



# CLIMATE PROOF AREAS

## 28/10/2009





# CLIMATE PROOF AREAS FUTURE







# SEA LEVEL RISE





# CHANGES IN RAINFALL







# MORE EXTREME TEMPERATURES





# IMPACT ON HEALTH ISSUES







# IMPACT ON FLOODS





# CLIMATE PROOF AREAS TIME TO ADAPT







# PROJECT

- ▶ Analysis of climate change and its impact
- ▶ How can adapting be done?
- ▶ Taking into account life in North Sea Region





# PIONEERS







# 13 PARTNERS

## Knowledge institutes

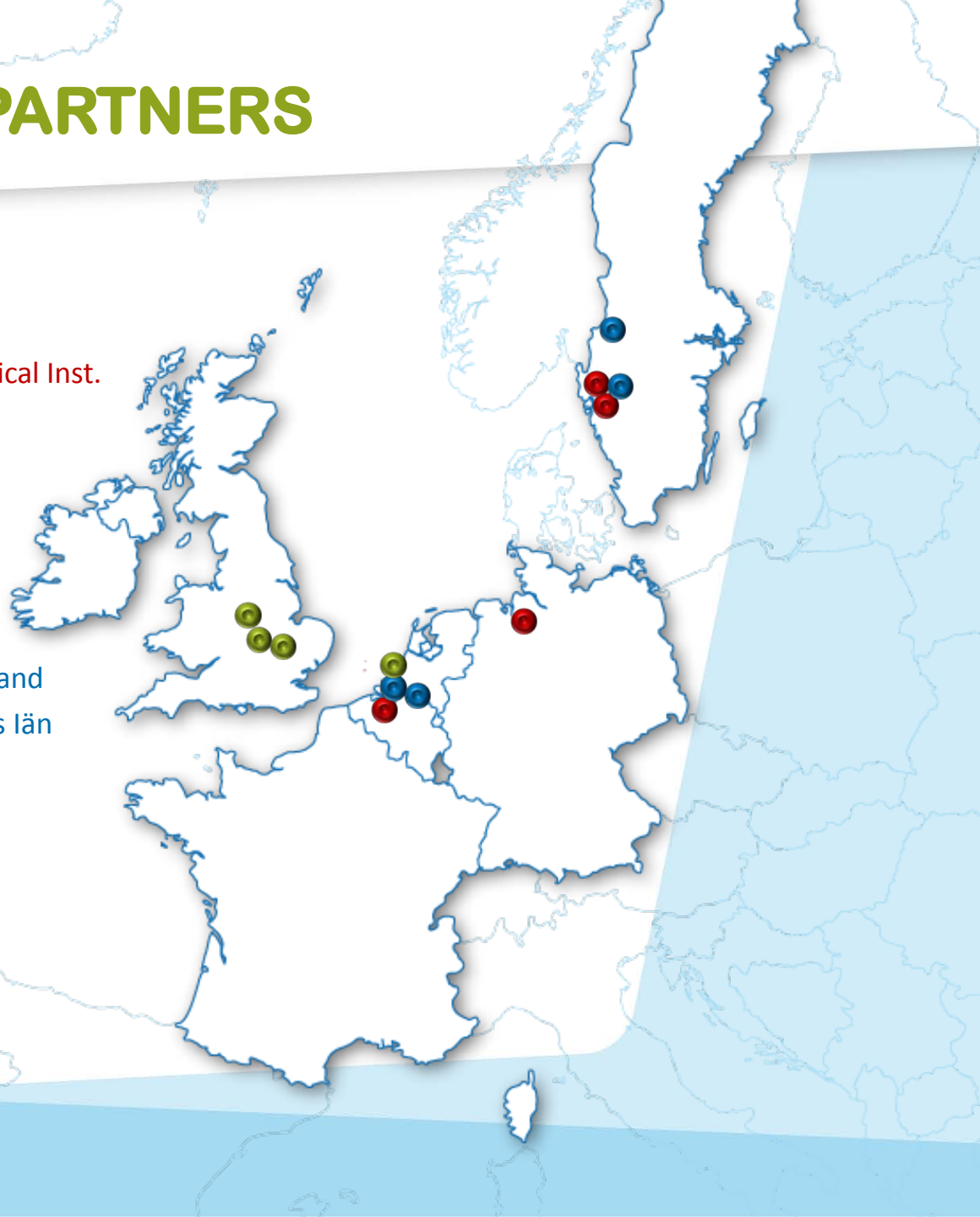
- Swedish Meteorological and Hydrological Inst.
- Ghent University
- University of Oldenburg
- Swedish Geotechnical Inst.

