

Adapting to climate change by sustainable management strategies in coastal regions

*A case study on the Wadden Islands of
Schiermonnikoog and Langeoog*



CAC

Climate Adaptation
in
Coastal
Regions



The Wadden Sea



Source: <http://www.youreuropemap.com/>



Source: http://coast.gkss.de/watis/IMAGES/WWF_WM_Map.gif

Research questions

Main aim:

Develop a set of recommendations on sustainable management for the research areas and their local communities with different stakeholders

Research questions:

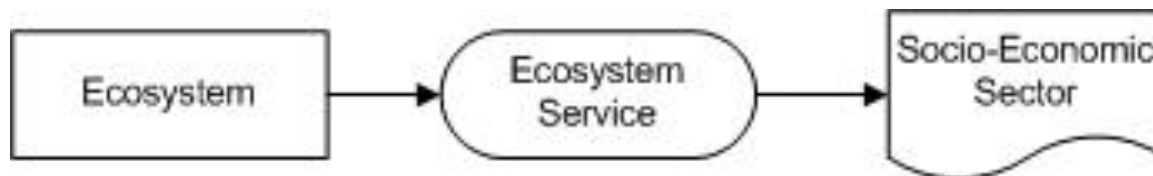
- What does the ecosystem look like in the research areas?
- What are the impacts of climate change on the ecosystems?
- Which ecosystem services are relevant?
- What are the impacts on ecosystem services and its socio-economic values?
- Which policy strategies have been developed?
- How are ecosystem services considered in recent adaptation strategies?
- What are the differences in strategies between the two case areas?

Research approach

- Ecosystem services approach (based on Millennium Assessment)
- Analysis of ecosystems and expected impacts of climate change
- Analysis of ecosystem services and expected impacts of climate change
- Analysis of current and relevant policies and strategies
- Comparison between both research areas
(Langeoog and Schiermonnikoog)
- Development of recommendations

Main results - 1

Ecosystem services approach



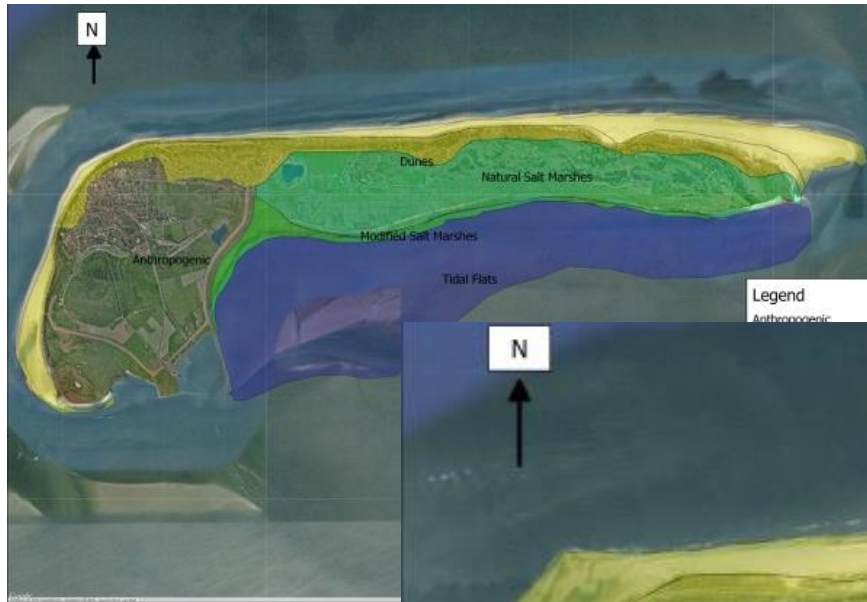
Ecosystem Services (MEA, 2005) ¹	Socio-economic sectors (Nicholls, 2007) ²	Determinants of well-being (MEA, 2005) ¹
Provisioning services	Agriculture and forestry Fisheries and aquaculture Freshwater resources	Security Health Basic Materials Good social relations
Regulating services	Flood Protection	
Cultural services	Settlements and infrastructure Recreational and tourism	
Supporting services	Biodiversity	

¹ MEA. 2005. *Millennium Ecosystem Assessment: Ecosystems and Human Well-being, A Framework for Assessment*. Washington: Island Press.

