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Conference Paper

The increasing importance of water management in the Dutch planning system

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The increasing importance of water management in the Dutch planning system

Frank Bruinsma

Mark Bokhorst

IGU Conference, July 1-4, 2010,
Groningen

Contents presentation

- Introduction
- Impacts of climate change
 - (Descending ground level)
 - Increasing sea level
 - Change in rainfall
 - Intensified rainfall
 - Periods of drought
- Polders become brackish
- Transformation rural areas
- Conclusion

Introduction: the Netherlands

- 16.5 million inhabitants
- About half of the country below sea level
- Lowest point: 6,74 m. below sea level
- Randstad below sea level
- 70% GDP produced below sea level

Source: www.waterland.net

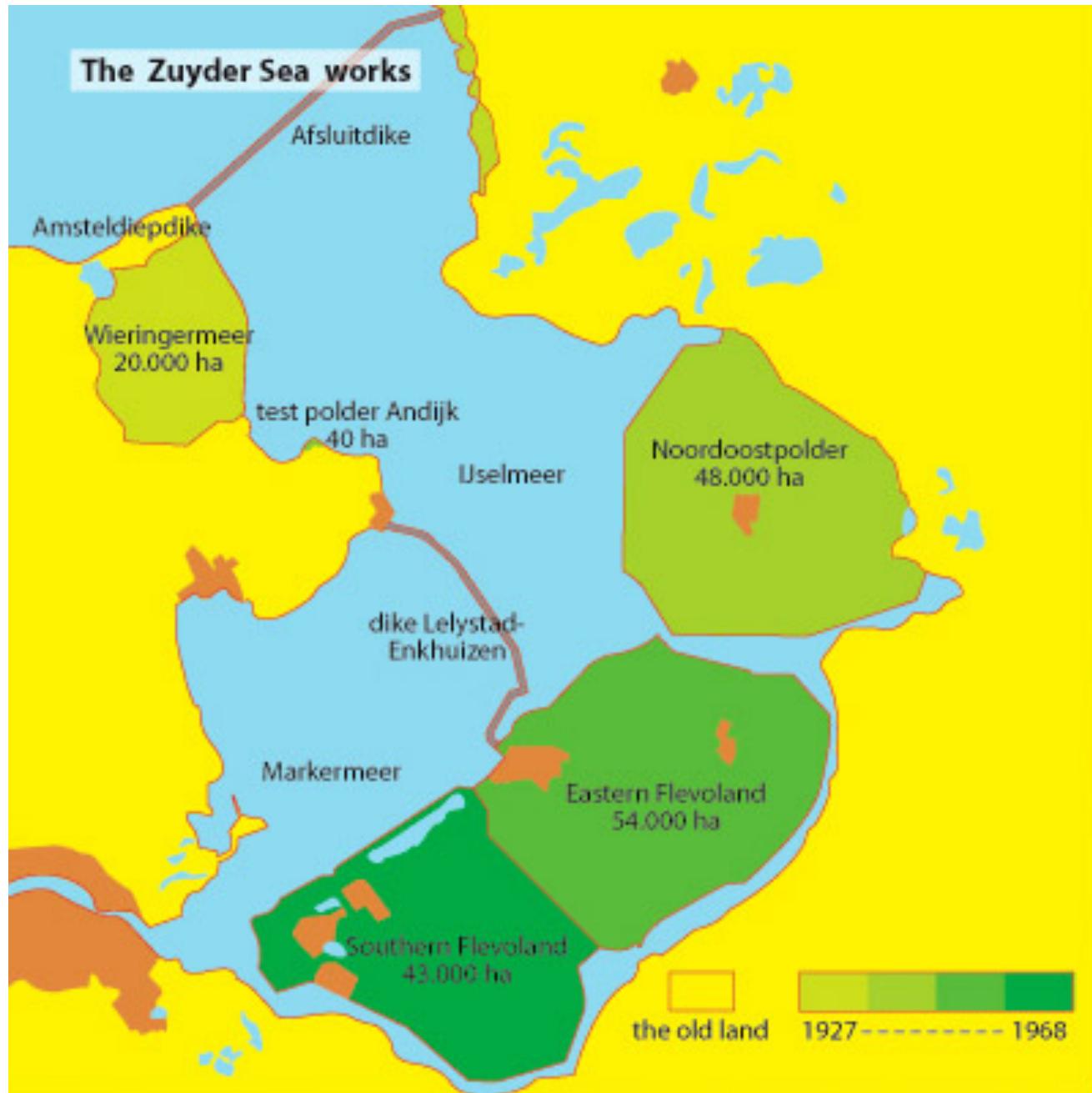


