



**NIBIO**

NORSK INSTITUTT FOR  
BIOØKONOMI

# NIBIO's competence and activities related to hydrology, water management and water quality

EEA FM 2014-2021, Programme GR-Environment „Water Management”  
Online Launching and Match-making Event, 20 Jan 2021

by: Csilla Farkas, Lampros Lamprinakis, Attila Nemes

## Outline:

- NIBIO short introduction
- Key research areas of potential interest
- Relevant water related projects (examples)

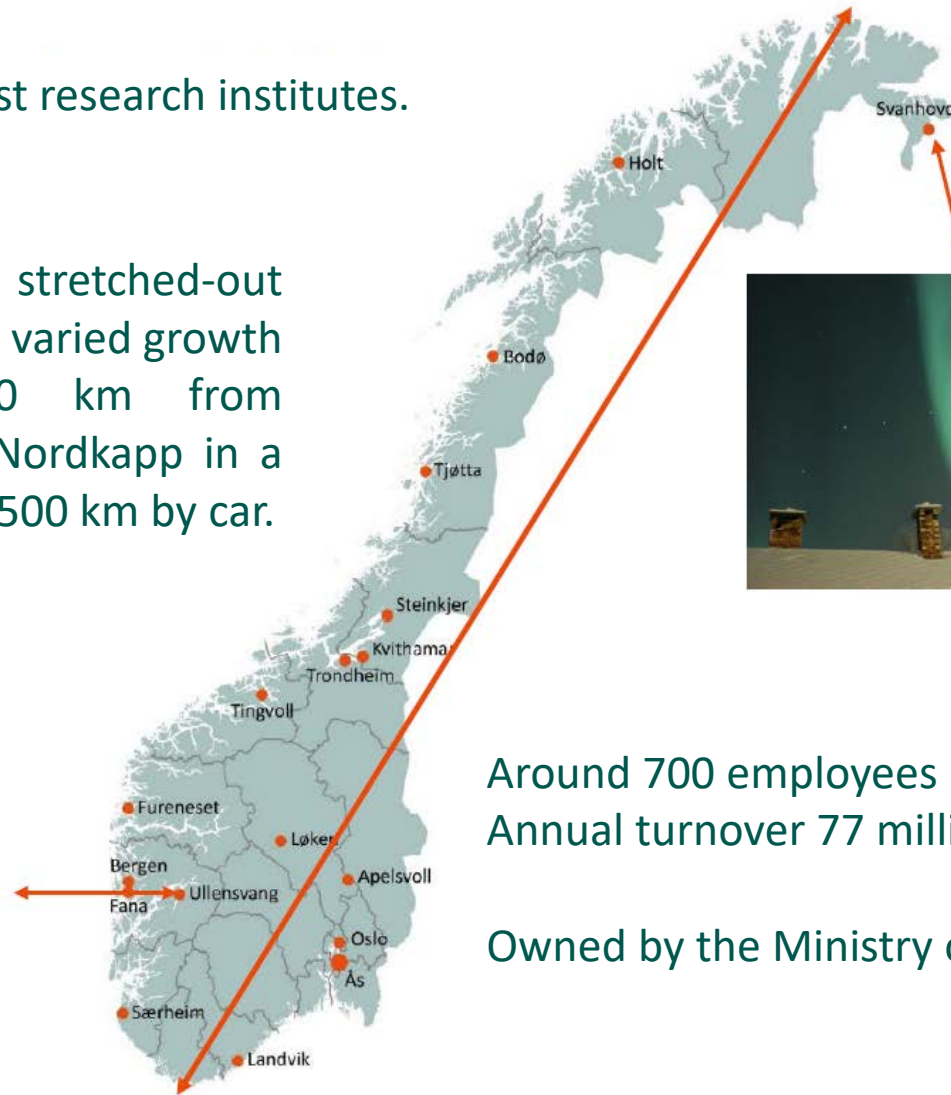


Photo: Attila Nemes, Soilspace project, 2018

# NIBIO – Norwegian Institute of Bioeconomy Research

One of Norway's largest research institutes.

