POLDER2C's

Animals on the levee

Interreg
EUROPEAN UNION
2 Seas Mers Zeeën
POLDER2C'S
European Regional Development Fund

Vana Tsimopoulou

U-Talent programma en de Hoogwater-excursie, 30-05-2022

This project has received funding from the Interreg 2 Seas programme 2014-2020 co-funded by the European Regional Development Fund under subsidy contract No [2S07-023]

Flood protection vs Nature

A ‘conflict of interest’ story

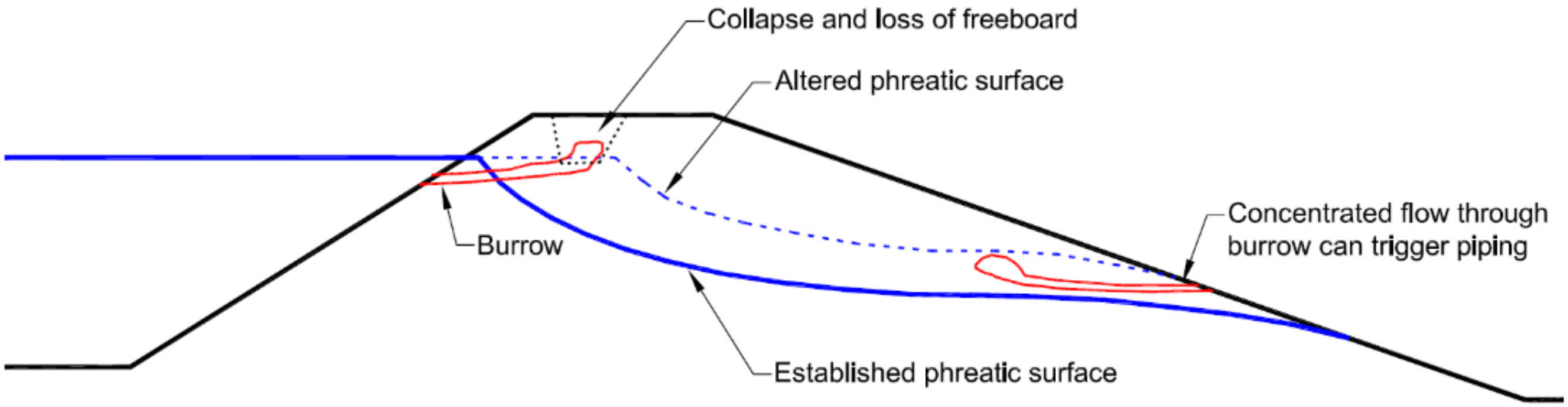
Lessons from Polder2C’s

This project has received funding from the Interreg 2 Seas programme 2014-2020 co-funded by the European Regional Development Fund under subsidy contract No [2S07-023]

The problem

Levee design

Engineers design levees without taking into account animal activity



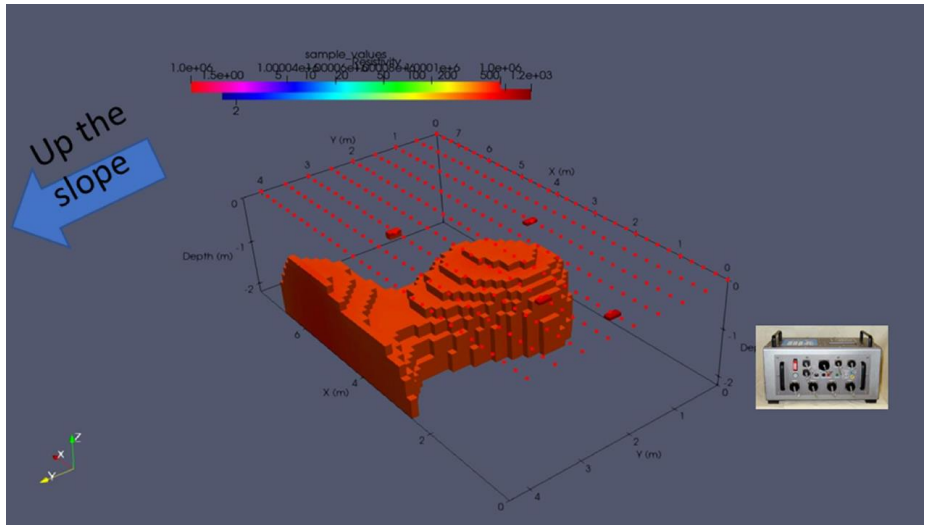
(Source: Cobos Roa, 2015)