Source: Ministry of Transport and Public Works, 2004

Primary defense

- 3,500 kilometers
 - 1,430 km. river dikes
 - 1,017 km. dikes around lakes (IJsselmeer)
 - 430 km. dikes coastal defense
 - 260 km. dunes coastal defense
- Big projects to reduce coastal defense:
 - IJsselmeerdam (1932)
 - Deltaworks (1997)

Source: www.waterland.net



Source: Stg. Deltawerken online



Source: www.deltawerken.com

Secondary barriers

- About 14.000 kilometers
 - Storage basin dikes
 - Polder embankments
 - Canal dikes

Organization water management

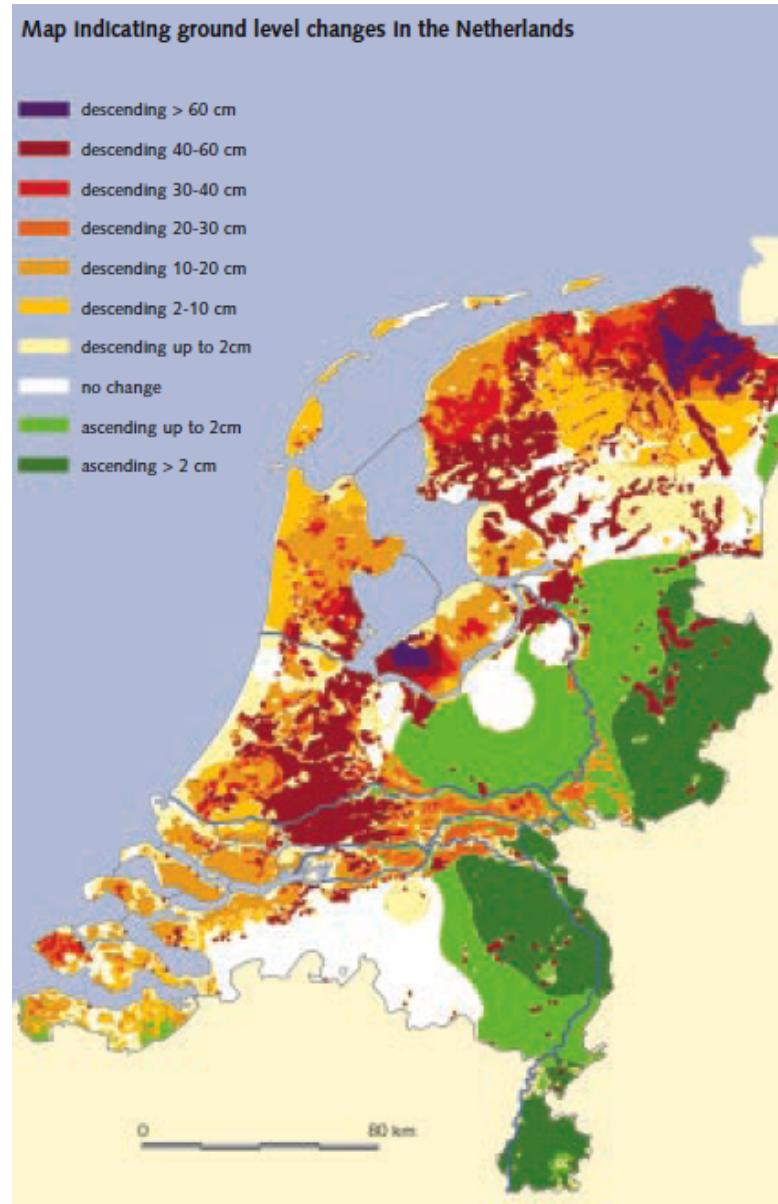
- District water boards (1940: 2,700 ↔ 2010: 27)
 - 90% primary defense
 - Turnover € 2.5 billion
 - € 200 million flood defense
 - € 800 million water quantity
 - € 1,500 million water quality
- National government
 - Turnover € 1,3 billion
- Provinces and municipalities

