

# Adaptation measures to agricultural drought within Baltic Sea region - a literature study

Project: Baltic Sea Cooperation for Climate Resilience  
- Flood and Drought Risk Management

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# Jokioinen, southern Finland,

## Field 1, June 2021



Compacted seedbed due to heavy rains in spring, poor seed emergence, after seeding heavy drought, no yield

## Field 2, July 2021



Reasonable seed emergence, moderate crop cover and yield potential but heavy drought lead less than 1500 kg/ha barley yields

# Effect of drought

Growth and yield will decrease as **transpiration** decreases

Nutrient balances and **leaching** will increase

High temperatures are often connected to drought and can **hasten development** which again decreases yields

**Wind erosion** increases when no or small crop cover

**Drinking water for animals** becomes scarce and quality risks occur

Low yields lead to **shortage of animal fodder** and can further lead to forced slaughtering

**Communal water supply** might have to restrict water use

# Has something changed in recent decades?

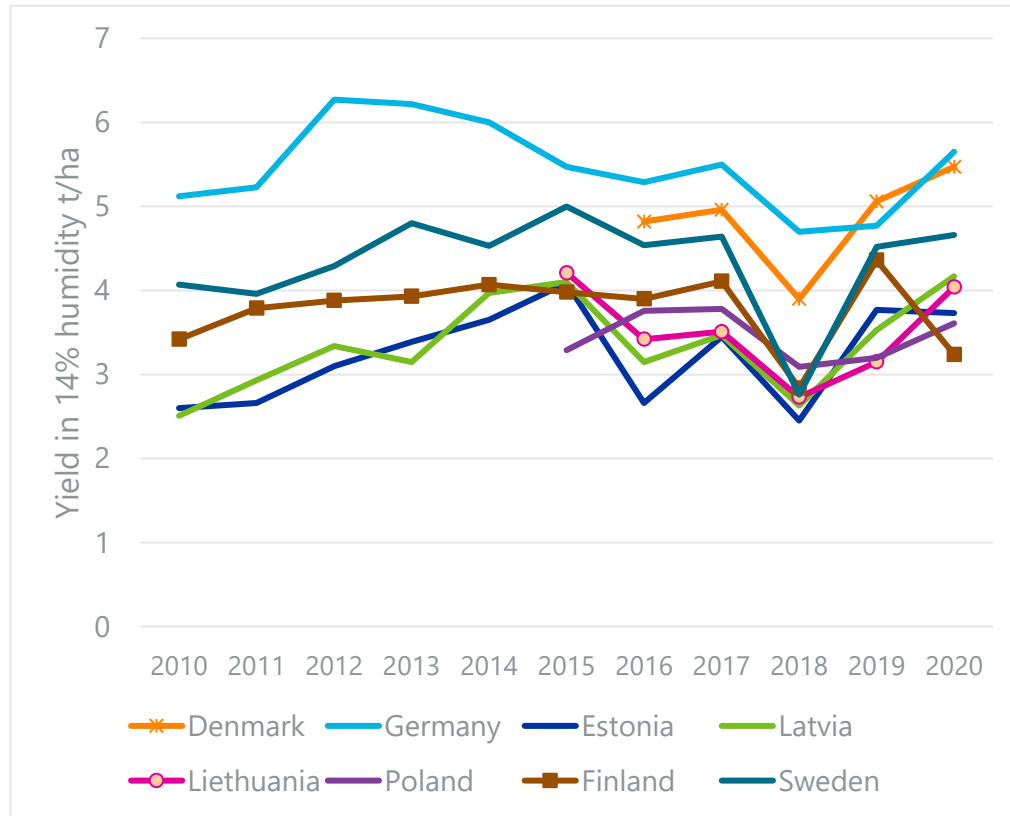
- **Climate change** is estimated to affect:
  - Increased temperature will hasten crop development and transpiration
  - Precipitation might increase slightly, but not necessarily in summer months
  - Proportion of heavy precipitation will increase

**Irrigation capacity** has remained low or even decreased

**Investments** for agricultural water management have been low

**Price** of agricultural products has not favored irrigation

# Spring wheat yields 2010-2020 (Eurostat)



2018 low yields in most Baltic Sea states

# How to adapt? What we know? 1/2

## Soil management

- Reduced tillage and no-till
- Keep or even increase soil organic matter
- Groundwater level regulation (e.g. controlled drainage)
- Cultivation of different soil types in order to secure sufficient production in different seasons (peatlands?!)

