological networks in Wadden Sea National Parks





Barnes et al. (2019) Nature Communications 10, 1-10

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