Norway is a stretched-out country with a varied growth season. 1700 km from Lindesnes to Nordkapp in a straight line, 2500 km by car.



Around 700 employees in different locations.  
Annual turnover 77 million Euro.

Owned by the Ministry of Agriculture and Food.

*Photo: Ragnar Våga Pedersen*



# NIBIO provides knowledge on biological resources from soil, forests and water



*Photos: Ragnar Våga Pedersen, Lars Dalen and Erling Fløistad*



## Extension international activity

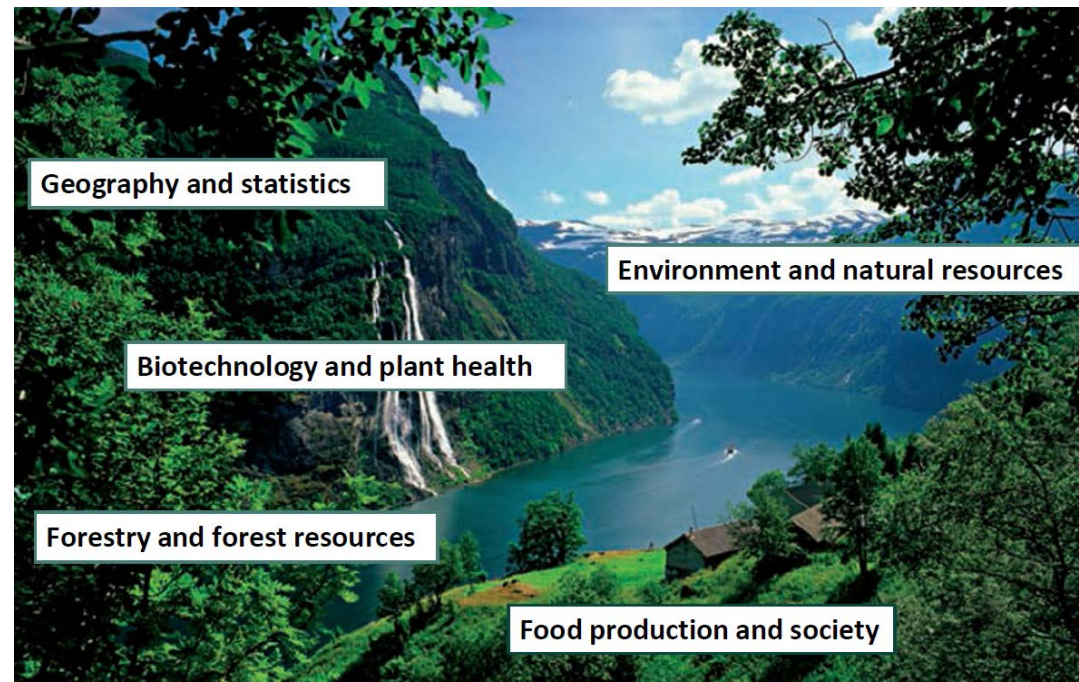


*Photos: Arnfinn Staverløkk, Ragnar Våga Pedersen and Anette Tjomsland*

# NIBIO – Norwegian Institute of Bioeconomy Research

- NIBIO contributes to food security and safety, sustainable resource management, innovation and value creation through research and knowledge production within food, forestry and other biobased industries
- NIBIO contributes to Green Shift – transition from fossil economy to bioeconomy

- Key thematic areas:





## DIVISION OF ENVIRONMENT AND NATURAL RESOURCES

### DEPARTMENT OF SOIL AND LANDUSE (Head of Dept: Jannes STOLTE)

- Measures against flooding, erosion and nutrient losses
- Hydro-technical solutions, such as drainage and retention dams
- The Norwegian Agricultural Environmental Monitoring System
- Modelling and mapping soil erosion and its risk
- Running the soil physics lab