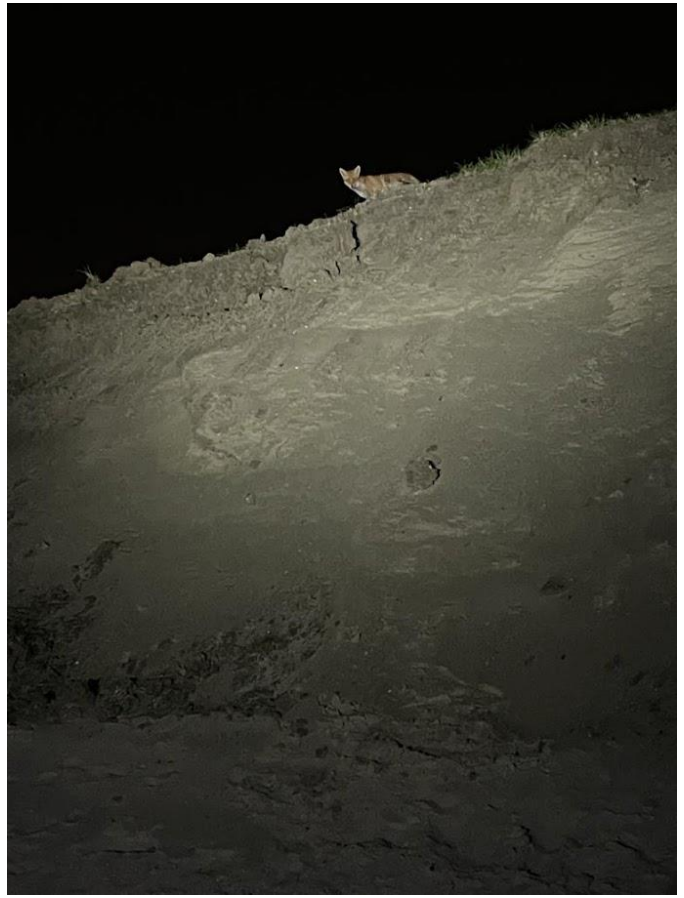
This project has received funding from the Interreg 2 Seas programme 2014-2020 co-funded by the European Regional Development Fund under subsidy contract No [2S07-023]

The problem

…but in reality

- Levees attract burrowing animals
- Many of them are protected (e.g. beavers)
- It is not always easy to detect burrows and remove them





This project has received funding from the Interreg 2 Seas programme 2014-2020 co-funded by the European Regional Development Fund under subsidy contract No [2S07-023]

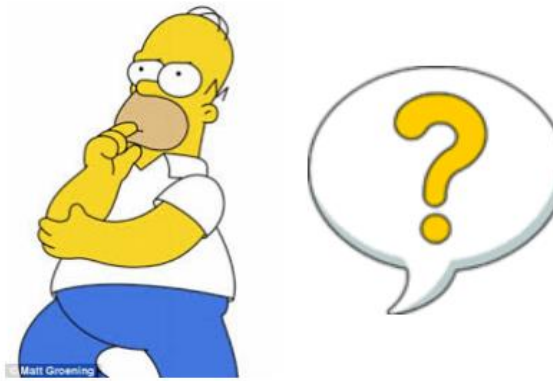
Are animal burrows dangerous?

(Source: Koelewijn et al. 2020)

Foxhole on the Hedwige levee after overflow testing, 23 November 2020

Test conditions:

- 180 l/sec discharge
- 2m-wide section
- Overflow duration: 1h 13 min



This project has received funding from the Interreg 2 Seas programme 2014-2020 co-funded by the European Regional Development Fund under subsidy contract No [2S07-023]

How much do we know about them?

Interreg 2 Seas Mers Zeeën POLDER2C'S
European Regional Development Fund

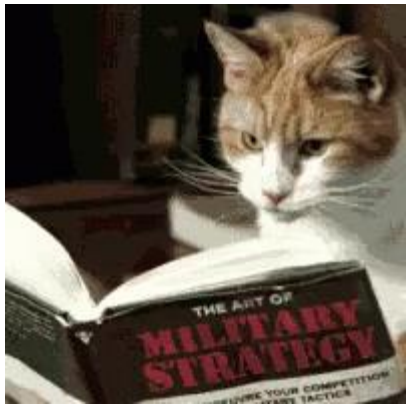
Literature review: **4 topics of interest**

