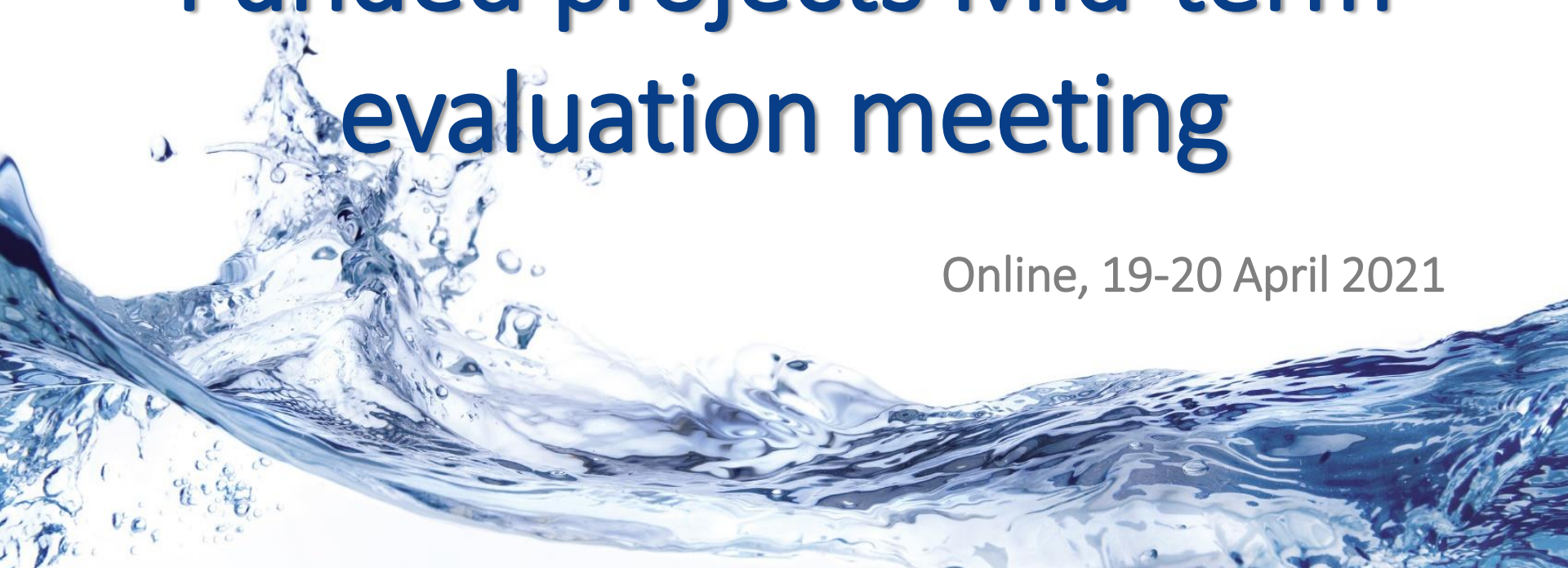
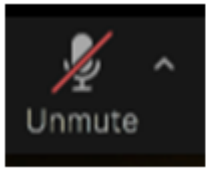
2018 JOINT CALL

Funded projects Mid-term evaluation meeting

Online, 19-20 April 2021



Guidelines for this virtual meeting



Mute your microphone when you are not talking

You want to talk? **Raise your hand**

Please, **introduce yourself before speaking**

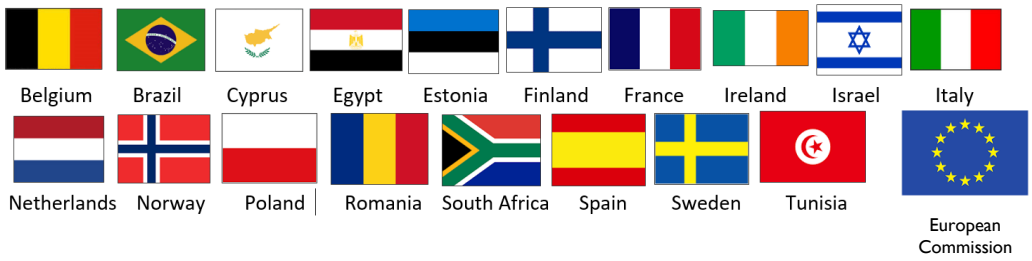
A **question** on the procedure/ a technical issue?