### DEPT. HYDROLOGY AND WATER ENVIRONMENT (Eva SKARBØVIK)

- Integrated Water Resources management (IWRM)
- Monitoring of runoff and water quality (rivers/streams, groundwater...)
- Catchment (agro)hydrology and material transport vs. climate change
- Field and catchment-scale hydrological modelling
- Groundwater modelling, hydrogeology

## DIVISION OF FOREST AND FOREST RESOURCES

### DEPT. FOREST AND CLIMATE (Gunnhild SØGAARD)

- Inventory of Land Use, Land-Use Change and Forestry (LULUCF)
- Monitoring of runoff and water quality from forested areas
- Modelling water balance of forested areas

## DIVISION OF FOOD PROD. AND SOCIETY

### DEPT. ECONOMICS AND SOCIETY (Birger VENNESLAND)

- Evaluation of ecosystem services related to wetlands and freshwater ecosystems
- Socio-economical evaluation of flood-related damages

NIBIO units with stakes in the subject...



Jannes  
Stolte



Csilla  
Farkas



Sigrun  
Kværnø



Helen  
French



Esther  
Bloem



Bjørn  
Kløve



Trond  
Mæhlum



Lillian  
Øygarden



Daniel  
Rasse



Stephanie  
Eisner



Johannes  
Deelstra



Marianne  
Bechmann



Robert  
Barneveld



Dominika  
Krzeminska



Eva  
Skarbøvik



Anne-Grete  
Buseth Blankenberg



Attila  
Nemes



Anne Strøm  
Prestvik



Asbjørn  
Veidal



Divina Gracia  
P. Rodriguez



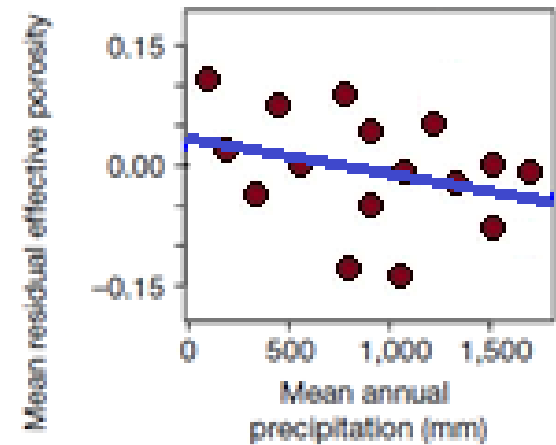
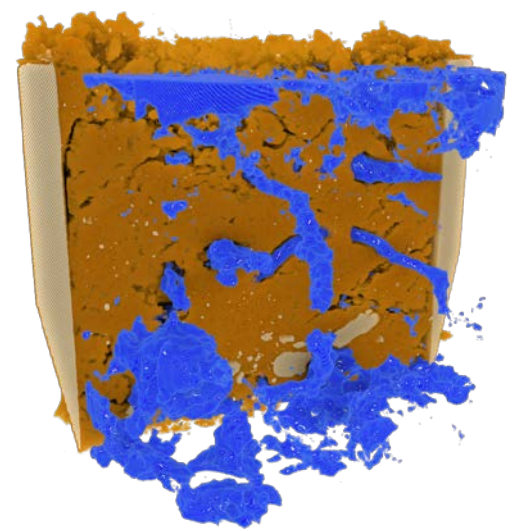
Lampros  
Lamprinakos

Key researchers – socio-economists engaged in water related projects



# BASIC RESEARCH IN WATER MANAGEMENT

- Pore network imaging and inference to soil hydraulic properties (Nemes)
- Climate/change: soil structure/hydrology relationships (Nemes, Øygarden)
- Land use and land use change imprints on soil hydraulic properties (Eisner, Øygarden, Nemes)
- Winter hydrology: snowmelt, infiltration (spring workability, erodibility, water quality aspects) (Stolte, French)
- Effect of green materials ((vermi)compost etc.) and biochar on soil hydraulic properties and soil water regime (Rasse, Farkas)



