



AdaptDam

Adapting drained forests to future climates:
Ensuring sustainable forest production, water
quality and biodiversity

From e-mail to accepted project:
our experience

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Who are we?

- **Zane Kļaviņa, Research Assistant, M.Sc. in Environmental Science**

Research area: Effects of forestry related activities on water quality

- **Ivars Kļaviņš, Research Assistant, M.Sc. in Environmental Science**

Research area: Effects of forestry related disturbances on nutrient cycling



How it started?

- E-mail from colleagues at the University of Tartu
- They had a project idea and they were looking for collaboration opportunities and expertise in the related fields
- The idea was broadened and refined by incorporating the expertise of each participant, and a framework for the research strategy was created that we believed was relevant, sound and technically complete
- We contributed our forestry-related expertise and knowledge of local conditions, while others broadened our perspective in modelling and biology



Background and motivation

- Drained peatland forests cover about 20–25% of forest land in Finland and the Baltic States
- Increased risk of prolonged and severe drought events (Dai 2013; Ruosteenoja et al. 2018)
- Exceptional drought periods could become common by 2043 (Toreti et al. 2019)
- Drainage (and DNM) can potentially accelerate soil drying and amplify water deficits (Koivusalo et al. 2008; George et al. 2020; Bogachev et al. 2024)
- Redesign of drainage systems – moving from rapid water removal to more controlled and sustainable water management





Project coordination & (semi)aquatic fauna

Maarja Vaikre
Liina Remm



Hydrology & water quality

Zane Lībiete
Arta Bārdule
Zane Kļaviņa
Ivars Kļaviņš



Tree growth & drought stress, hydrological modelling

Paul Szejner
Olli-Pekka Tikkasalo
Eduardo Martínez García
Jari-Pekka Nousu
Kersti Leppä
Mikko Peltoniemi



Aquatic primary production

Maria Myrstener

Research questions

- Does seasonal water availability limit tree growth in drained forests?
- Can cost-effective adaptive drainage solutions mitigate drought stress, maintain or enhance tree growth, improve water quality, and support biodiversity under changing climate conditions?



Project objectives and research questions

M – modelling E – empirical



I (M): Identify and characterize hemiboreal drained forests that are vulnerable to drought-induced stress



II (E&M): Design and implement ADS at experimental forest sites in Estonia and Latvia and apply hydrological modelling to assess the optimal placement and impact of ADS



III (E): Quantify the effects of ADS on site-level hydrology and nutrient and sediment retention