## Public authorities

- Municipality of Arvika
- County Administrative Board of Värmland
- Administrative Board Västra Götalands län
- Province of Zeeland
- Municipality of Schouwen-Duiveland

## Implementing bodies

- Rijkswaterstaat, dep. Zeeland
- National Trust (UK)
- RSPB (UK)
- Wildlife Trust NCPB (UK)





# CLIMATE PROOF AREAS OUR CHALLENGE







# WORKING





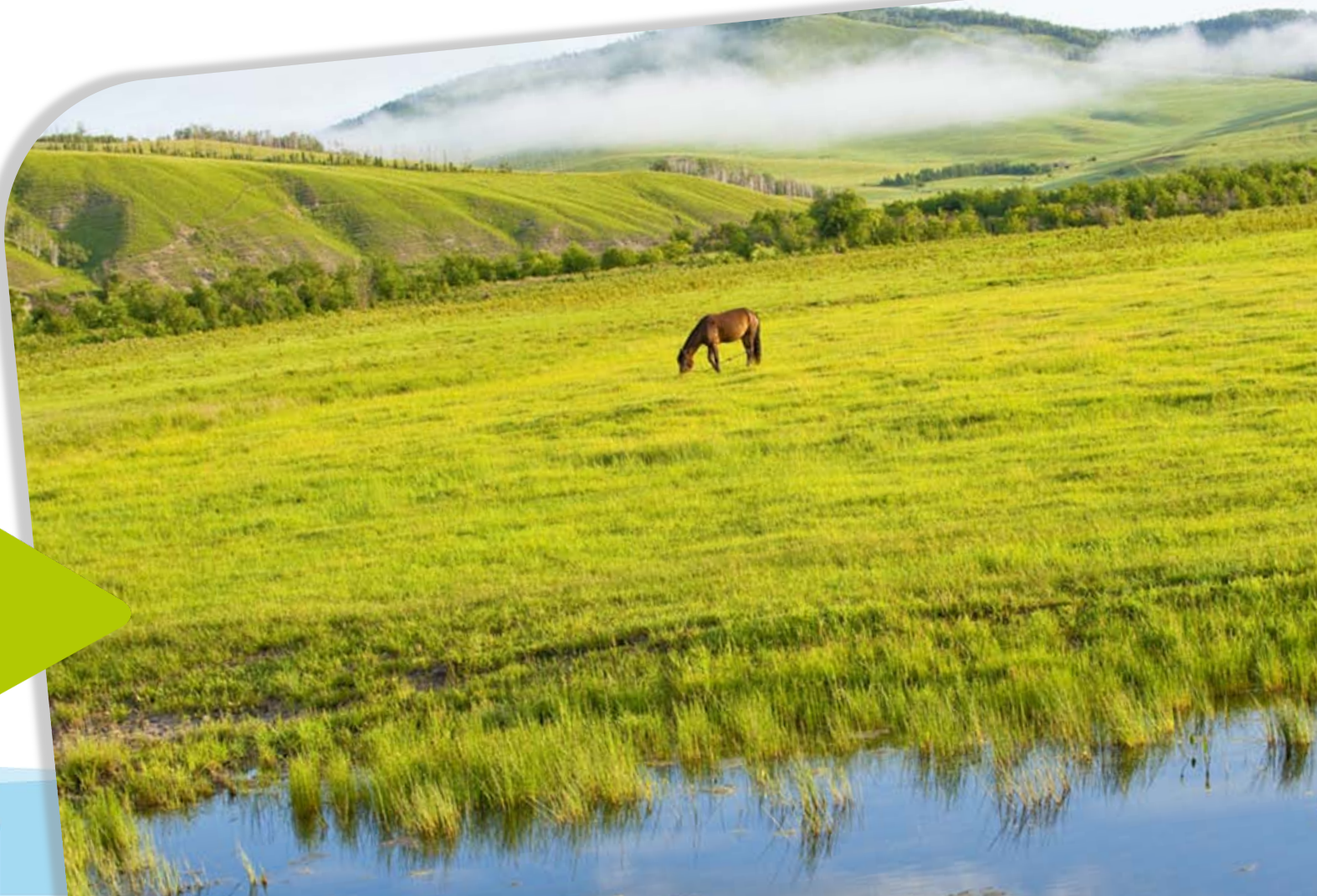
# GUARDING







# PROTECTING





# GROWING







# PLAYING



# LIVING







# CLIMATE PROOF AREAS OUR METHODS







# PROJECT STRUCTURE

## 5 work packages



WP5 Project management and communication  
(project support, control, communication strategy and tools)





# KNOWLEDGE EXCHANGE

- ▶ Facts about climate change
  - ▶ Reports of 5 countries
- ▶ Climate proof innovations
  - ▶ Developing new techniques
  - ▶ 10 real life innovative test labs
    - ▶ 1 Feasibility study
    - ▶ 3 Adaptation strategies
    - ▶ 6 Investments in innovative techniques





# POLICY RECOMMENDATIONS

- ▶ Raise political awareness
- ▶ Encourage to act now
- ▶ International and local level