- Agricultural drainage (Farkas, Stolte)
- Methodology comparisons, laboratory ring test (Nemes, Stolte)
- Soil hydraulic databases: design, QA, data mining (Nemes, Kværnø)

(Ongoing) research areas of potential interest

# APPLIED RESEARCH IN WATER MANAGEMENT

- Natural Soil Water Retention Measures - improve water retention in-field and in the landscape for e.g. flood prevention, improved water quality downstream, buffer-zone hydrology (Stolte, Krzeminska, Blankenberg, Skarbøvik, Bechmann, Farkas and others)
- Field and catchment scale hydrological modeling, soil erosion modeling, groundwater modeling (Farkas, Stolte, Krzeminska, French, Bloem, Kværnø, Kløve, Nemes)
- Mapping – e.g. erosion risk mapping (Barneveld, Kværnø)
- Green materials and biochar application to improve soil water retention (Rasse, Farkas)
- Water retention in urban areas, green roofs,
  - urban wetlands (French, Mæhlum)
- Peatland hydrology (Kløve)

## SEASONAL DROUGHT: AN EMERGING SUBJECT!



Photo: Eva Skarbøvik

(Ongoing) research areas of potential interest





Agricultural economics

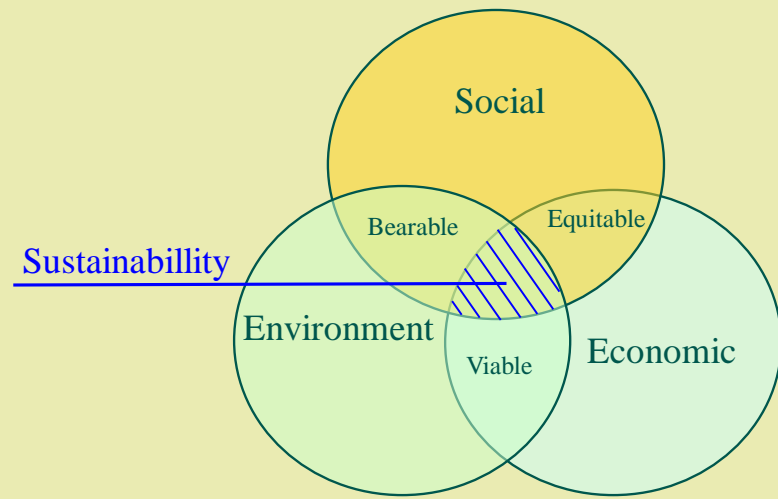
Social **economics**

Institutional economics

Political science

Sociology

*Sustainable development*



## Crucial questions to answer

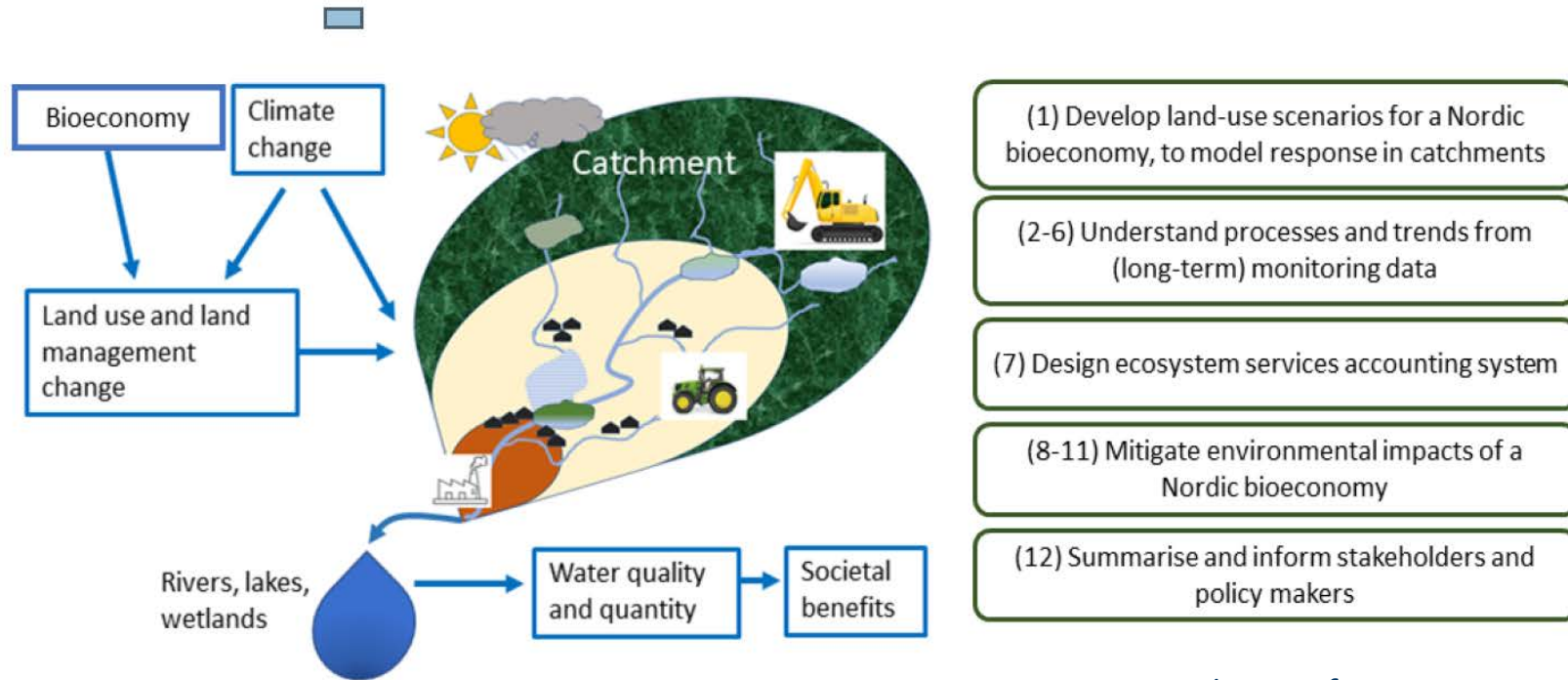
- What affect choices people make? *People* can be:
  - Farmers, consumers, companies
  - Local communities
  - Administrators and policy makers
- What are the consequences of choices?
  - Economic
  - Social
  - Environmental
- How to address the questions?
  - Interviews and surveys
  - Modelling, estimations, considerations
  - Literature studies

Example:  
technology  
and  
innovation