IV (E): Investigate how ADS influence tree growth and forest productivity

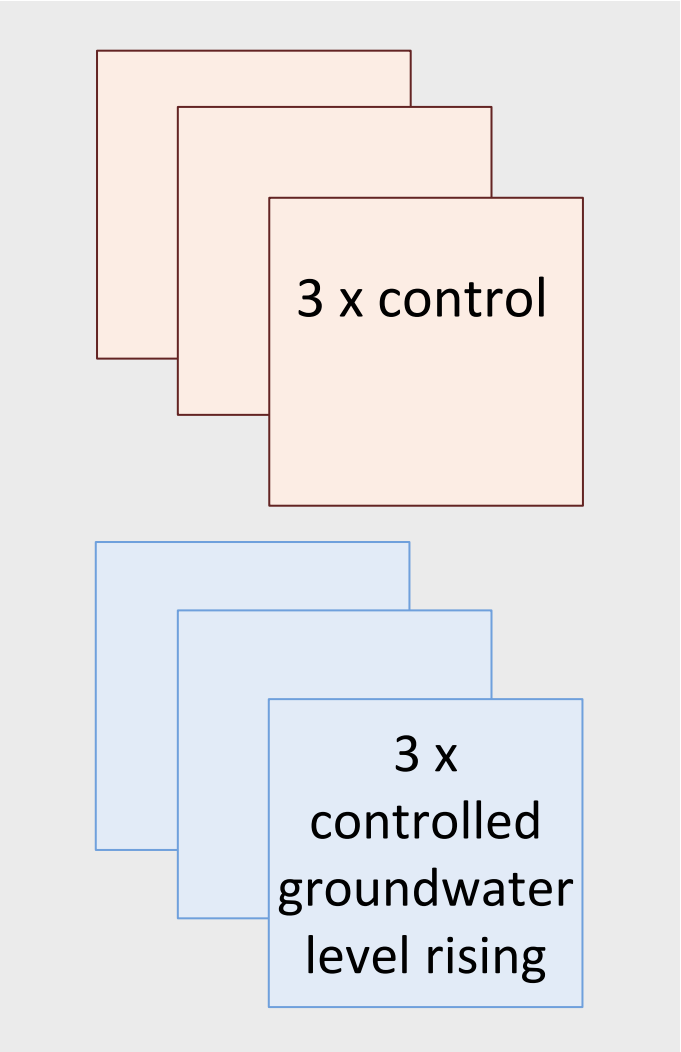


V (E): Evaluate the influence of ADS on aquatic primary production, amphibians, aquatic and emergent invertebrates