1. Climate change

- (Descending ground level)
- Rising sea level
- Change in rainfall

1.1 (Descending ground level)

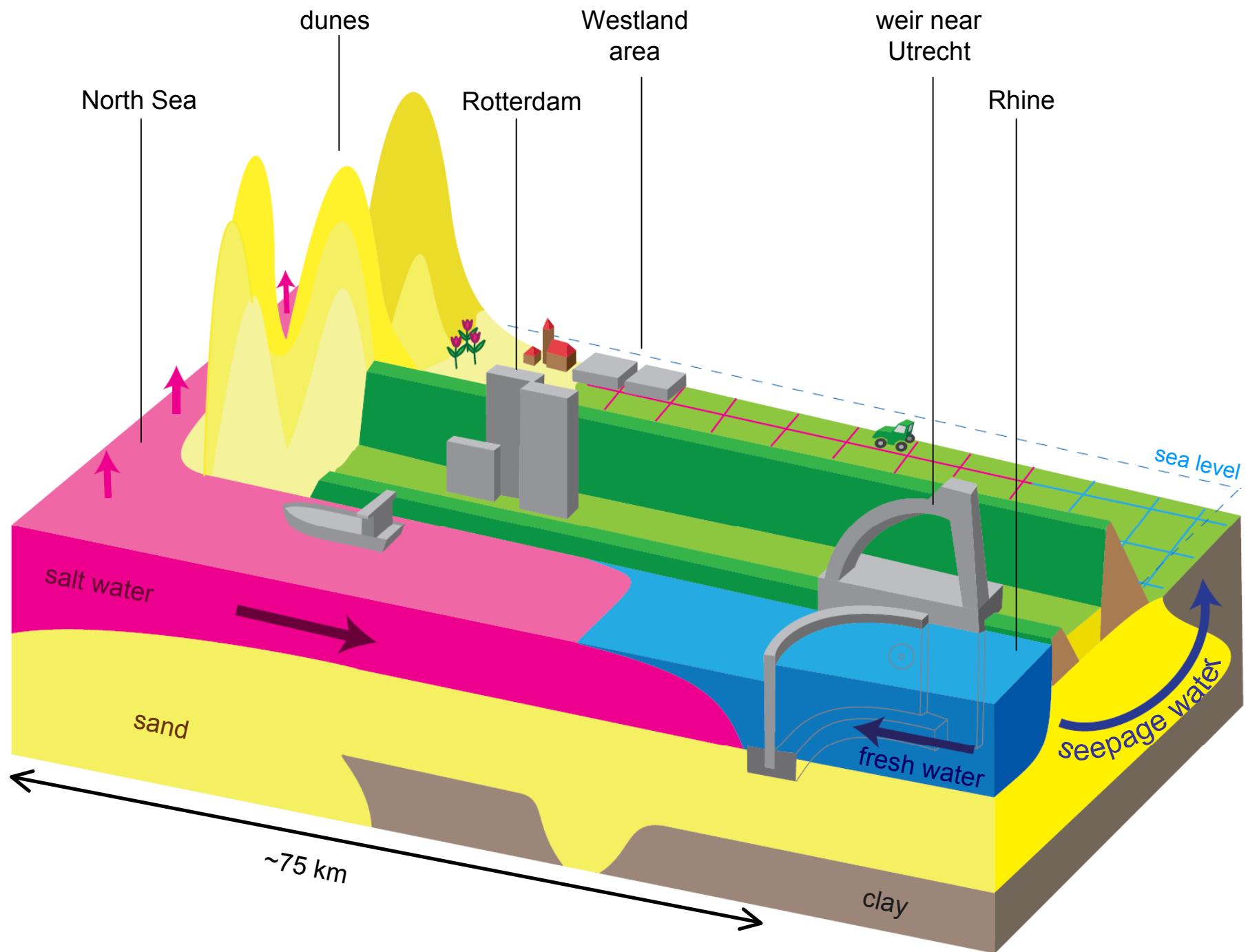
- Western part of the country
 - Dikes along the rivers
 - Peat extraction
 - Draining of peat polders: oxidize and subsides
- Northern part of the country
 - Gas extraction Groningen field: > 60 cm