# BIOWATER (2017-2022) NordForsk, Nordic Centre of Excellence, contact: E. Skarbøvik

## Integrating land and water management for a sustainable Nordic bioeconomy

Primary objective: Quantifying the combined effects of land use change, climate change and industrial innovation due to green shift, for catchment-scale carbon, nutrient and water cycles, as well as major ecosystem services.



Source: Biowater Policy Brief No. 1 2020

## Mitigating the effects of bioeconomy

Photo: Anne-Grete B. Blankeberg



vegetation  
buffer zones

Photo: Csilla Farkas



constructed  
wetlands

set aside land  
grassed waterways  
reduced tillage  
reduced fertilization  
improved drainage etc.



# **OPTAIN** (2020-2025, EU-H2020 RI, contact: A. Nemes)

**OPTimal strategies to retAIN and re-use water and nutrients in small agricultural catchments across different soil-climatic regions in Europe** *(22 partners, 15 countries across Europe, 14 case studies)*

- We will identify efficient techniques for the retention and reuse of water and nutrients in small agricultural catchments, in close cooperation with local actors
- We will select natural soil water retention measures at farm and catchment level and optimize their spatial allocation and combination, based on environmental and economic sustainability indicators



- Keywords: stakeholders, field/catchment-scale hydrological and nutrient transport modeling, environmental and economic indicators, field and landscape-scale measures, PARETO solutions (multi-criteria optimization)
- Our contribution: measures and indicators, field/catchment modeling, socio-economic assessment, case study hosting

Photo: Attila Nemes, BUFFERKLIMA Project, 2018



The OPTAIN project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No. 862756.