² Nicholls, R.J., P.P. Wong, V.R. Burkett, J.O. Codignotto, J.E. Hay, R.F. McLean, S. Ragoonaden, and C.D. Woodroffe. 2007. "Coastal systems and low-lying areas. Climate Change 2007: Impacts, Adaptation and Vulnerability." In *Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. Linden and C.E. van der Hanson, 315-356. Cambridge: Cambridge University Press.

Main results - 2

Ecosystems and impact of climate change



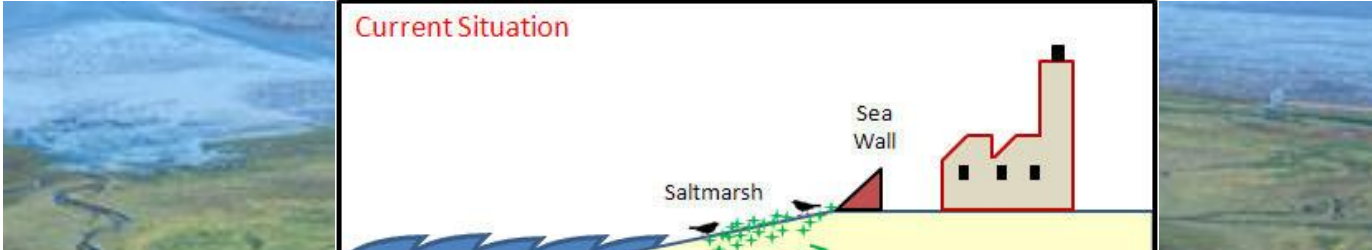

Ecosystems of Langeoog
(Baseimage: Digital Globe)



Ecosystems of Schiermonnikoog (Baseimage: Aerodata)