Source: Directorate-General of Public Works and Water Management,
NAM

1.2 Climate change: rising sea level

- Sea level will rise by about 1 meter
 - No problem considering safety: primary defense strong enough
 - Problem: inland penetration saltwater tongue
→ threat valuable agricultural land
 - Solution: freshwater Lake IJsselmeer



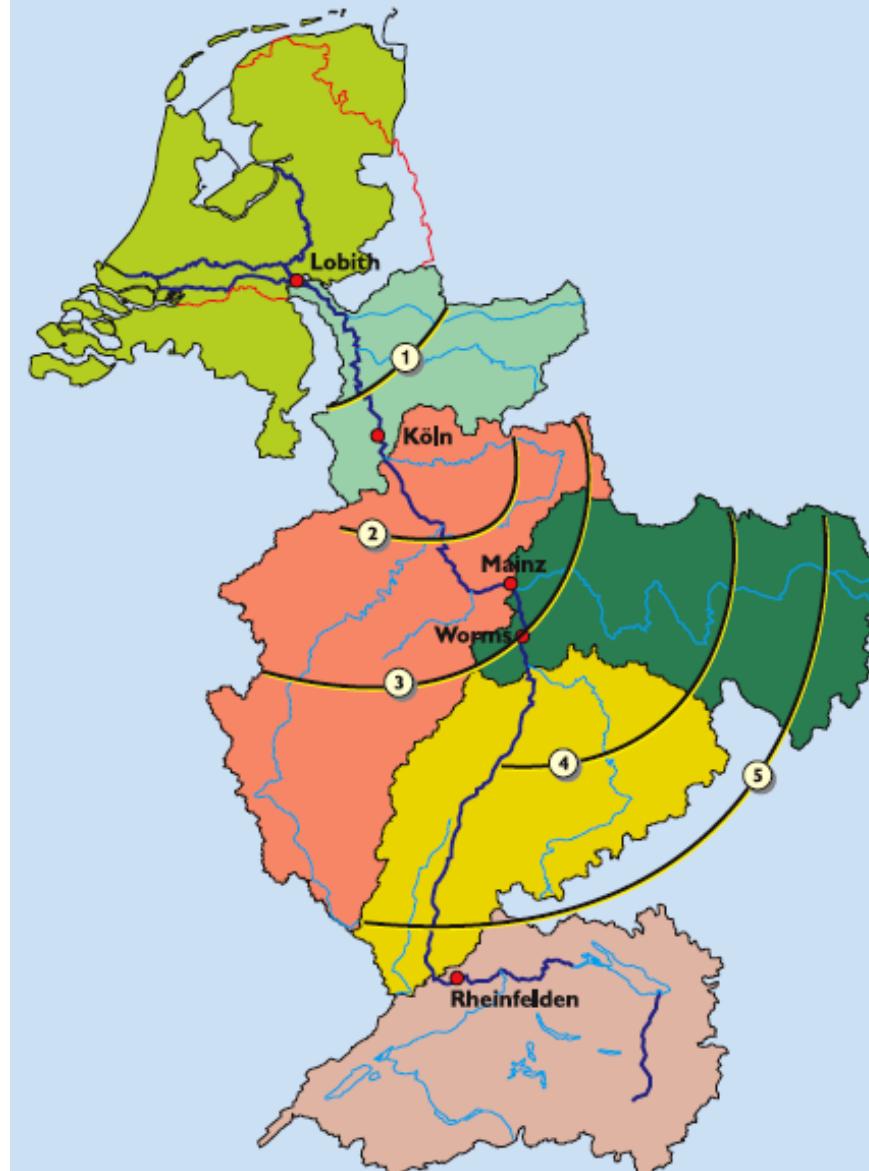
1.3 Climate change: rainfall

- Winters: wetter & increase extreme rainfall events
- Summers: dryer & increase extreme rainfall events & decrease rainy days
- Excess water rainfall \leftrightarrow drought

1.3a Climate change: excess water

- Room to the river
 - (higher dikes, higher water levels → higher risks by breakthrough)
- The Netherlands “drain of Europe”
- 2 sets of measures
 - Enlargement carrying capacity rivers
 - Storage of excess rainwater within the Netherlands

Number of days on which a high water surge reaches the Rhine catchment area in the Netherlands