1. Eco-engineering approaches for deterrence of animals

   → ***How can we make animals go elsewhere?***

2. Detection and measurement techniques

   → ***How can we find burrows on a levee and measure their geometry?***



3. Failure paths

   → ***How do levees fail when they have burrows?***

4. Effectiveness of countermeasures

   → ***How can we repair levee damages made by burrowing animals***

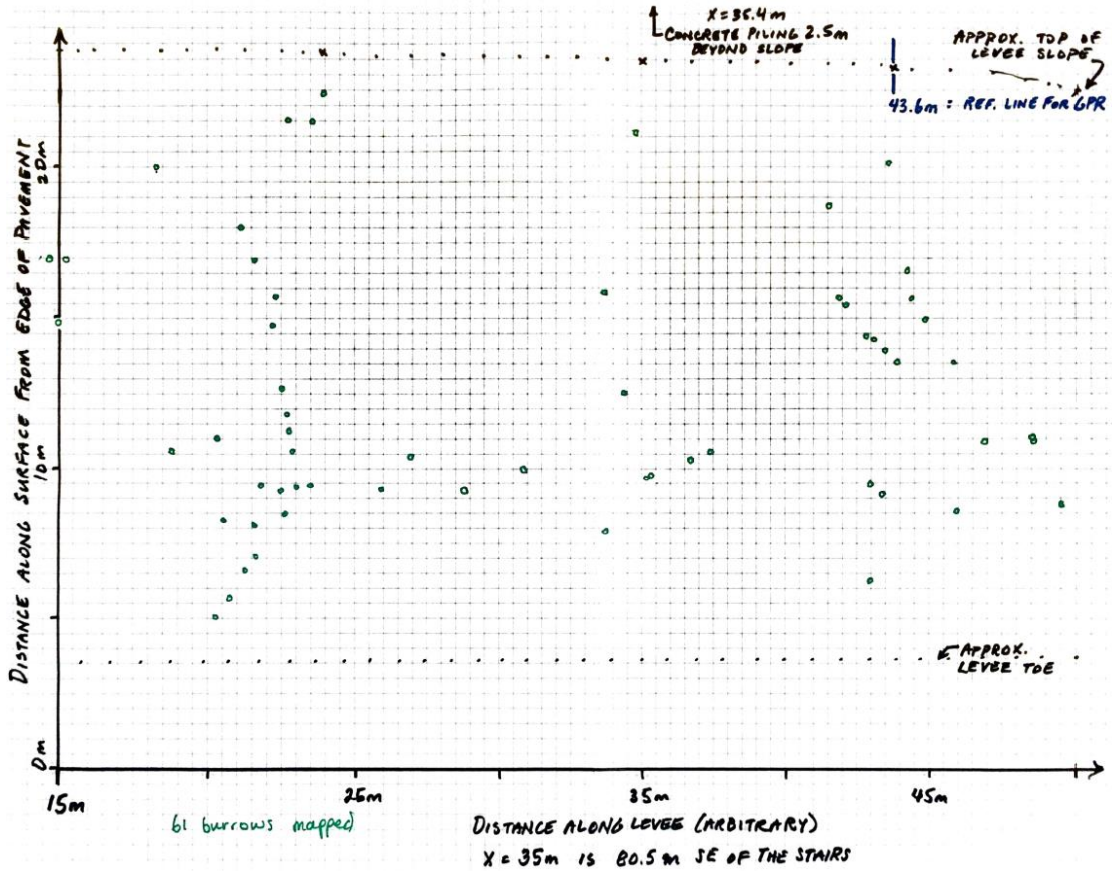
This project has received funding from the Interreg 2 Seas programme 2014-2020 co-funded by the European Regional Development Fund under subsidy contract No [2S07-023]