# PROJECT MANAGEMENT

## ▶ Project management

- ▶ Project support

- ▶ Financial control

## ▶ Communication

- ▶ Strategy

- ▶ Tools



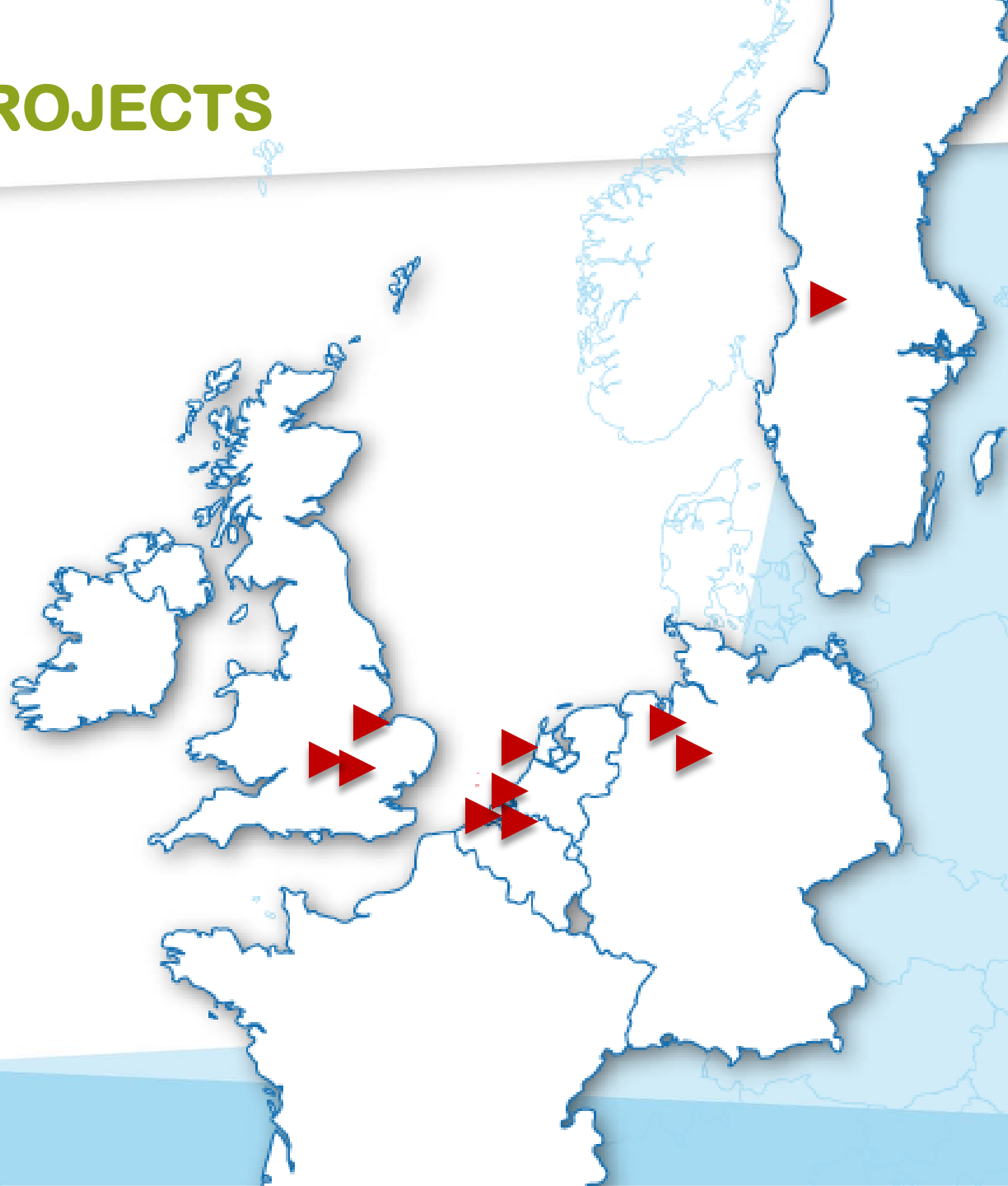


# CLIMATE PROOF AREAS PROJECTS





# PROJECTS





# SCHOUWEN-DUIVELAND (NL)





# STRATEGY

## ► Aim

- Transform into a climate proof island
- Combining functions living, working and leisure

## ► Method

- Integrated adoption strategy
- Based on Climate Change Impact Report
- Involvement of local stakeholders





# PARTNERS

- ▶ Province of Zeeland
- ▶ Rijkswaterstaat (Directorate-General for Public Works and Water Management)
- ▶ Process manager
- ▶ Municipality Schouwen-Duiveland





# SHELLFISH REEFS (NL)





# INVESTMENT

## ▶ Aim

- ▶ Coastal defence
- ▶ Innovative technique

## ▶ Method

- ▶ Creating a shellfish reef
- ▶ Monitor the impact





# OPPORTUNITIES

- ▶ Provide delicious shellfish
- ▶ Prevent erosion by reducing the direct wave attack on the beach





# HANGING BEACH (NL)





# INVESTMENT

## ▶ Aim

- ▶ Coastal defence
- ▶ Innovative technique

## ▶ Method

- ▶ Creating a platform under water by inserting hard surfaces below the sand
- ▶ Monitor the effects





# OPPORTUNITIES

- ▶ Retain sand on the 'steps' of the cascade
- ▶ Provide popular bird grounds
- ▶ Make possible shellfish beds





# Sand nourishment (NL)





# SAND NOURISHMENT (NL)

## ► Aim

- Coastal defence
- Innovative technique

## ► Method

- Carrying out a sand nourishment of 500m diameter and + 150.000m<sup>3</sup>
- Monitoring the impact for 3 years





# OPPORTUNITIES

- ▶ Modelling the geo-morphological processes
- ▶ Preparing a new larger scale project based on lessons learned





# Wesermarsch urban





# STRATEGY

## ► Aim

- Prepare the city of Brake to adapt for climate change
  - Increased flood risk
  - Moving frontier salt and fresh water