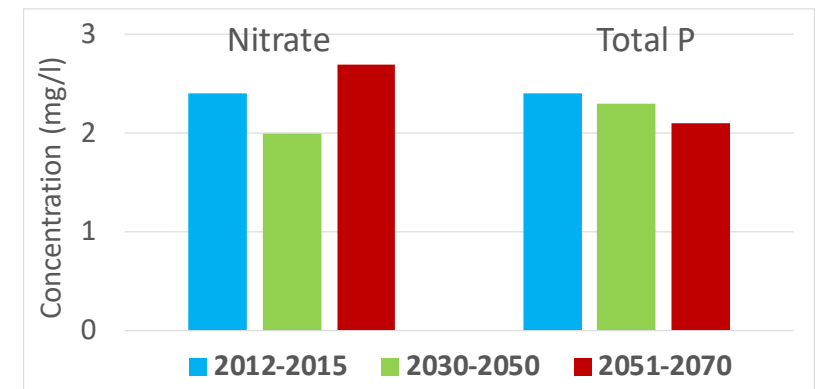
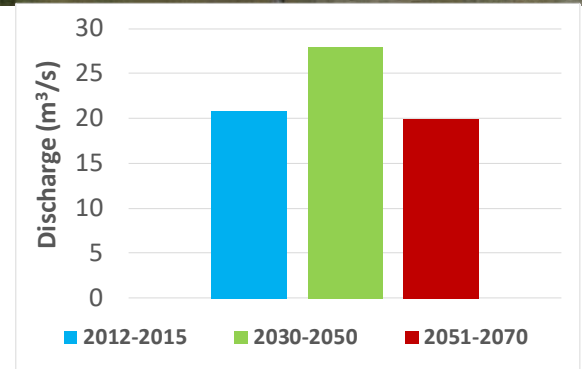
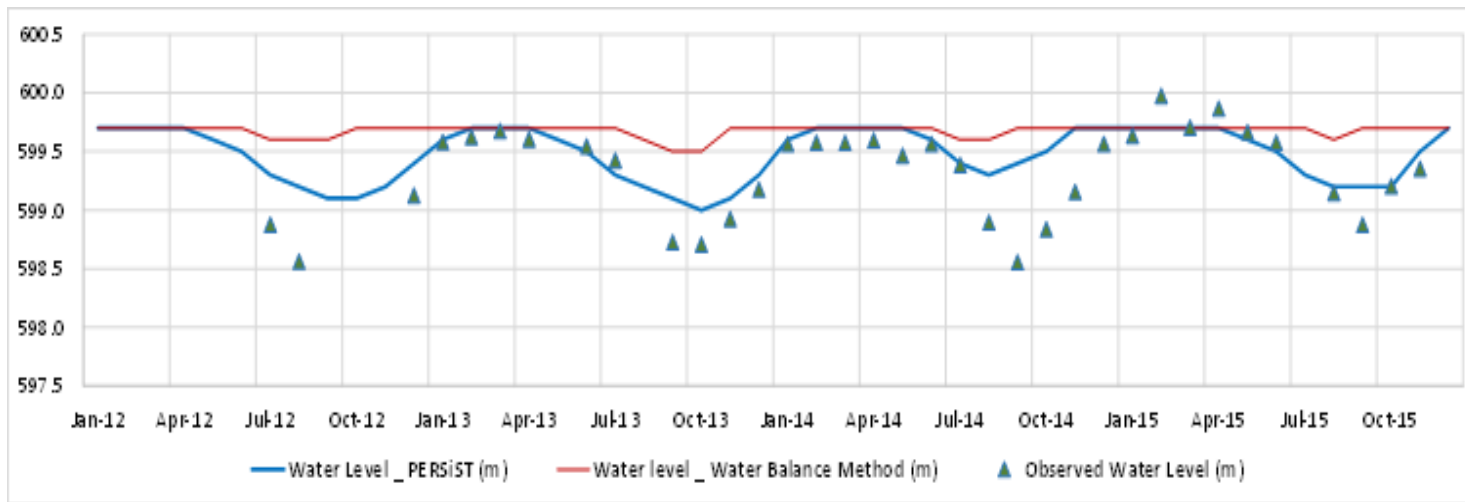
# LAKES (2016-2017) EEA-Norway Grants, contact: Cs. Farkas

