Starting from scratch: assembly of novel ecosystems

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We live in a human-dominated world

Ellis (2011), KK10 historic land use model
Marine areas:

- Waddenzee
- Griend
- IJsselmeer
- Markerwadden
- Markermeer
Markerwadden
Recent lake sediment
Old marine sediments
Suspended sediment
Clear water
Present situation
Future situation
Markerwadden
Novel land-water interactions
Griend – aug 2016
Before the restoration

Photo Jasper Doest
Griend – sept 2016
after restoration, based on natural processes
Human design and ecological novelty: two major axis for classifying types of ecosystems

Planned, designed, managed ecosystems

Self-assembled ecosystems

Biotic or abiotic novelty (species combinations, abiotic configurations)

Historical

Restored

Managed, Used

Novel


Pathways of change:

- Development, intensification, land use change
- Abandonment, release
- Climate change, biological invasions
- Classic restoration
- Rewilding

Ecosystem assembly from scratch: closed ecosystems

Primary Succession at Glacier Bay

- Exposed rock
- Pioneer species: moss, herbaceous plants
- Herbal rose and willow mat
- Alder bush
- Spruce
- Spruce-hemlock
- Ponds and bogs
Ecosystem assembly from scratch: open ecosystems?
Ecosystem development is kickstarted by marine inputs
2 years of succession
30 years of succession
60 years of succession
100 years of succession
Different trophic groups have very different species diversity dynamics

Estimates of bacterial diversity in the soil: highest in early-successional bare sand!

Dini-Andreote et al (2014) ISME journal
Upcoming research Griend

Upcoming research Markerwadden

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