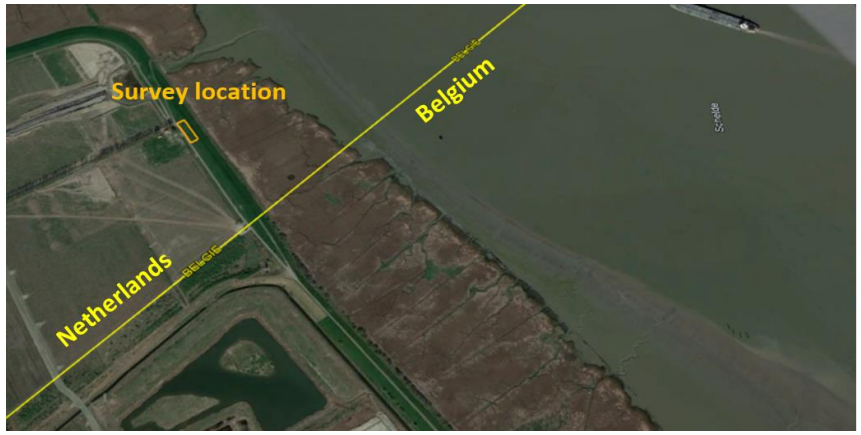
Mapping with a visual inspection

Mapping with a visual inspection

Interreg
2 Seas Mers Zeeën
POLDER2C'S
European Regional Development Fund

LLHPP, September 2021



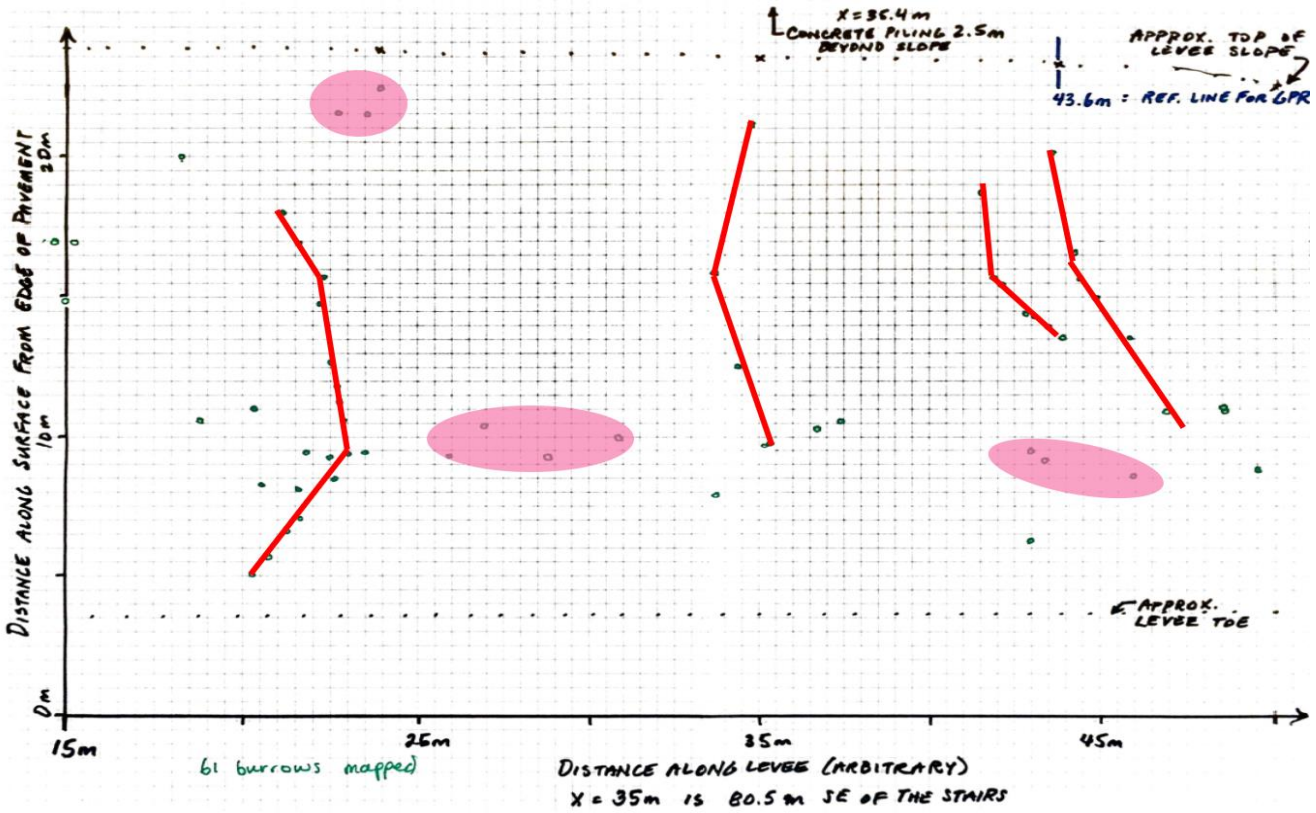


- Burrows of small rodents
- 100 m of levee surveyed
- 90 burrows detected
- Depths < 25 cm
- Diameters: 1 - 12 cm