Main results - 2

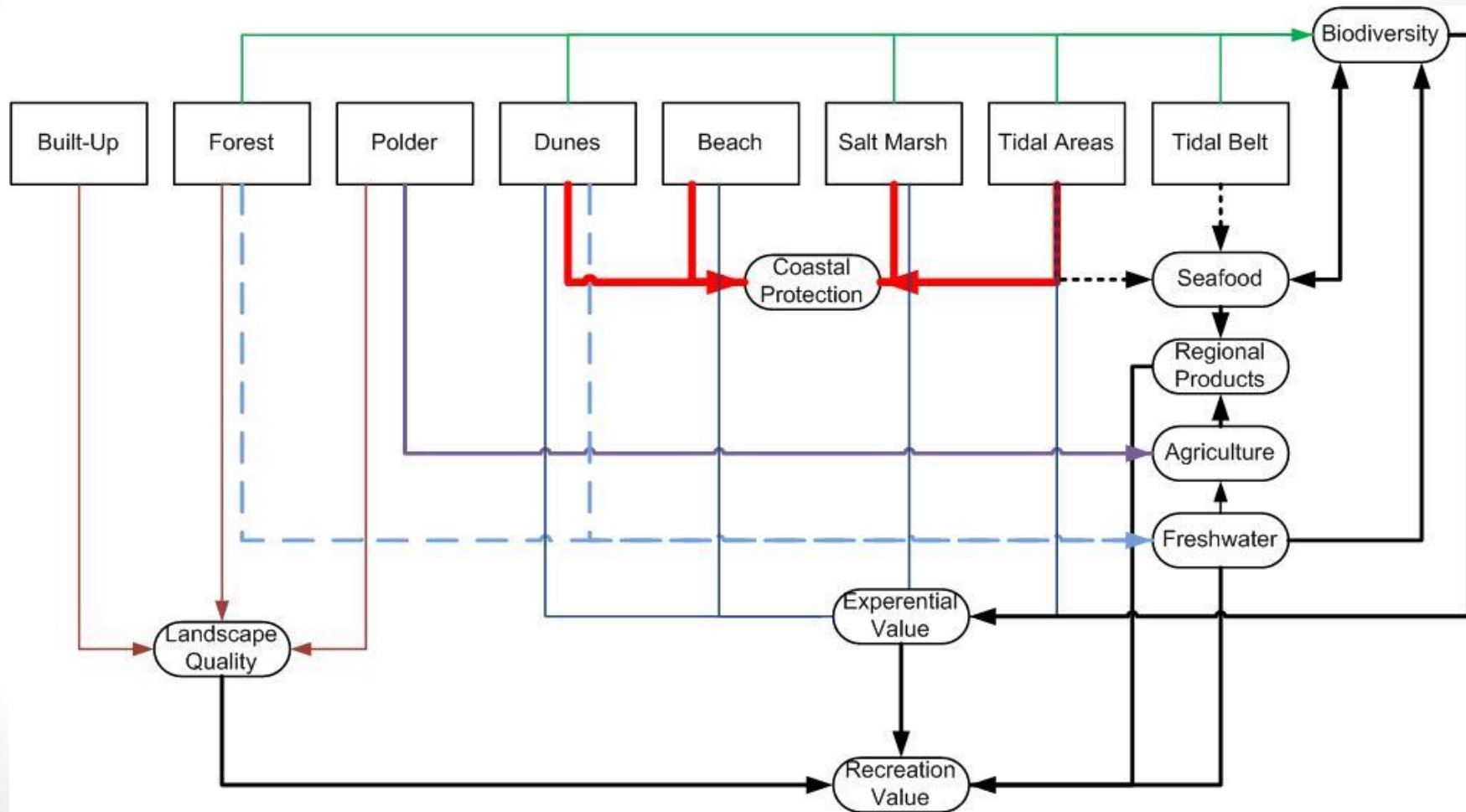
Ecosystems and impact of climate change

	Langeoog	Schiermonnikoog
Salt marsh	Changes in flora and fauna are expected	
Tidal area		
Beaches and dunes		

(Photo: Jan Huneman)