Use the Chat to contact the Secretariat

2018 JOINT CALL

Topic: Closing the Water Cycle Gap – Sustainable Management of Water Resources

Theme1 - Enabling sustainable management of water resources
Theme 2 - Strengthening socio-economic approaches to water management
Theme 3 - Supporting tools for sustainable integrative management of water sources



Mid-term Evaluation Meeting

Objective :

- ✓ present the current development of the funded projects
- ✓ provide the opportunity to the Project Coordinators and the Follow-up Group members to exchange ideas and feedback.

Participants (over 85 participants registered):

- ✓ Water JPI 2018 Project Coordinators and Research Team Members,
- ✓ Follow-up Group Experts,
- ✓ Water JPI Funding Organisations.

Agenda 19 April

10:00 – 10:20	Welcome and opening of the meeting *WaterWorks2017 Coordinator, Maurice HERAL (ANR, France)* Future opportunities in the Water JPI and new Horizon Europe instruments *Water JPI Coordinator, Véronique BRIQUET-LAUGIER (ANR, France)*
10:20 – 10:40	Project management and follow-up update *Follow-up Secretariat, Maja KOLAR (AEI, Spain)*
Projects presentations on Topic 1- Enabling Sustainable Management of Water Resources *FG members: Budds, Lo Porto, Vehanen, Suzenet, Schirmer*	
10:40 – 11:00	*IN-WOP*
11:00 – 11:20	*REFORM WATER*
11:20 – 11:40	*WATERPEAT*
11:40 – 12:00	Coffee Break
12:00 – 12:20	*FLUXMED*
12:20 – 12:40	*EnTruGo*
12:40 – 13:00	*ATeNaS*
13:00 – 13:15	*Group Discussion with the Follow-up Group and Coordinators*
13:15 – 14:15	Lunch Break
Projects presentations on Topic 3- Supporting Tools for sustainable Integrated Management of Water Resources *FG members: Covaliova, Lo Porto, Schirmer, Suzenet, Vehanen*	
14:15 – 14:35	*BLOOWATER*
14:35 – 14:55	*iAqueduct*
14:55 – 15:15	*URBANWAT*
15:15 – 15:30	*Group Discussion with the Follow-up Group and Coordinators*
15:30 – 15:40	Wrap-up day 1

Joint programming initiative to tackle Water challenges for a changing world

Maurice Heral – WaterWorks2017 Coordinator
Véronique Briquet-Laugier – Water JPI Coordinator