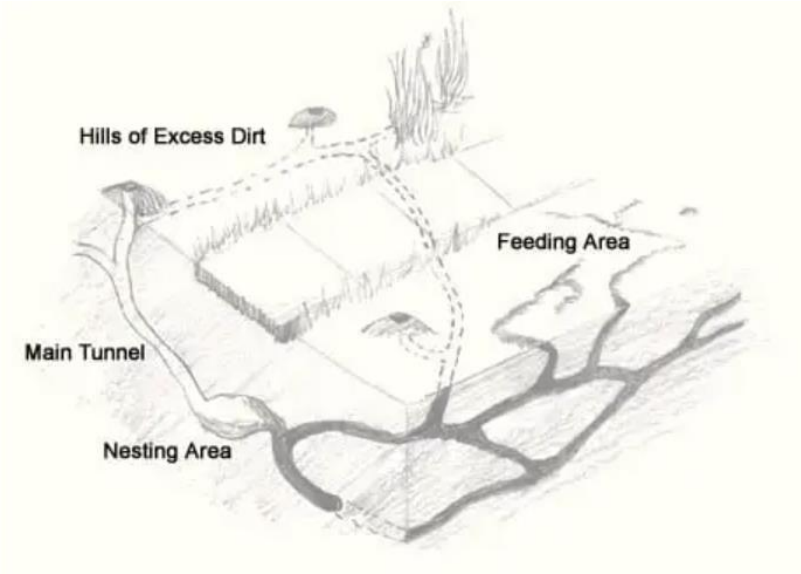
Detection and monitoring techniques

Interreg 2 Seas Mers Zeeën POLDER2C'S
European Regional Development Fund

Spatial distribution patterns

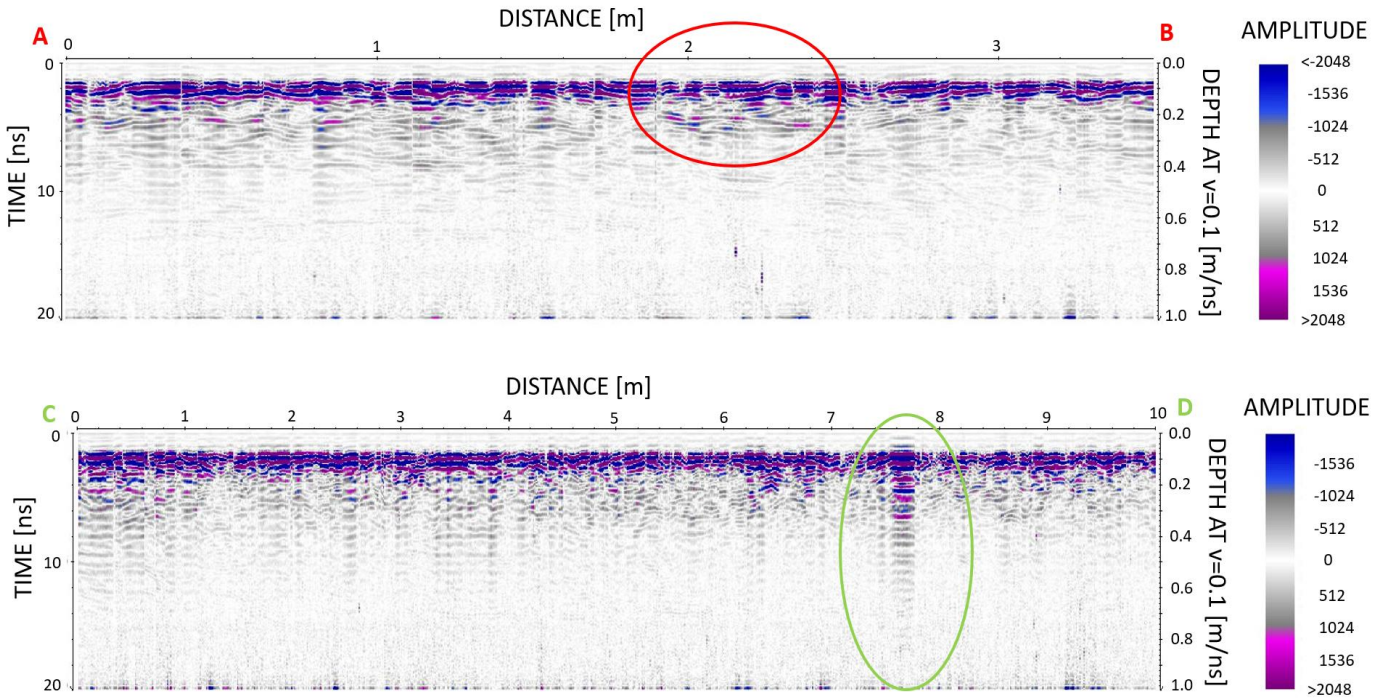


- Clusters (mice & moles)
- Lines (moles)



Ground penetrating radar

Taking an X-ray of the levee

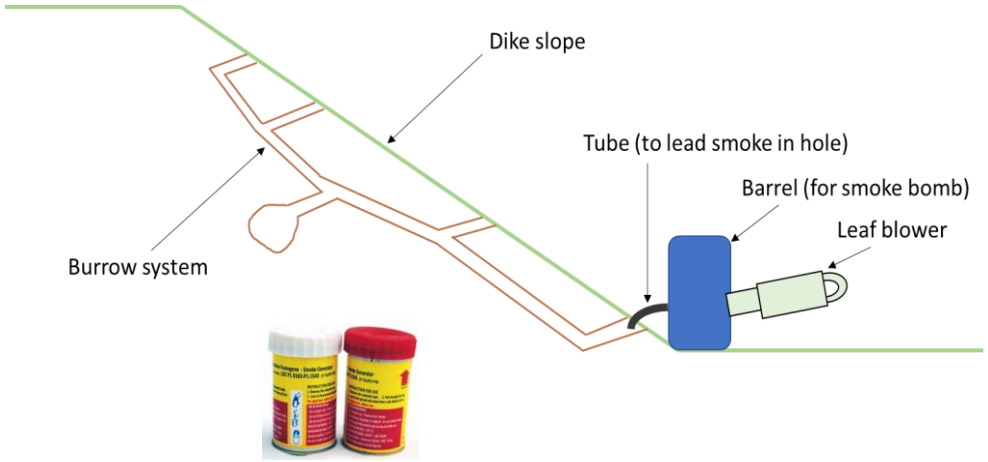


Max depth = 35 cm

Smoke-bomb experiment

Interreg
EUROPEAN UNION
2 Seas Mers Zeeën
POLDER2C'S
European Regional Development Fund