## ► Method

- Integrated adaptation strategy
- Based on Climate Change Impact Report
- Involving local stakeholders





# PARTNERS

- ▶ Water Board of Brake and Stadland
- ▶ Dike Board (Il. Dike Board Oldenburg)
- ▶ County Government (Dep. Of environment and Spatial Planning)
- ▶ OOWV, drinking water supply and waste water treatment
- ▶ City of Brake (Dep. Town Planning)
- ▶ Agency for Water Mgt., Coastal Protection and Nature Conservation (Lower Saxony, NLWKN)
- ▶ Ministry of the Interior Lower Saxony, Government Agency Oldenburg, Dep. Spatial Planning
- ▶ Agency for Economic Development of the county Wesermarsch





# Wesermarsch rural hinterland





# FEASIBILITY STUDY

## ► Aim

- Range of possible solutions to:
  - Possible flooding
  - Salinisation of fresh water
  - Irrigation systems for the hinterland

## ► Method

- Feasibility study
- Based on Climate Change Impact Report





# PARTNERS

- ▶ Water Boards (Butjadingen, Stadland, Jade)
- ▶ Dike Boards (I and II Dike board Oldenburg)
- ▶ County Govern. (Dep. Of Environment and Spatial Planning)
- ▶ Municipality of Butjadingen
- ▶ Chamber of Agriculture
- ▶ Farmer's Association lower Saxony, Office Wesermarsch (Landvolk)
- ▶ Agency for Water Management, Coastal Protection and Nature Conservation (Lower Saxony, NLWKN)
- ▶ BUND Friends of the Earth, Association for Environmental protection (NGO)
- ▶ National Park Authority, dep. For Man and Biosphere





# TITCHWELL MARSH





# INVESTMENT

## ► Aim

- To help raise awareness of the need for innovative forms of flood defence as part of adaptation to the impacts of climate change.  
Economic diversity of the region

## ► Methods

- Moving sea defence West Bank
- Moving sea defence North Wall
- Monitoring impact





# INVESTMENT

## ► Opportunities

- Protection of freshwater and brackish habitats
- More viewing points on new sea wall
- Encourage sustainable tourism





# GREAT FEN





# INVESTMENT

## ► Aim

- Reconnect and buffer two national nature reserves
- Conservate of heritage and natural resources
- Sustainable water resource management





# INVESTMENT

## ► Method

- Analysis current drainage system and impact
- Conservation and restoration work to protect the peat soil
- Active management of the area by grazing and other techniques







# INVESTMENT

## ► Opportunities

- Solution to flood risk problems of surrounding farmland and property
- Stop the loss of carbon to the atmosphere
- Planning framework that supports tourism and economy





# WICKEN FEN







# INVESTMENT

## ► Aim

► Turn this important lowland wetland into a vital green lung  
Increased flood risk

## ► Method

► Eco-hydrological wetting

► Monitor the impact

► Involving local stakeholders







# INVESTMENT

## ► Opportunities

- More attractive recreational area
- Higher quality of life near Cambridge



# ARVIKA





# STRATEGY

## ► Aim

- Transform Arvika to climate proof city
- Increased flood risk

## ► Method

- Integrated adaptation strategy
- Based on Climate Change Impact Report
- Involving local stakeholders







# PARTNERS

- ▶ Swedish Meteorological and Hydrological Institute (SMHI)
- ▶ Swedish Geotechnical institute (SGI)
- ▶ Municipality of Arvika
- ▶ The county administrative voard of Värmland
- ▶ The county administrative board of Västra Götaland





# **CLIMATE PROOF AREAS** **OUR OUTCOME**





# ADAPTATION TOOLKIT

- ▶ Develop your own adaptation strategy
  - ▶ Impact of climate change per region
  - ▶ Main options for adaptation
  - ▶ Practical guide and methods to develop a strategy
  - ▶ Matched measures for specific regions







**CLIMATE PROOF AREAS**  
**THANKS**

[www.climateproofareas.com](http://www.climateproofareas.com)