Water JPI Activities

Common Vision

Strategic R&I Agenda

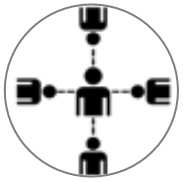
Research Funding Calls, TAP…

Impact Measures

Knowledge Transfer and Dissemination

Data, Observatories & Infrastructures

Capacity Building



Stakeholders Involvement & Engagement

International Cooperation

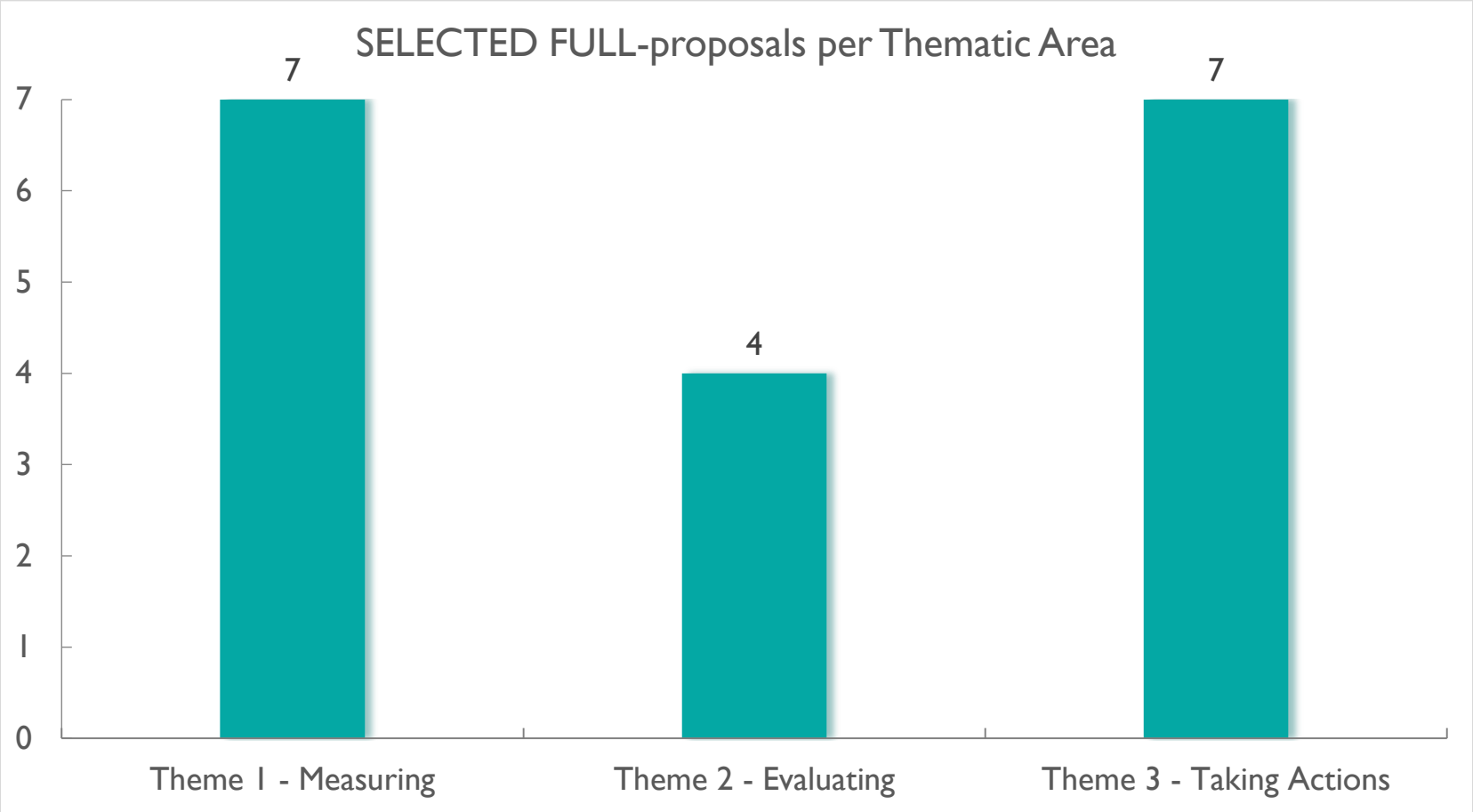
Mapping & Foresight Activities

AquaticPollutants

- **Transfer Project TransNet** (coordinated by DECHEMA) recommended for funding
  - 1 M€ committed by 3 FPOs (BMBF/SRC/ANR)
  - Kick-off meeting foreseen in September 2021 back to back with all AquaticPollutants funded Projects

- **2020 Joint Call on Risks posed to human health and the environment by pollutants and pathogens present in the water resources**
  - Evaluation Step 2 on 23-25 February 2021
  - 18 projects recommended for funding / budget of 20 M€
  - Kick-off meeting of RDI funded projects foreseen in September 2021