Detecting interconnectedness of burrows



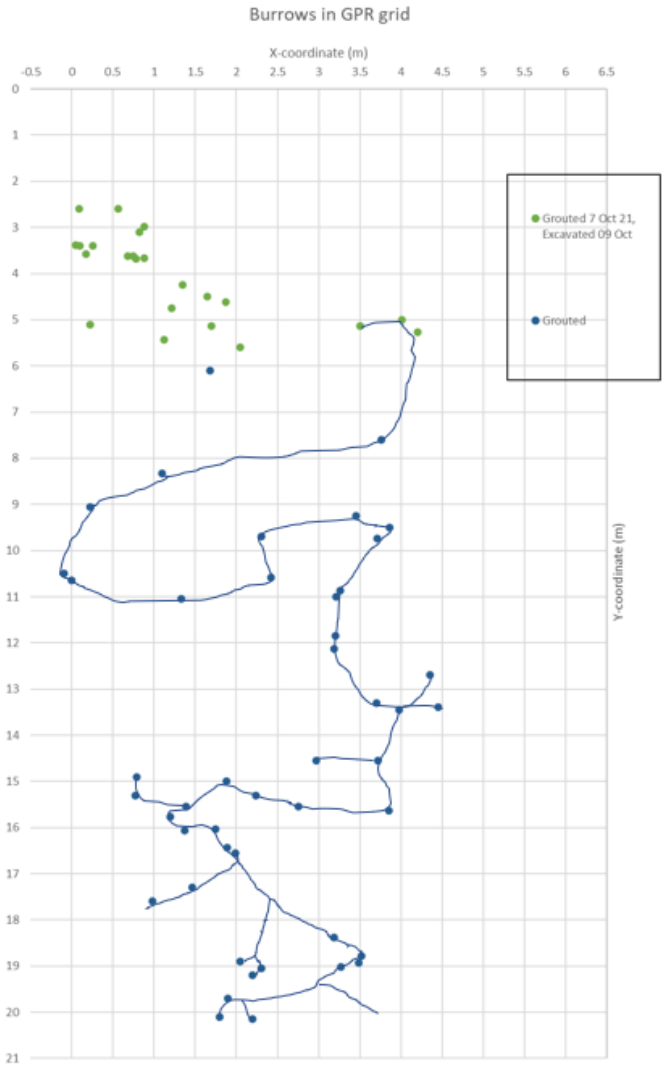
Grouting and excavation

Destructive monitoring technique

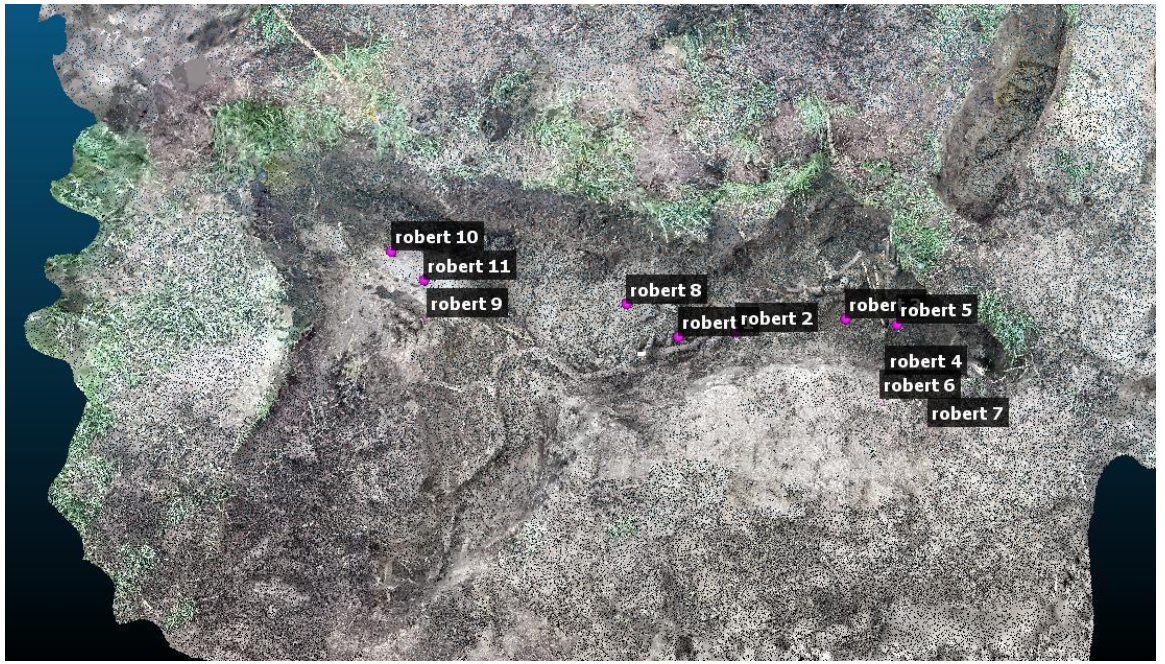
Linear mole system

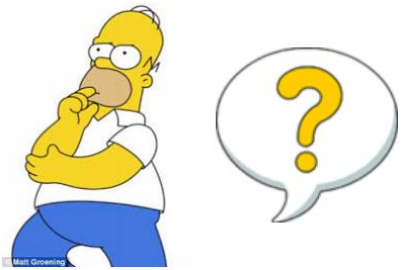
Cluster of mice burrows

Grouting and excavation



…. Burrows by small rodents seem to go much deeper in the levee than we thought before…





Question to you

Interreg 2 Seas Mers Zeeën POLDER2C'S
European Regional Development Fund

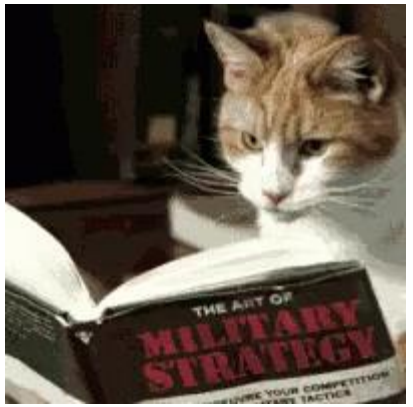
What are the advantages and disadvantages of every technique?

How much do we know about them?

Interreg 2 Seas Mers Zeeën POLDER2C'S
European Regional Development Fund

Literature review: 4 **topics of interest**

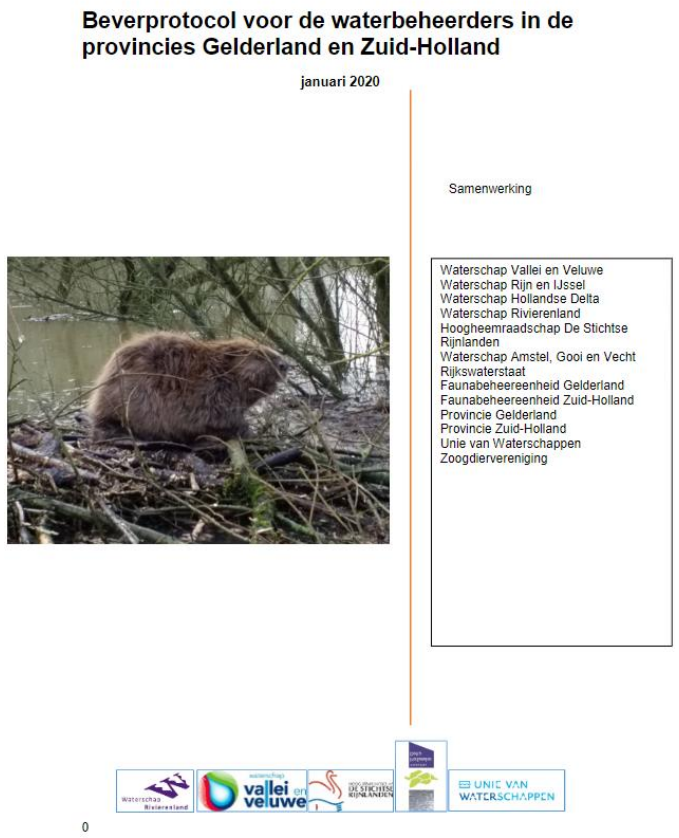
1. Eco-engineering approaches for deterrence of animals
   → ***How can we make animals go elsewhere?***
2. Detection and measurement techniques
   → ***How can we find burrows on a levee and measure their geometry?***
3. Failure paths
   → ***How do levees fail when they have burrows?***
4. Effectiveness of countermeasures
   → ***How can we repair levee damages made by burrowing animals***