## Improving the knowledge in determining the minimum water level and flow of water bodies

**Objective:** To improve the knowledge related to the determination of the environmentally required minimum water level/flow in Greek water bodies, particularly under the impact of climate change.

### NIBIO contribution (Soulu River and Lake Zazari):

- mathematical modelling of runoff and water quality (PERSiST, INCA)
- water balance calculations and modelling of water level
- estimating the impact of climate change on water level and water quality





# Mapping and economic valuation of the ecosystem services provided by a wetland site in Danube

## Ecosystem services of the Divici-Pojejena wetland in Romania

A mixed methods approach.

- Qualitative part with focus groups and interviews to identify key stakeholders and services.
- Benefit transfer (BT) for the monetary valuation of the ecological services of the site.

## Mapping ecosystem goods and services (Fig 1.)

- Two focus groups were conducted
  - one in Oslo with experts on the wetland ecosystem services of the area
  - one on the policy site in Romania with local stakeholders.
- The experts described several non-use option values of the wetland – especially in terms of bird-watching and recreation.
- Interviews with local actors, inhabitants, and tourists show that there is limited awareness of the wetland as a special protection site.



Figure 1: Identified main services of the Divici-Pojejena wetland.

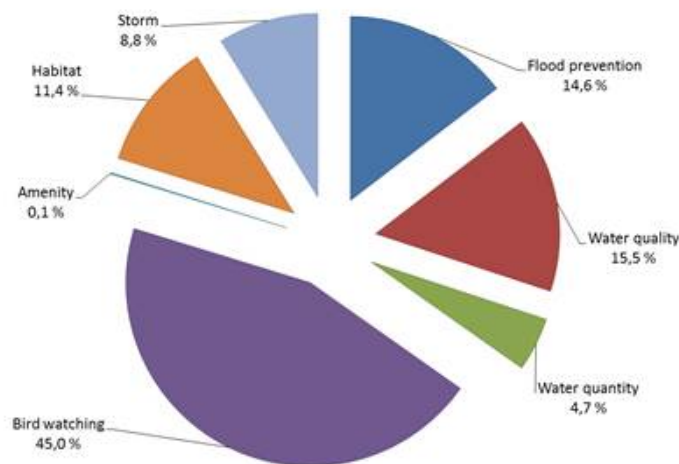


Figure 2: Relative contribution of ecosystem services.

## Economic evaluation of the ecosystem services in the area (Fig 2.)

- With BT, environmental benefit estimates from existing case studies (i.e., study sites) are transferred to a new, policy case study (i.e., policy site).
- After exploring different approaches we chose a meta-regression model as a basis for our evaluation.
- Bird watching opportunities, water quality, and flood prevention services provided by the wetland are among the highest valued services, while the amenity services are the least valued among all wetland services.

## Economic valuation of the ecosystems services provided by the pilot wetland area

Lamprinak, L., Rodriguez, D. G. P., Prestvik, A. S., Veidal, A. and Klimek, B.