AquaticPollutants – JTC



BiodivRestore

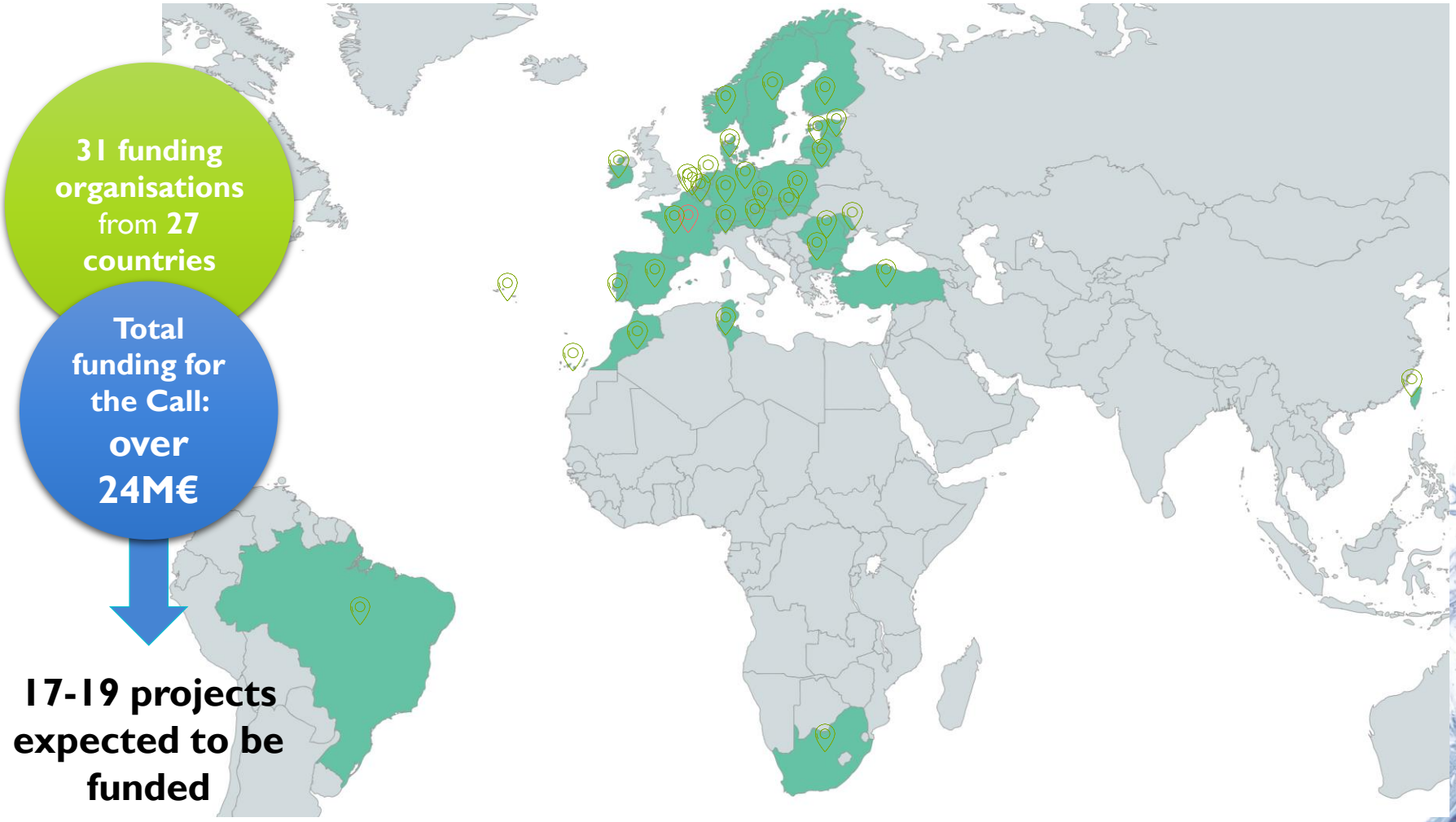
2020-2021 Joint Call on Conservation and restoration of degraded ecosystems and their biodiversity, including a focus on aquatic systems

3 non-exclusive themes:

- **THEME 1:** studying the biological and biophysical processes at stake for conservation/restoration, and their interactions
- **THEME 2:** assessing trade-offs and synergies between targets, benefits and policies for conservation and restoration
- **THEME 3:** knowledge for improving the effectiveness and upscaling of conservation and restoration actions

- Call opened on 5/10/2020 with a submission deadline on 7/12/2020
- Evaluation Step 1 on 24-26 February 2021 and 3 March 2021
- **92 pre-proposals** invited to Step 2 with a deadline to submit full proposals on **3 May 2021**

Size of the call



31 funding organisations from **27 countries**

Total funding for the Call: over 24M€

17-19 projects expected to be funded

AQUATAP-ES Stakeholders upcoming event

Aquatic ecosystem services on the science-policy-practice connection: challenges and opportunities

- 22 June 2021 - 1h30 virtual event
- Targeted audience: policy makers

- Panel members (6 max)
  4 confirmed
  - **DG RTD**
  - **IPBES**
  - **COST action**
  - **EEA**
  - DG ENV
  - Water director from an EU MS (e.g. PT)

Scientists, Economists, Policy makers, Stakeholders and Start-Up companies...

3rd Water JPI Conference

16-18 November 2021

Mülheim an der Ruhr, Germany

+

„Junior Water Jump“
> Start-Up competition for digital solutions !

Topics:

From Research into Practice:

Pollutants, pathogens and antimicrobial resistances in the water cycle

Water JPI

Aquatic Pollutants

SPONSORED BY THE

Federal Ministry of Education and Research

For updates visit: www.waterjpi.eu

2021 Water JPI Conference

Three days event - 16 to 18 November 2021

Mulheim, Germany

- Day 1: Meeting of students from German Academic Exchange Service (DAAD)
- Day 2: JPI Water Conference (with Junior Water Jump Award Ceremony)
- Day 3: Excursions and possibility of helding meetings (rooms available)

** Everything is subject to change due to pandemics (Hygiene Rules of the event location, Participants limits, Rapid tests will be available)*