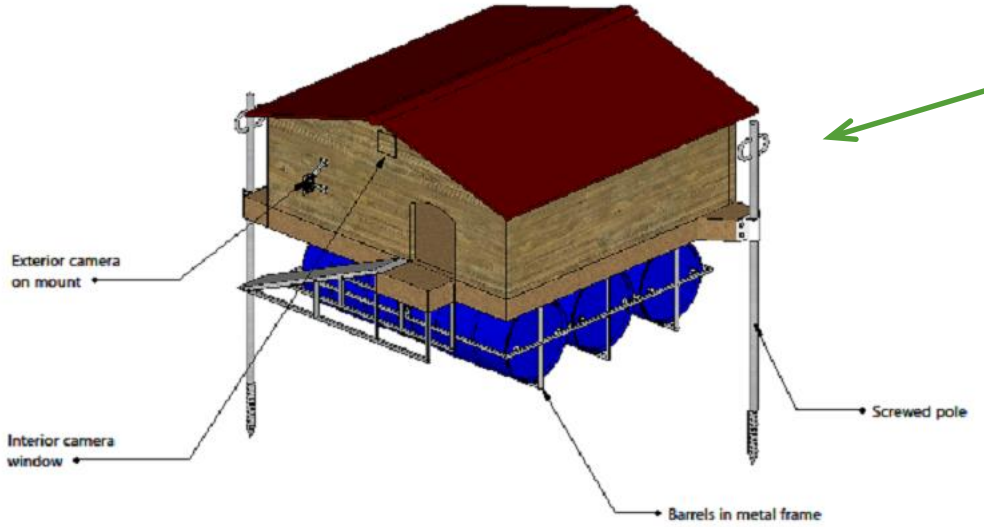
This project has received funding from the Interreg 2 Seas programme 2014-2020 co-funded by the European Regional Development Fund under subsidy contract No [2S07-023]

How can we make animals go elsewhere?

Interreg
2 Seas Mers Zeeën
POLDER2C'S
European Regional Development Fund



- Animal behaviour patterns
- Dealing with protected species
- Need for closely monitored pilot projects



Concept for floating beaver refuge

How much do we know about them?

Interreg 2 Seas Mers Zeeën POLDER2C'S
European Regional Development Fund

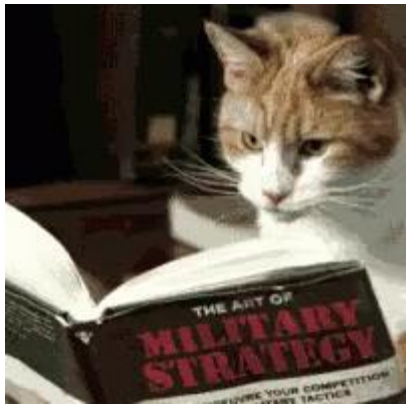
Literature review: 4 **topics of interest**