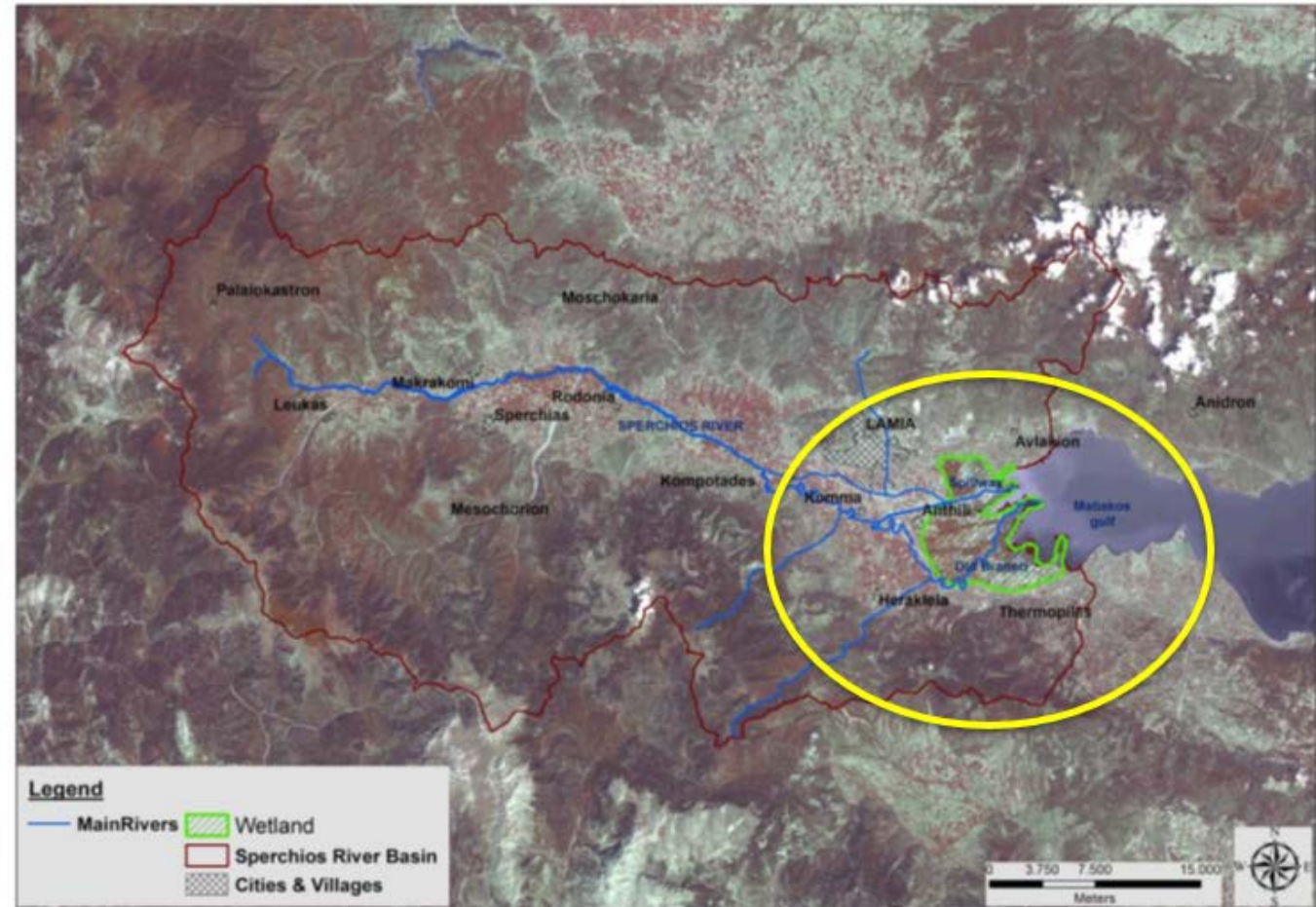
Norwegian Institute of Bioeconomy Research (NIBIO)

Bucharest, 22.03.2017

## Socio-economic valuation of flood damage to agriculture: the case of Sperchios

Divina Gracia P. Rodriguez, Asbjørn Veidal and Sjur Spildo Prestegard  
Norwegian Institute of Bioeconomy Research (NIBIO)

Prepared for the project "Integrated enviromental study and mapping for the improvement of the river basin management plans and the coastal zone of river Sperchios" (SPERCHIOS)





# Looking forward to cooperation!

Photo: Attila Nemes, SOILSPACE project, 2015

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