Junior Water Jump competition to be announced before the conference

- "Junior Water Jump" (JWJ) is a European-wide competition for young companies to present their business models and creative ideas for digital solutions in the water sector
- Interested young start-ups or innovators submit short applications on the subject "Solutions for control of pollutants, pathogens and antimicrobial resistances in the water cycle"
- A jury selects the 30 best start-ups. Selected start-ups pitch to the jury on the first day of the conference
- The best 3 start-ups pitch to the entire audience at the 2021 Water JPI Conference
- Audience and jury award the best contribution: Prizes (money or coaching) are taken over by a sponsor

Partnership Water4All

Common Vision

Strategic R&I Agenda

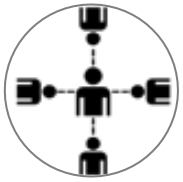
Research Funding Calls, TAP…

Impact Measures

Knowledge Transfer and Dissemination

Data, Observatories & Infrastructures

Capacity Building



Stakeholders Involvement & Engagement

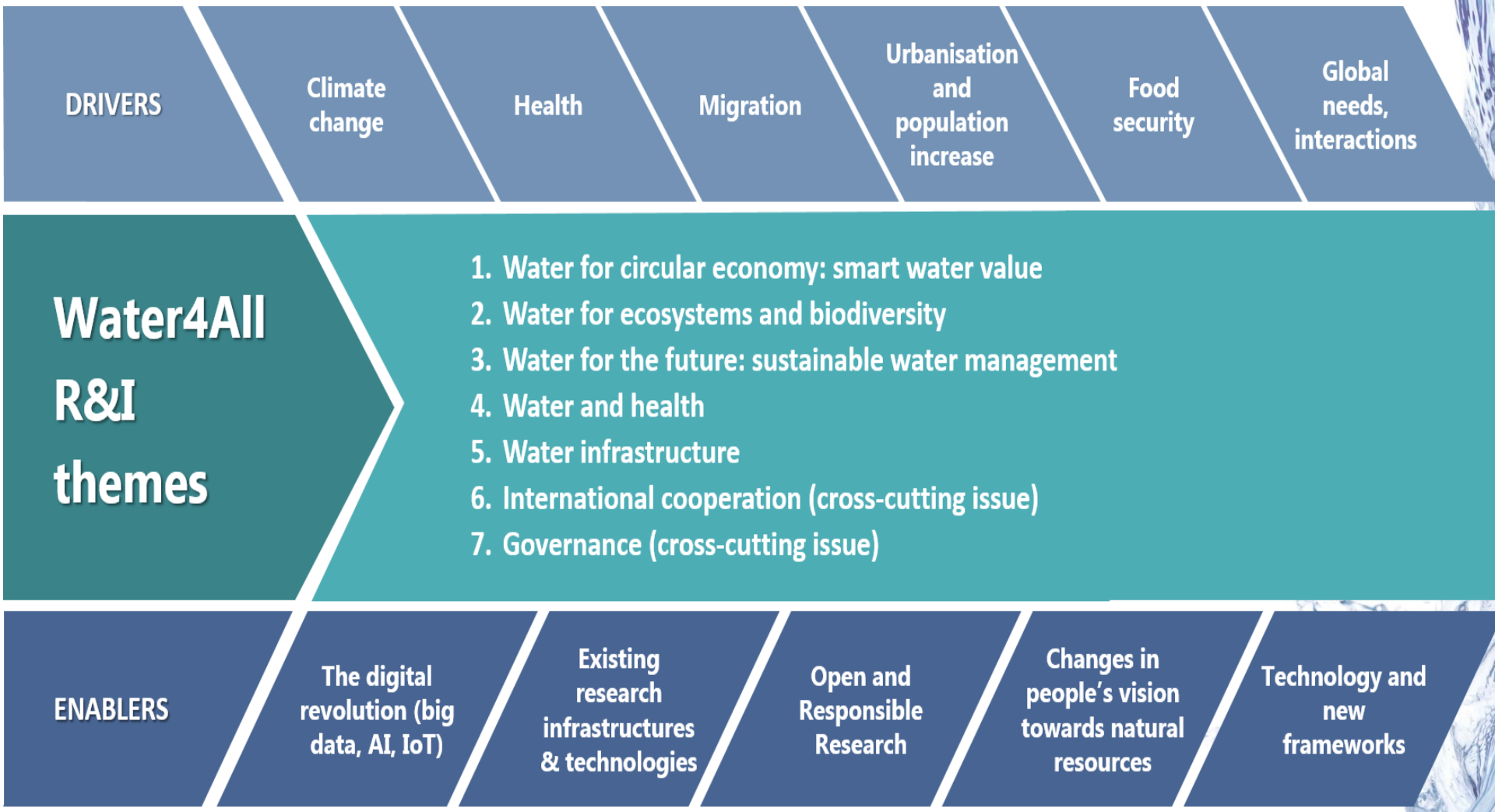
International Cooperation

Mapping & Foresight Activities

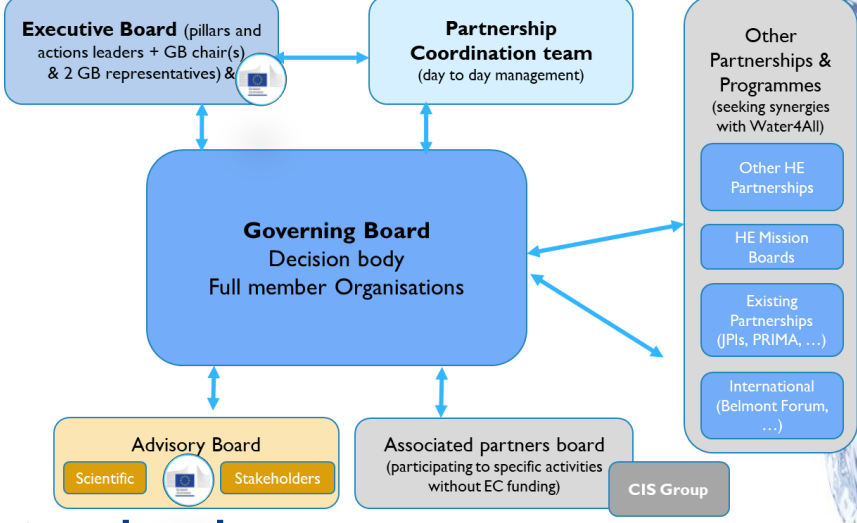
Water4All partnership
Water Security for the Planet

- Draft version available at: http://www.waterjpi.eu/implementation/water-challenges-in-horizon-europe/water4all-_2nd_draftsria_08022021_fordistribution.pdf

Strategic Research & Innovation Agenda



The governance



- **Governing Board**, decision-making body
  - Member states in form of national/ regional funding institutions and partners (industry, end-users, RPOs…) contributing (in cash or in kind) to activities other than call for projects