## Crop selection

- Species and cultivars with fast developing and deep root systems
- Winter crops (early development and growth)

# How to adapt? What we know? 2/2

## Irrigation

- Water should be available
- Selection of suitable machinery/method
- Calculate economical feasibility
  - Animal production has a long chain of events

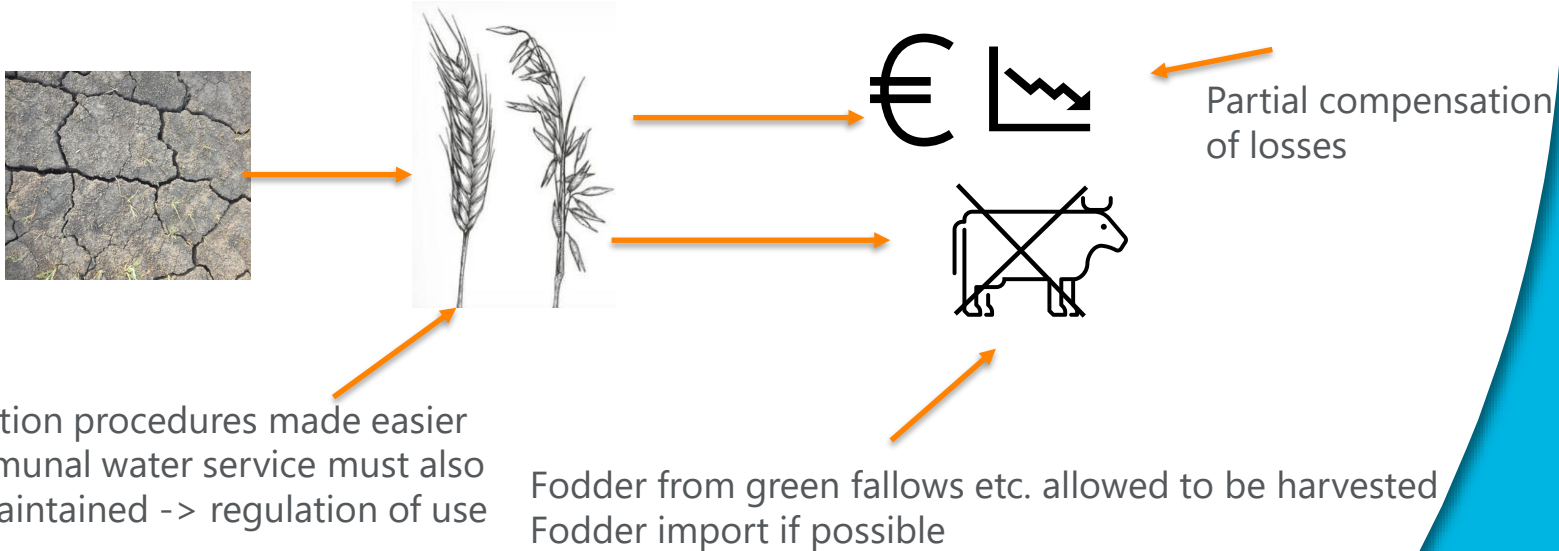
## Water reserves

- Natural resources (lakes, rivers, ponds, groundwater?)
- Constructed reservoirs

## Communal water

- Risks of pipe leakages should be decreased
- Regulation of water use
- Alternative water sources

# The reactions of Baltic Sea states after severe drought and low yields





# Examples of adaptation measures in Baltic Sea states 1/3

## Finland:

- Instructions for planning and establishing irrigation systems
- Area of controlled drainage and drainage irrigation should be increased
- The availability and demand of irrigation water should be estimated in different watersheds

## Sweden:

- Service for estimating water availability (Risk för vattenbrist)
- SLU has launched several studies to estimate economy of irrigating cereals and grassland
- Instructions for planning irrigation pond

## Examples of adaptation measures in Baltic Sea states 2/3

### Denmark:

- Service for estimating the effects of climate change
- SEGES provides advisory services and “Water accounts online/Vandregnskap” service
- Instructions when sea water could be used for irrigation

### Germany:

- Aim for: Reduced tillage, drought tolerant crop species and cultivars, diverse production that will decrease losses of drought spells.
- Wind erosion can be prevented by crop residues on the soil surface, increase of soil roughness and organic matter. Trees and agroforestry protect also soil from wind erosion.
- Discussions on drought insurances

# Examples of adaptation measures in Baltic Sea states 3/3

## Poland and Baltic states:

- Instructions from WMOs Global Water Partnership-project (2015)
- Global Water Partnership. 2015a. Guidelines for preparation of the Drought Management Plans.
  - [https://www.gwp.org/globalassets/global/gwp-cee\\_images/idmp-guidelines-pdf-small.pdf](https://www.gwp.org/globalassets/global/gwp-cee_images/idmp-guidelines-pdf-small.pdf)
- Global Water Partnership. 2015b. Natural small water retention measures combining drought mitigation, flood protection and biodiversity conservation. Guidelines.
  - [https://www.gwp.org/globalassets/global/gwp-cee\\_files/idmp-cee/idmp-nswrm-final-pdf-small.pdf](https://www.gwp.org/globalassets/global/gwp-cee_files/idmp-cee/idmp-nswrm-final-pdf-small.pdf)
- Increase water retention in agricultural catchment (Waterdrive/Kutno) on fields and drainage systems (Nature based Solutions)

# How to prepare? Support for society

System analysis from effectiveness of the following methods:

Soil management (tillage, organic matter, groundwater control)

Crop breeding

Crop selection

More studies on economy of irrigation with grass, cereals etc.