1. Eco-engineering approaches for deterrence of animals

   → ***How can we make animals go elsewhere?***

2. Detection and measurement techniques

   → ***How can we find burrows on a levee and measure their geometry?***



3. Failure paths

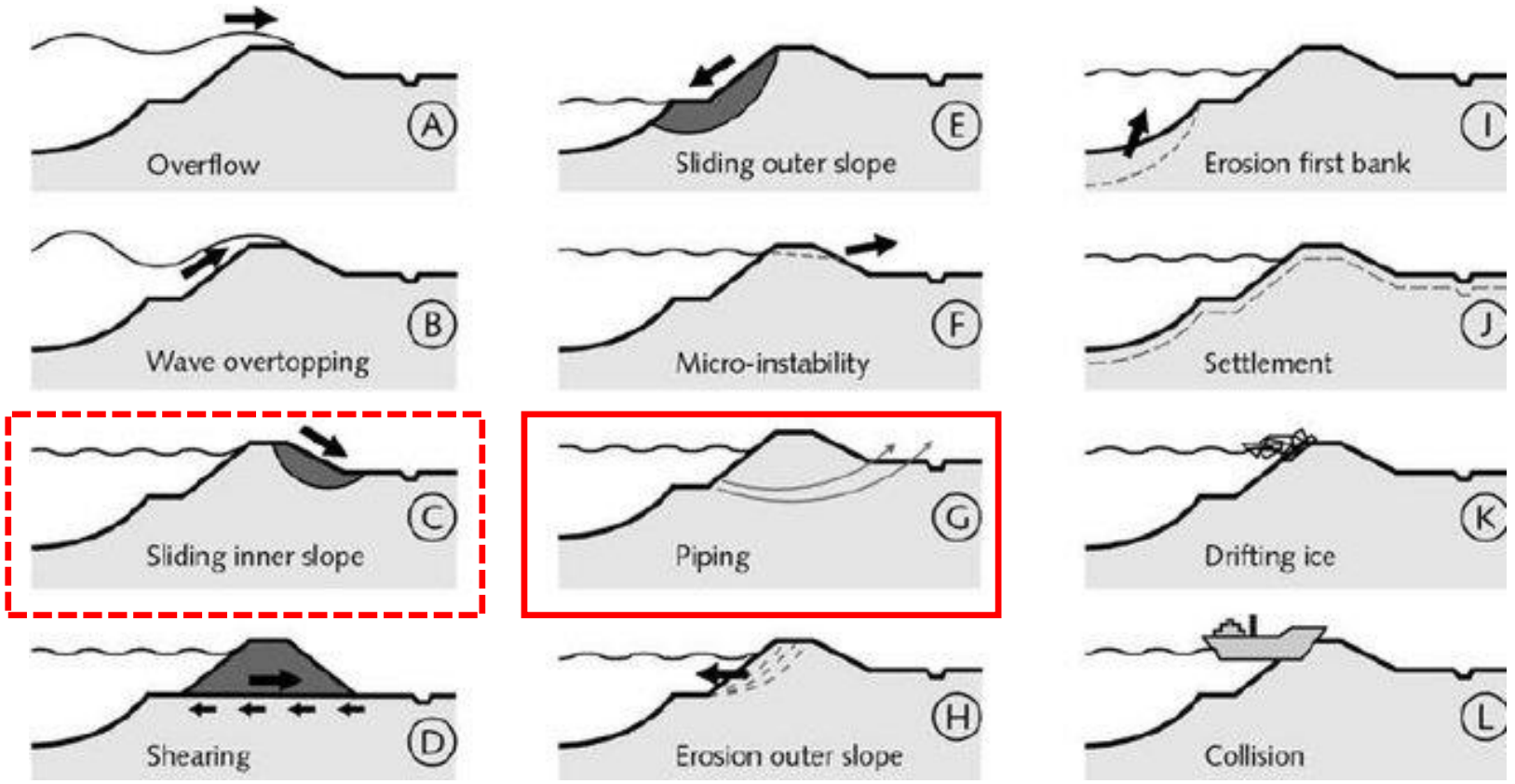
   → ***How do levees fail when they have burrows?***

4. Effectiveness of countermeasures

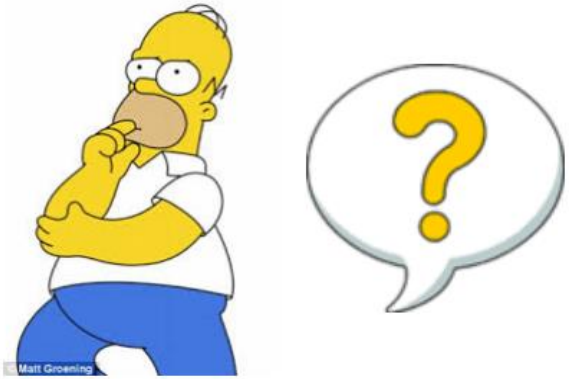
   → ***How can we repair levee damages made by burrowing animals***

This project has received funding from the Interreg 2 Seas programme 2014-2020 co-funded by the European Regional Development Fund under subsidy contract No [2S07-023]

How do levees fail when they have burrows?



Interreg
EUROPEAN UNION
2 Seas Mers Zeeën
POLDER2C'S



How much do we know about them?

Interreg 2 Seas Mers Zeeën POLDER2C'S
European Regional Development Fund

Literature review: 4 **topics of interest**

1. Eco-engineering approaches for deterrence of animals

   → ***How can we make animals go elsewhere?***

2. Detection and measurement techniques

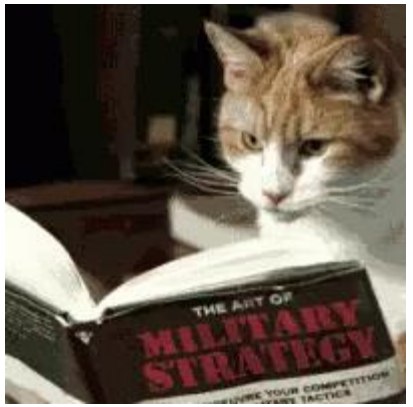
   → ***How can we find burrows on a levee and measure their geometry?***

3. Failure paths

   → ***How do levees fail when they have burrows?***

4. Effectiveness of countermeasures

   → ***How can we repair levee damages made by burrowing animals***



This project has received funding from the Interreg 2 Seas programme 2014-2020 co-funded by the European Regional Development Fund under subsidy contract No [2S07-023]

Low cost repair with ‘rijplatten’

Interreg
2 Seas Mers Zeeën
POLDER2C’S
European Regional Development Fund

Overflow experiment, November 2021

What are we up to?

- Making sense of data
- Reporting
- Feedback sessions

THANK YOU FOR YOUR ATTENTION!

Interreg
2 Seas Mers Zeeën
POLDER2C'S
European Regional Development Fund

Questions?

Send an email to v.tsimopoulou@hz.nl