- **Associated partners:** partners to specific activities, not full members of the consortium (without EC funding)
- **Advisory Board**: scientists, stakeholders and representatives of the EC (Env, Region, Climate, Growth, Agri)

Potential members & Budget

- Potential members at this stage:
  - >60 public bodies from 23 EU MS + 4 non-EU countries (IL, MD, NO, ZA)
  - Private companies and networks under discussion
  - Ongoing discussion with regions (FR, NL, FI)
  - Additional international partners contacted (CH, UK) or to be contacted (BR, US, TR, EG, TN…)

- Global budget estimate ~**420 Mio. Euro**.
  - 126 M€ EC funding foreseen in Horizon Europe Cluster 6 Draft Work Program 2021
    - 30% support rate
    - Use of these funds is to be decided within the consortium
  - Overall MS commitment: 264 M€
    - 2/3 cash, 1/3 in-kind ? => to be confirmed
    - Regional-level & private commitments to be added

Update!

Expected schedule

- EC Call publication: early May
- Deadline: 01 September *(tbc)*
  - Submission of full proposal
  - Final Strategic Research & Innovation Agenda
  - Implementation Plan for 1st year
- Early 2022:
  - signature Grant Agreement with consortium
  - effective launch
- Full operations until 2027

For more information…

- Website : www.waterjpi.eu
- A Newsletter – Subscribe on line!
- @WaterJPI
- LinkedIn - Water JPI researcher forum group https://www.linkedin.com/groups/8455262
  - Joint Calls announcements & Networking
  - Announcement of events and activities

- A unique contact point
  - waterjpisecretariat@agencerecherche.fr
  - Phone + 33 1 78098120

- Olivier.bouc@anr.fr

Contact

waterjpisecretariat@agencerecherche.fr

Thanks to all!