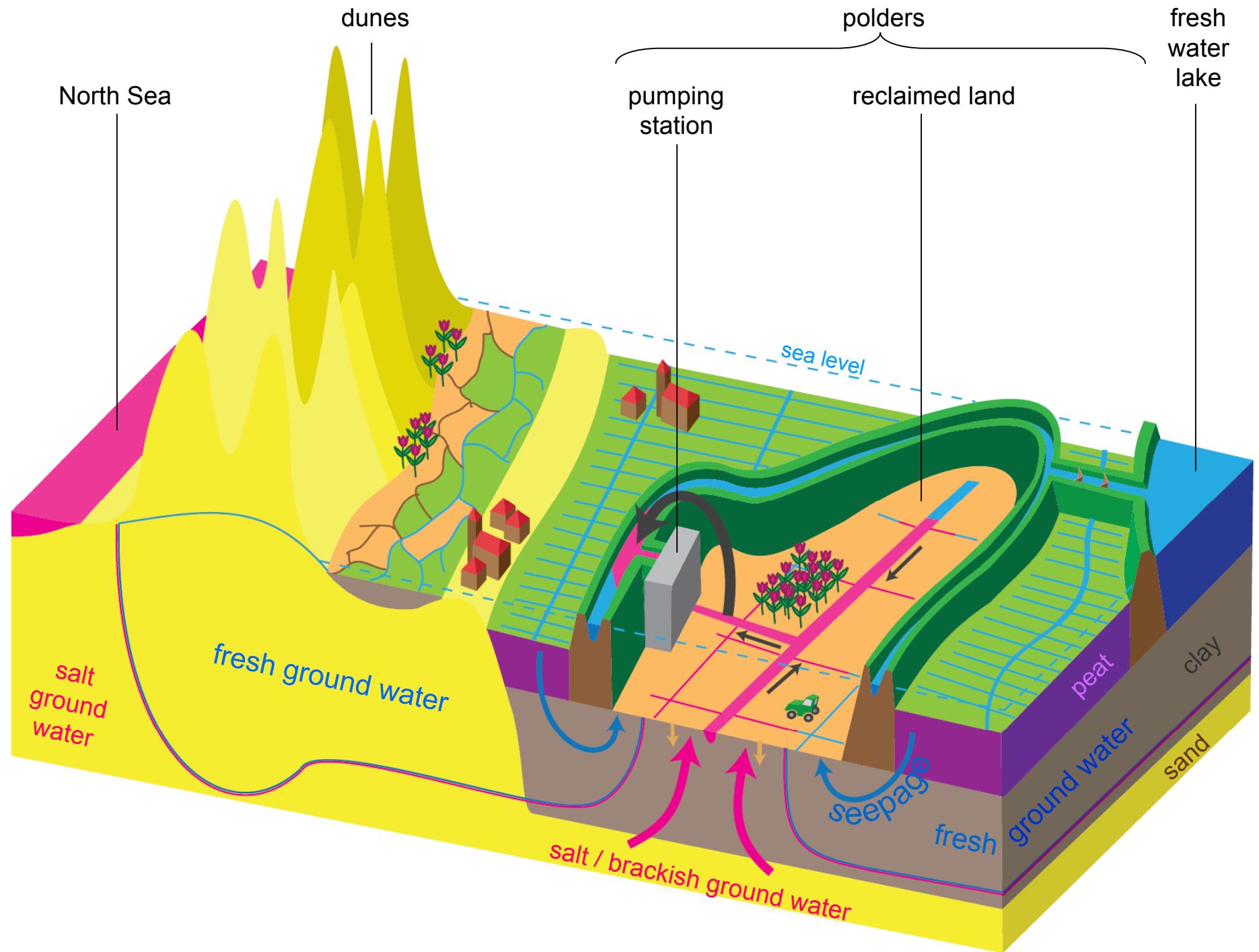
Source: *de Rijn op Termijn*, WL Delft

1.3b Climate change: drought

- Occasional water shortage
 - Peat dikes drying out (breakthrough Wilnis, 2003)
 - Irrigation agriculture
 - Cooling water energy supply
 - Inland barges
- Reserves of freshwater
 - Lake IJsselmeer (+ 1.5 meter of 0,3 meter)
 - Deltaworks

2. Polders become brackish

- Polders, reclaimed land, ponds
- System of waterways to manage groundwater level
- Freshwater pumped out
- Water too salt for agricultural use
- Nature? Flushing with freshwater?