Watershed level planning for water reserves

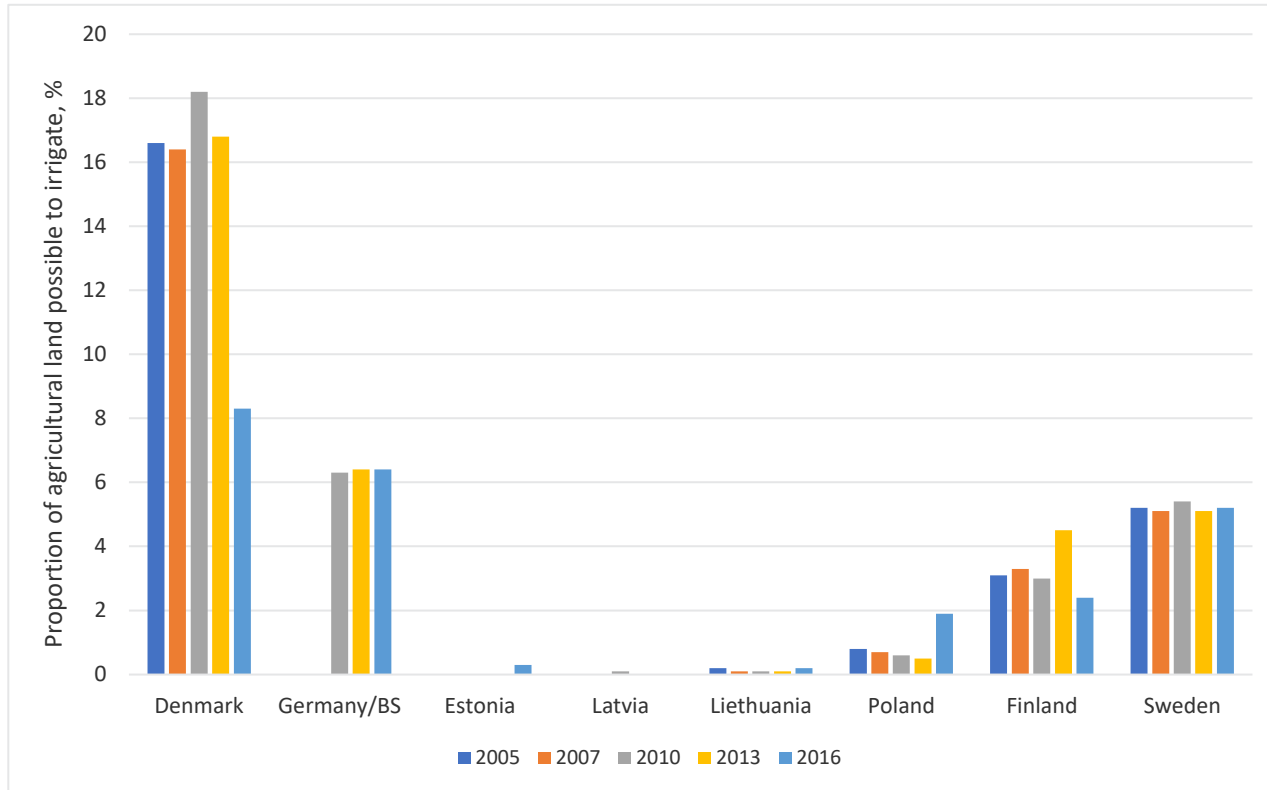
Irrigation scheduling for watersheds, drought warnings

Clear instructions for irrigation permits

} Investments to irrigation systems

Treated wastewater and other alternative sources for irrigation

# Irrigable utilized agricultural area, Eurostat



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*More studies on economy of irrigation with grass, cereals etc.*

*Watershed level planning for water reserves*

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**Investments to  
irrigation systems**

Treated wastewater and other alternative sources for irrigation

# Further information

Luke report 87/2021 in Finnish (with English summary)

<http://urn.fi/URN:ISBN:978-952-380-327-5>

Available before Christmas

## Baltic Sea Cooperation for Climate Resilience

- Flood and Drought Risk Management project
- 11/2019 - 12/2021
- [Link to project page](#)



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**Maatalouden ja vesihuollon  
sopeutumistoimet lisääntyviin  
kuivuusjaksoihin**

Tapio Saito, Merja Mutka ja Pekka Parkkila

Luke

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# Thank you!

*Waterdrive*

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