Project management and follow-up update

Maja Kolar,
Follow-up Secretariat
AEI, Spain

General Duties for Project Management

Light management approach:

- ✓ minimising the reporting obligations of the
- ✓ ensuring that FPOs have access to key information regarding project progress

Consortium Coordinator obligations toward JPI:

- ✓ Prepare and deliver a Consortium Agreement (done for all projects)
- ✓ Inform the Water JPI about any major change or problem in the course of the project affecting the Consortium as a whole (e.g. changes in work plan, scope or in the Consortium; substantial delays).
- ✓ Coordinate the preparation and submit a mid-term and a final report
- ✓ Participate in the evaluation meetings
- ✓ If required, requests project extension on behalf of Consortium to the Water JPI

All Consortium Partners obligations toward their FPOs:

- ✓ Comply fully with the reporting requirement of their respective national FPOs.
- ✓ Notify their relevant FPOs and the coordinator of any issues, delays/difficulties.
- ✓ Ensure that all project publications and dissemination material include proper acknowledgement
- ✓ If required, requests grant extension to the FPO

Water JPI rules do not substitute national funding rules!

RD project extension request on Water JPI level

Required when the overall objectives and duration of the transnational funded project are affected. Usual procedure:

1. Coordinator, on behalf of consortium, sends a justified request to the Follow-up Secretariat

2. The Follow-up Secretariat informs the relevant FPOs to discuss the request

3. The Follow-up Secretariat notifies the Coordinator about the shared position at the international level.

4. Each project partner sends a justified request to their respective FPO in order to obtain a formal national grant extension, in line with the national FPO rules. This request should take into account the joint position at the international level.

General rule: RD projects must to finish at least 6m before the end of the Era-Net instrument (WaterWorks2017 by the Water JPI)

RD project extension request on Water JPI level

However:

All projects reported delays for the same reasons (consultation July 2020, Mid-term reports October 2020) :

- ✓ All due to COVID-19 pandemic
- ✓ In several cases delays due to individual national calendars for awarding grants.

Decision taken to manage the extension centrally on the JPI level.

To allow extensions of the RD projects, the Era-Net instrument (WaterWorks2017) must be extended as well – on-going talks with the EC.

Proposal for the max end date of projects between 31 Dec 2022 and 30 June 2023 (however, projects may finish earlier!) – NOT YET CONFIRMED

RD project extension request on Water JPI level

IMPORTANT:

- Each partner in the RDI project consortia will still need to request an extension of their grant at national level, in line with the decision of the consortium on the common end date and the max end date allowed by the Water JPI.
- The national rules differ among FPOs - many require the position on the JPI level for the international project as a whole to grant an extension or at least try to take it into account (aim to align the international project dates with the dates of the national grants).
- The position on the extension by the JPI cannot override the decision of the individual FPO on a national level. National rules apply!
- All extensions are no-cost extensions (affect only the timeline but no extra cash).

Project monitoring and evaluation process

The evaluation of the progress of the 2018 Joint Call projects :

- ✓ Kick-off Meeting -**12th April 2019** in Stockholm
- ✓ Mid-Term Evaluation (remote evaluation without a physical meeting) – **19-20 April 2021**
- ✓ Final Evaluation Meeting: **TBC**

Aim to invite the RD projects to Water JPI networking and alignment workshops and Knowledge Hub and Thematic Annual Programming events, depending on the topic: networking activities largely delayed / cancelled in the past year due to COVID-19 pandemic.

Some events to be restored in the second half of 2021, e.g. Water JPI 3rd Annual International Conference (Mülheim An Der Ruhr, Germany)

http://www.waterjpi.eu/resources/conferences/water-jpi-3rd-annual-international-conference

Reporting & Evaluation Procedure

Mid-term Evaluation:

- ✓ Progress Report Submission
- ✓ Initial Check by FS
- ✓ Individual Reviews by FG members
- ✓ **Mid-term Evaluation meeting**
- ✓ **Consensus Reports prepared by FG after the meeting**
- ✓ **Feedback to the Coordinators**
- ✓ Feedback to the Water JPI Governing Board
- ✓ Review of the Overall Impacts of the Projects (Final evaluation)

The Follow-up Group

All 7 members are from the Water JPI 2018 JC Evaluation Panel (EP) and the Water JPI Advisory Boards (ABs)

Name	Organisation	EP / ABs member
Becker, Mi-Yong	Bochum University of Applied Sciences (GER)	EP
Budds, Jessica	University of East Anglia (UK)	EP
Covaliova, Olga	Academy of Sciences of Moldova (Moldova)	ABs
Lo Porto, Antonio	Water Research Institute IRSA-CNR (Italy)	ABs
Schirmer, Mario	Swiss Federal Institute of Aquatic Science & Technology (Switzerland)	EP
Suzenet, Gaëtane	Global Impact Partners (France)	EP
Vehanen, Teppo	Natural Resources Institute Finland LUKE (Finland)	ABs