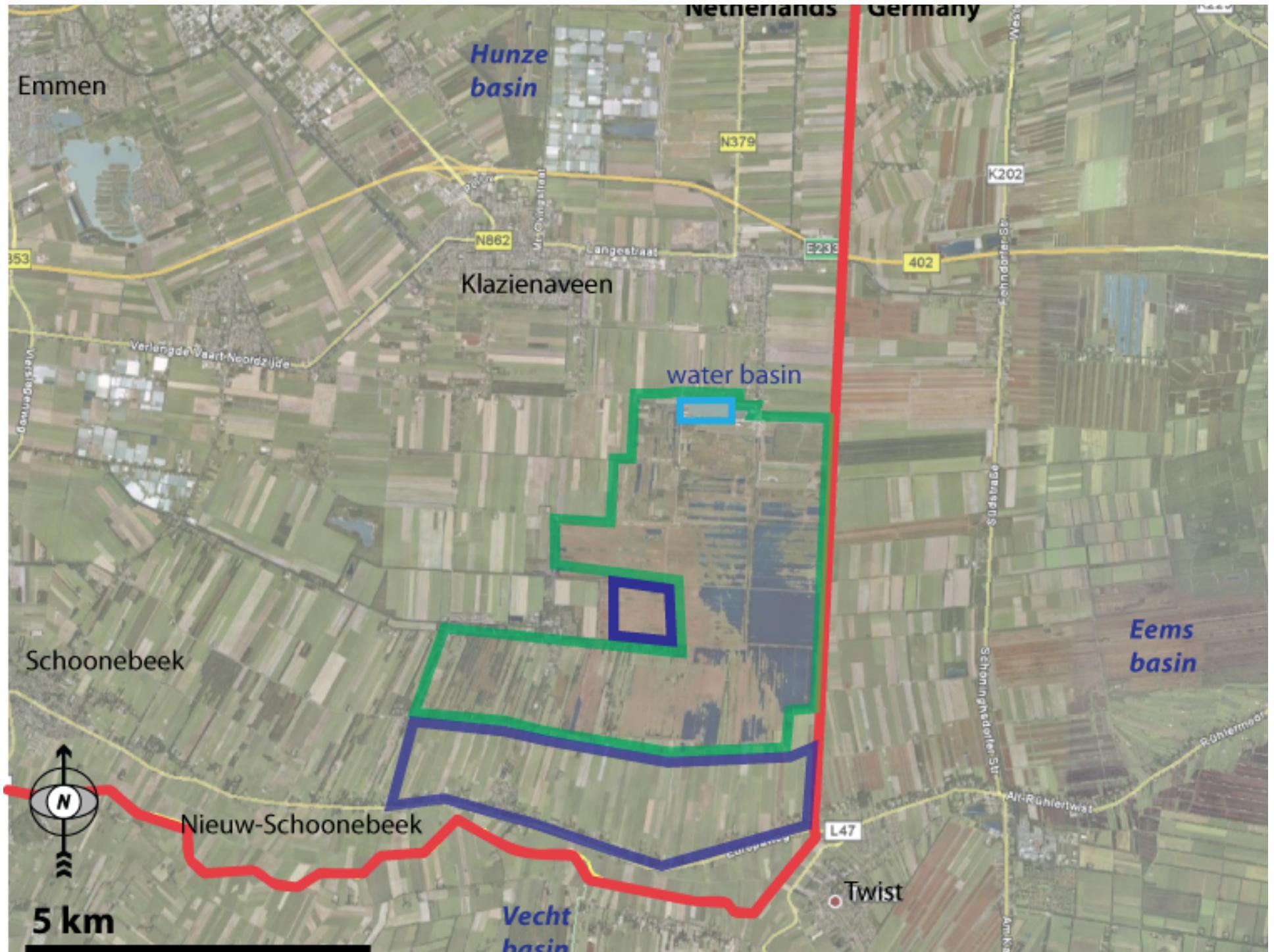


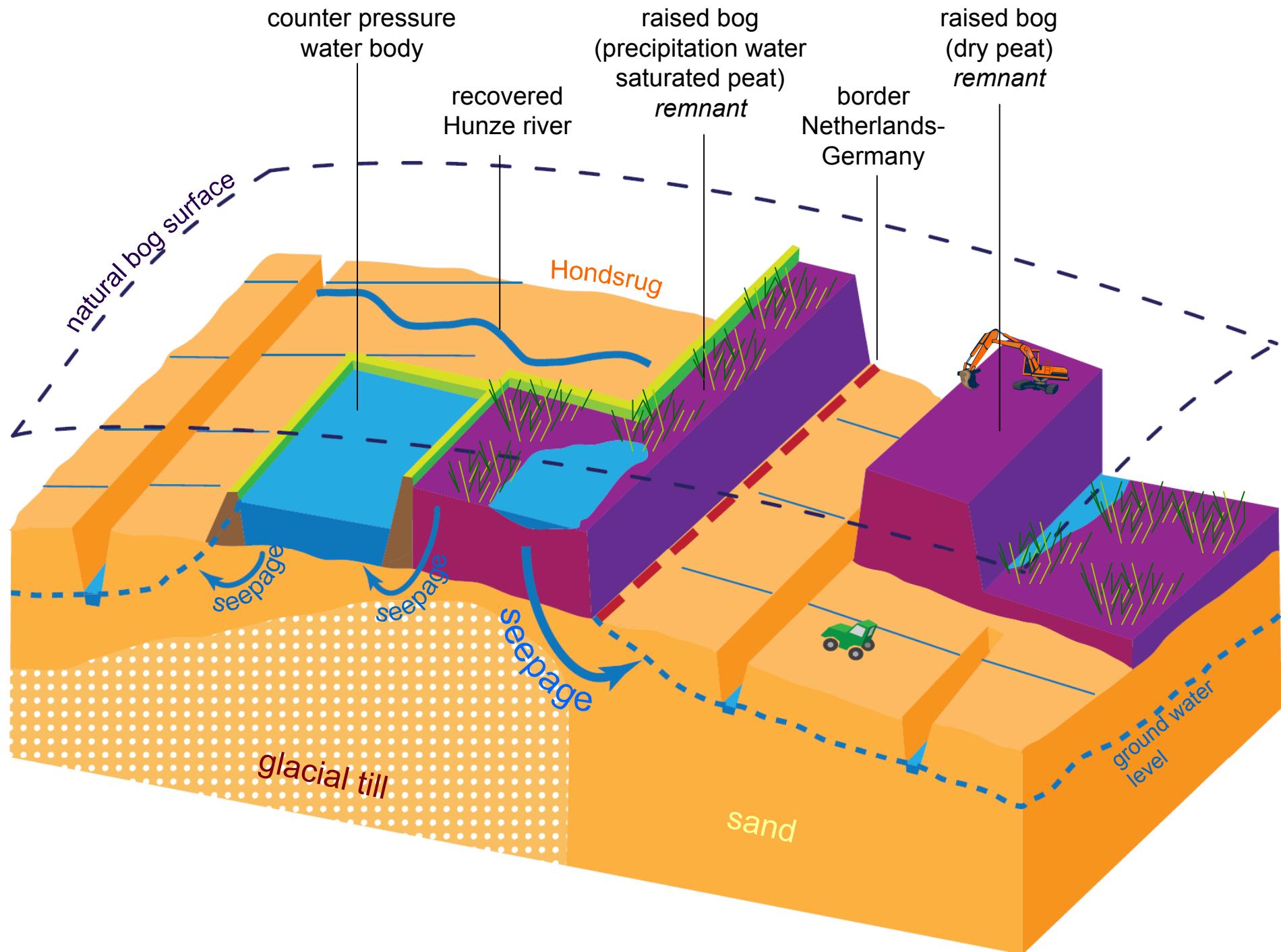
3. Transformation rural areas

- Agricultural sector:
 - Mechanization / increase in scale agriculture
 - Depopulation → services below critical threshold
 - Non-agricultural activities in rural areas
- Autonomous developments
 - Welfare increase: disposable income, leisure, mobile
 - Recreation, cultural historical landscapes, nature
- From production to consumption area

3. Transformation rural areas

- Diversity of actors
- Different spatial claims
- Different claims water management systems
- Subsystems within the present system
- Extension secondary barriers





Conclusion

- Many challenging tasks water management
 - Climate change
 - Polders too brackish
 - Transformation rural areas
- Central position of District Water Boards
- Present debate governmental reform
- Don't underestimate importance and knowledge district water boards!