Main results - 3

Ecosystem services and socio-economic sectors



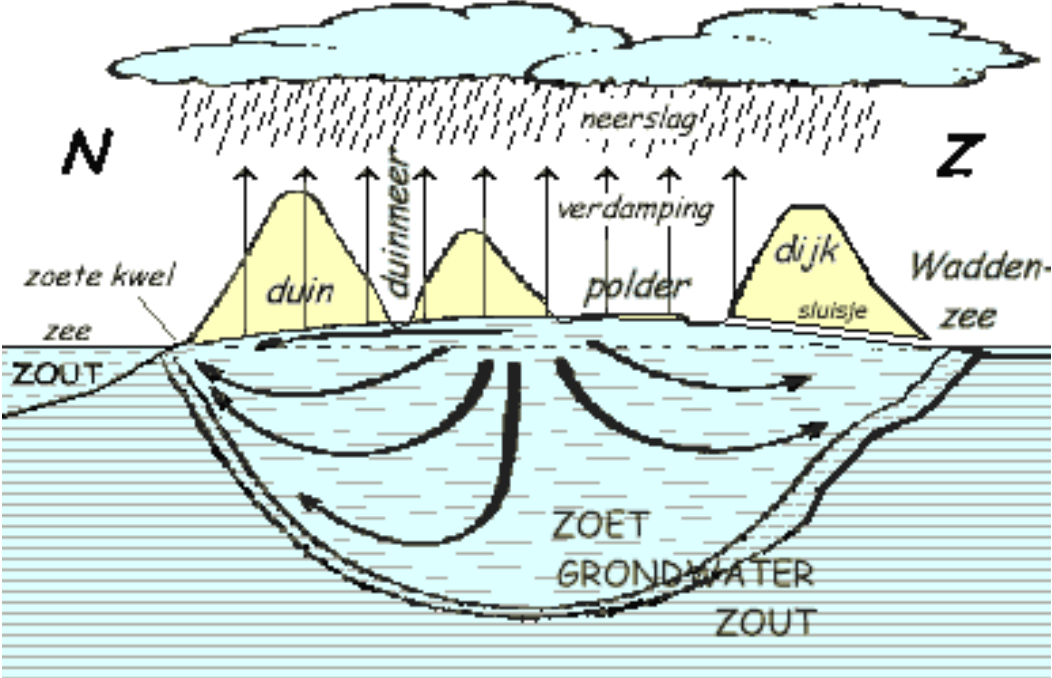
Main results - 3

Ecosystem services and socio-economic sectors

	Ecosystem Services	Socio-economic sectors	Determinants of well-being
Cultural services	Landscape Quality Experiential Value Recreation Value	Settlements & Infrastructure Recreation & Tourism Recreation & Tourism	Health Security
Provisioning services	Seafood Regional Products Agriculture Freshwater	Fisheries & Aquaculture Recreation & Tourism Agriculture & Forestry Freshwater resources	
Supporting services	Biodiversity	Biodiversity	

Main results - 4

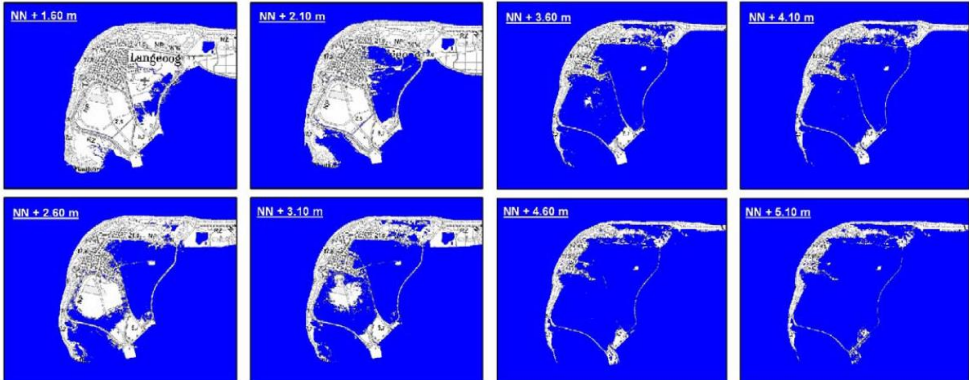
Socio-economic sectors and impact of climate change

	Schiermonnikoog	Langeoog
Freshwater resources	Threatened due to salinization	
Agriculture and forestry		
Fisheries and aquaculture		

Source: Nationaal Park Schiermonnikoog n.d.

