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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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)

Safi et al. (2019) Ocean & Coastal Management 174, 116-130
Holistic assessment of ecosystem health with indices from Ecological Network Analysis (ENA)

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

AWI mesocosm facility in Sylt

Esther Horvath
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
Social-ecological networks

Participatory approach and social-ecological networks of Type III
Strategic criteria for the indicators calculated using Ecological Network Analysis (ENA)

(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)

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Shin et al. (2012) Reviews in Fish Biology and Fisheries, 22, 835-845
The extended peer community – from the integration options to a joint prioritization
Different levels of integration of the social and/or ecological realm

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