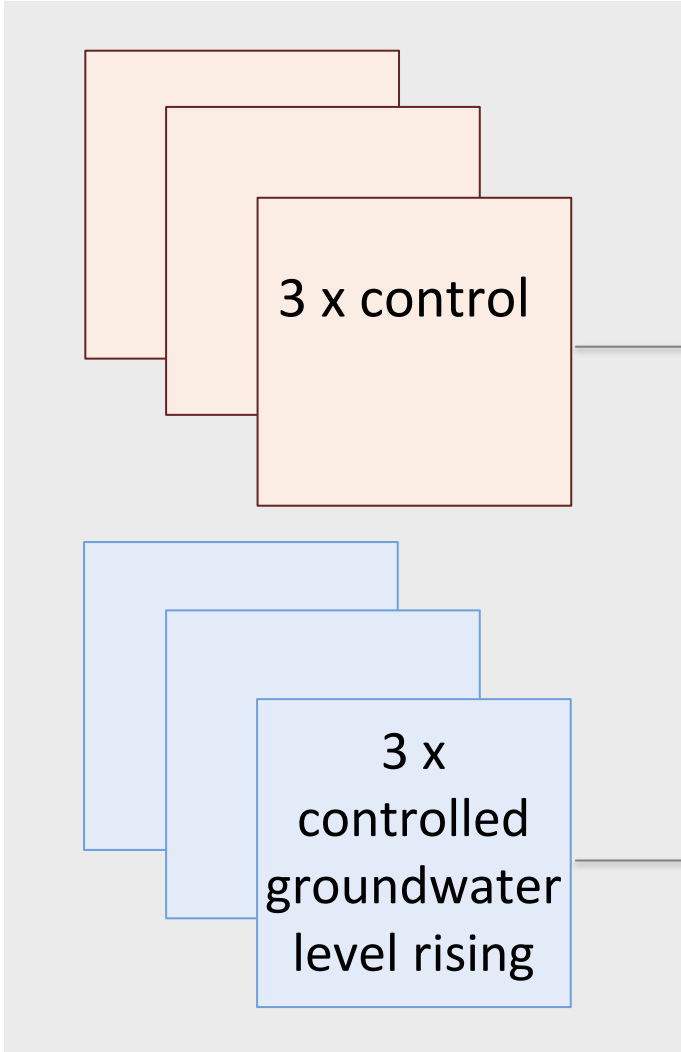


BACI experiment

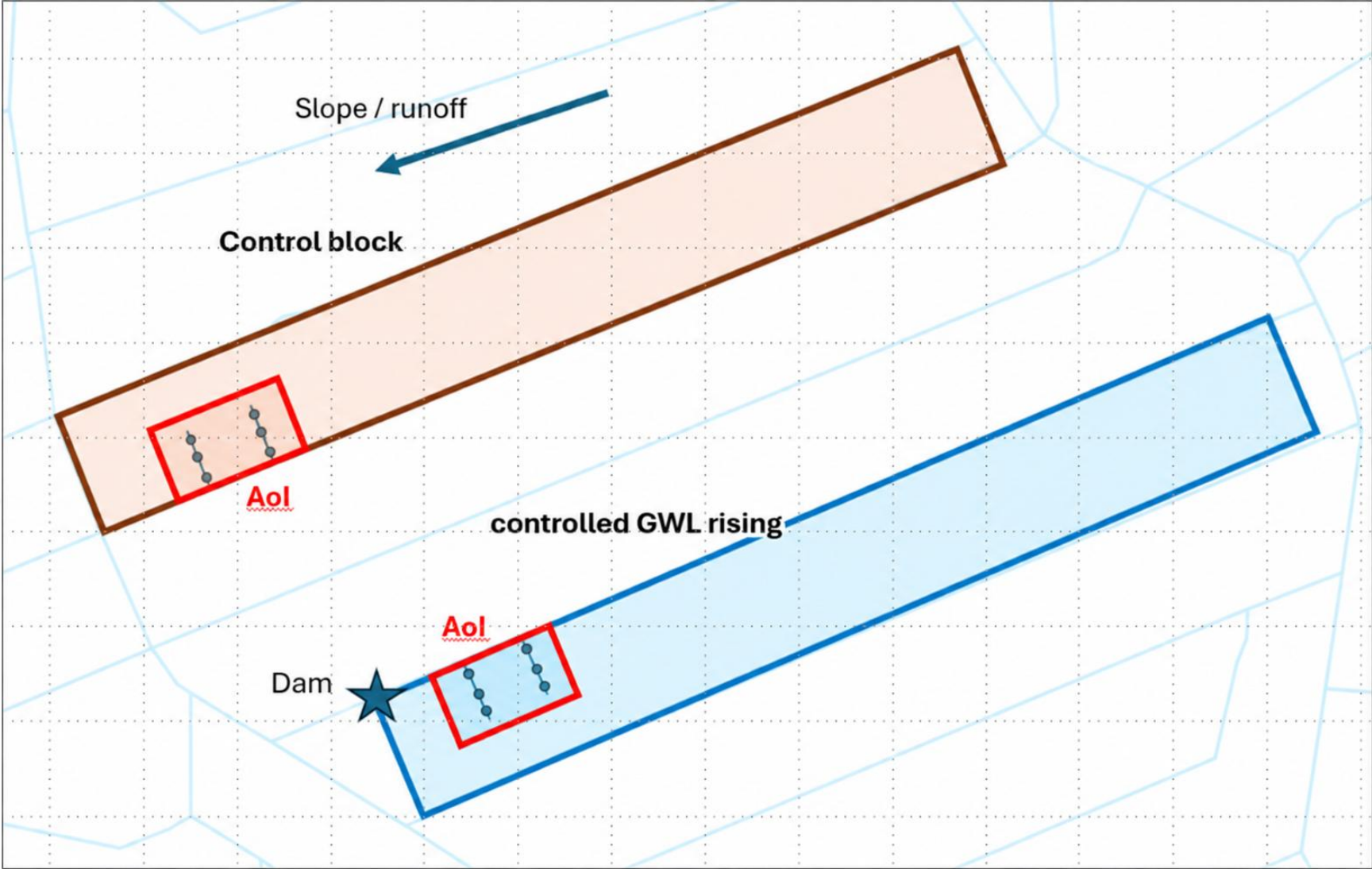
ESTONIA



LATVIA



Experimental sites in RMK (Estonian State Forest Management Centre) and Latvian Forest Research Station forests



Aol = area of interest





Expected results and potential impact

Improved scientific understanding of drained forest ecosystems

Drought-vulnerable drained forests identified

Hydrological models developed for ADS optimization

Practical experience gained with ADS implementation

Effectiveness of ADS assessed for biodiversity protection

Evidence and tools provided for policy and management

Success factors

- **Practically relevant research idea**
- **Clear and scientifically sound research plan**
- **Great research team with diverse expertise**



Thank you for your attention!

Adapting drained forests to future climates: Ensuring sustainable forest production, water quality and biodiversity (AdaptDam)

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Latvian Council of Science



Estonian Research Council