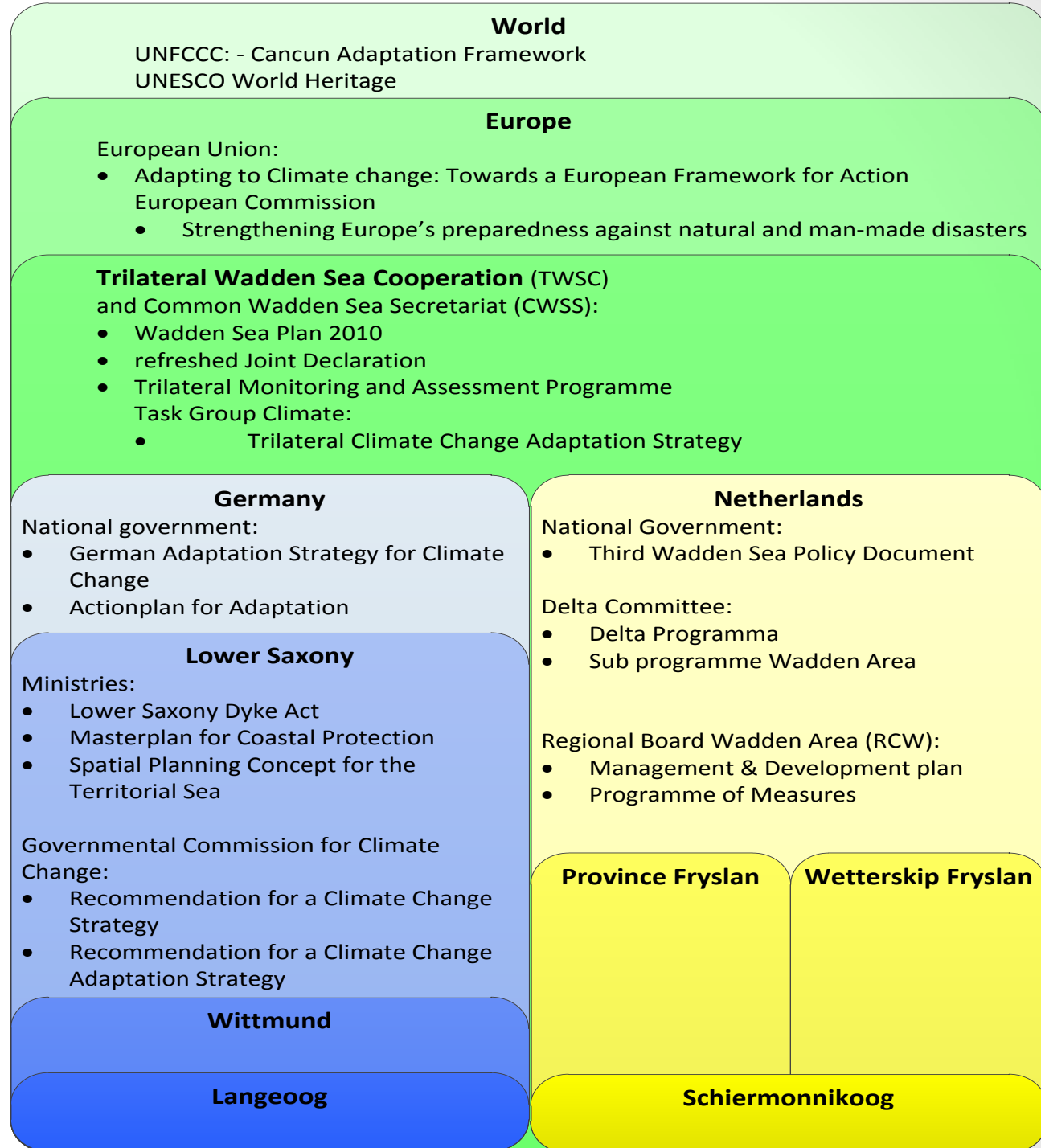
Main results - 4

Socio-economic sectors and impact of climate change

	Schiermonnikoog	Langeoog
Recreation and tourism	<p>Main source of income</p> <p>Threatened by sea-level rise and more extreme weather events</p> <p>Positive effects due to warmer weather</p>	
Biodiversity		
Settlements/ infrastructure		
Health and security	 <p>(Source: COMRISK 2005)</p>	

Main results - 5

Policies & strategies



Discussion & Conclusion

These are the recommendations:

- Because of the uncertainties a **holistic approach** is needed to tackle this problem in a sustainable manner as the ecosystems and its services are highly interlinked.
- For salt marshes, dunes and beaches measures should be sought that use **natural processes** where possible, as these are more likely to be sustainable and have less negative effects.
- Focus management on the **experiential value** ecosystem service. It depends on all natural ecosystems and their most important services and benefits the biggest socio-economic sector; tourism and recreation.
- For policy makers is recommended to **collaborate with related and similar areas** to find common ground and to develop guidelines and principles that would benefit the local situation, and can influence national policies and strategies.

Group members

Jikke Adema

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Environmental Sciences M Sc.



Skills:

Experience in group work, holds the group together, good English skills, knowledge in coastal ecosystems, the Wadden Sea and the ecosystem of Schiermonnikoog, experience in writing scientific papers

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Skills:

GIS skills: design of useful graphics, good English skills, general knowledge in coastal ecosystems, the Wadden Sea and services, experience in writing scientific papers

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Skills:

Good at coordinating the group, good English skills, general knowledge in coastal ecosystems, experience in writing scientific papers

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Environmental Science B Sc.



Skills:

Knowledge in coastal ecosystems, the Wadden Sea and the ecosystem of Langeoog

Christoph Hochmüller

Karl-Franzens University Graz
Geography and History B Sc.



Skills:

GIS skills to design useful graphics, general knowledge in ecosystems

Thank you!