The Follow-up Group

The FG will monitor the progress of the projects based on the Mid-Term and Final Progress Reports, according to the following criteria:

- ✓ Scientific and technological progress
- ✓ Collaboration, coordination and mobility within the Consortium
- ✓ Coordination with other international projects funded under the 2018 JC, or other instruments.
- ✓ Coverage of the themes and sub-themes of the call
- ✓ Stakeholder/industry engagement
- ✓ Transnational added value of the project
- ✓ Impact of the project (final evaluation only)
- ✓ Dissemination of the results (e.g. publications, patents)
- ✓ Identified problems or specific risks
- ✓ Recommendations for improvements/amendments of the report
- ✓ Any other recommendations/feedback relevant to the Consortium

Allocation of projects to the Follow-up Group

#	Project acronym	FG member 1	FG member 2	Consensus report
1	ATeNaS	Schirmer	Suzenet	Suzenet
2	BLOOWATER	Covaliova	Suzenet	Covaliova
3	EnTruGo	Budds	Suzenet	Budds
4	EviBAN	Budds	Lee	Lee
5	FLUXMED	Budds	Lo Porto	Lo Porto
6	iAqueduct	Lo Porto	Vehanen	Lo Porto
7	IN-WOP	Lo Porto	Suzenet	Lo Porto
8	MARadentro	Covaliova	Schirmer	Schirmer
9	NATWIP	Budds	Schirmer	Budds
10	NEWTS	Lee	Suzenet	Suzenet
11	RainSolution	Lee	Vehanen	Lee
12	RECOWATDIG	Covaliova	Lee	Covaliova
13	REFORM WATER	Lo Porto	Vehanen	Vehanen
14	Sense and Purify SPy	Schirmer	Suzenet	Schirmer
15	SIMTWIST	Budds	Covaliova	Covaliova
16	URBANWAT	Covaliova	Schirmer	Schirmer
17	WaterHarmony	Lee	Vehanen	Vehanen
18	WATERPEAT	Lo Porto	Vehanen	Vehanen

Open Access policy in Water JPI

In line with the H2020 guidelines, the Water JPI is implementing the Open Access policy, which refers to:

- ✓ **peer-reviewed scientific research articles** (published in scholarly journals), or
- ✓ **research data** (data underlying publications, curated data and/or raw data).

Open Water JPI tool: http://opendata.waterjpi.eu/

Open Access policy in Water JPI

Open Access to publications: all projects are required to **make sure that any peer-reviewed journal article they publish is openly accessible**.

Open Access to research data: striving towards "open research data per default", but allowing for **opt-outs for some datasets**, for instance in cases of **intellectual property rights (IPR) protection, personal data or national security issues**.

Dissemination by RD projects: Acknowledgement

Include the acknowledgement and/or logos to all dissemination material, project website and publications arising from the funded RD project:

"The authors would like to thank the European Commission and (enter National funders names) for funding in the frame of the collaborative international consortium (Consortium acronym) financed under the 2018 Joint call of the WaterWorks2017 ERA-NET Cofund. This ERA-NET is an integral part of the activities developed by the Water JPI."

Dissemination by Water JPI: Online booklet of funded projects

Water JPI disseminates the information on funded projects via Water JPI home page:

- ✓ Information on project partners
- ✓ Publishable abstract and keywords
- ✓ Project structure (contents)
- ✓ Planned outcomes
- ✓ Consortium photo

Information on few projects still missing – we will be in touch.

Water JPI Dissemination tools

www.waterjpi.eu

- Website : www.waterjpi.eu
- A Newsletter – Subscribe on line!

- @WaterJPI
- LinkedIn - Water JPI researcher forum group (ca. 2000 members) https://www.linkedin.com/groups/8455262
  - Joint Calls announcements & Networking
  - Announcement of events and activities

Contact point
Follow-up Secretariat

Spanish State Research Agency (AEI)

Maja Kolar & Miguel Ángel Gilarranz

waterjpi.ncp@aei.gob.es

Phone + 34 916037345 (currenly not in use due to work from home offfice)

Projects presentations on Topic 1- Enabling Sustainable Management of Water Resources
(15 min presentation+5 min for questions and answers)

FG members: Budds, Lo Porto, Vehanen, Suzenet, Schirmer*
*absent

Mind the Water Cycle Gap: Innovating Water Management Optimisation Practice (IN-WOP)

Jan Kwakkel

Water JPI 2018 Joint Call

Mid-term evaluation meeting
19-20 April 2021 Online

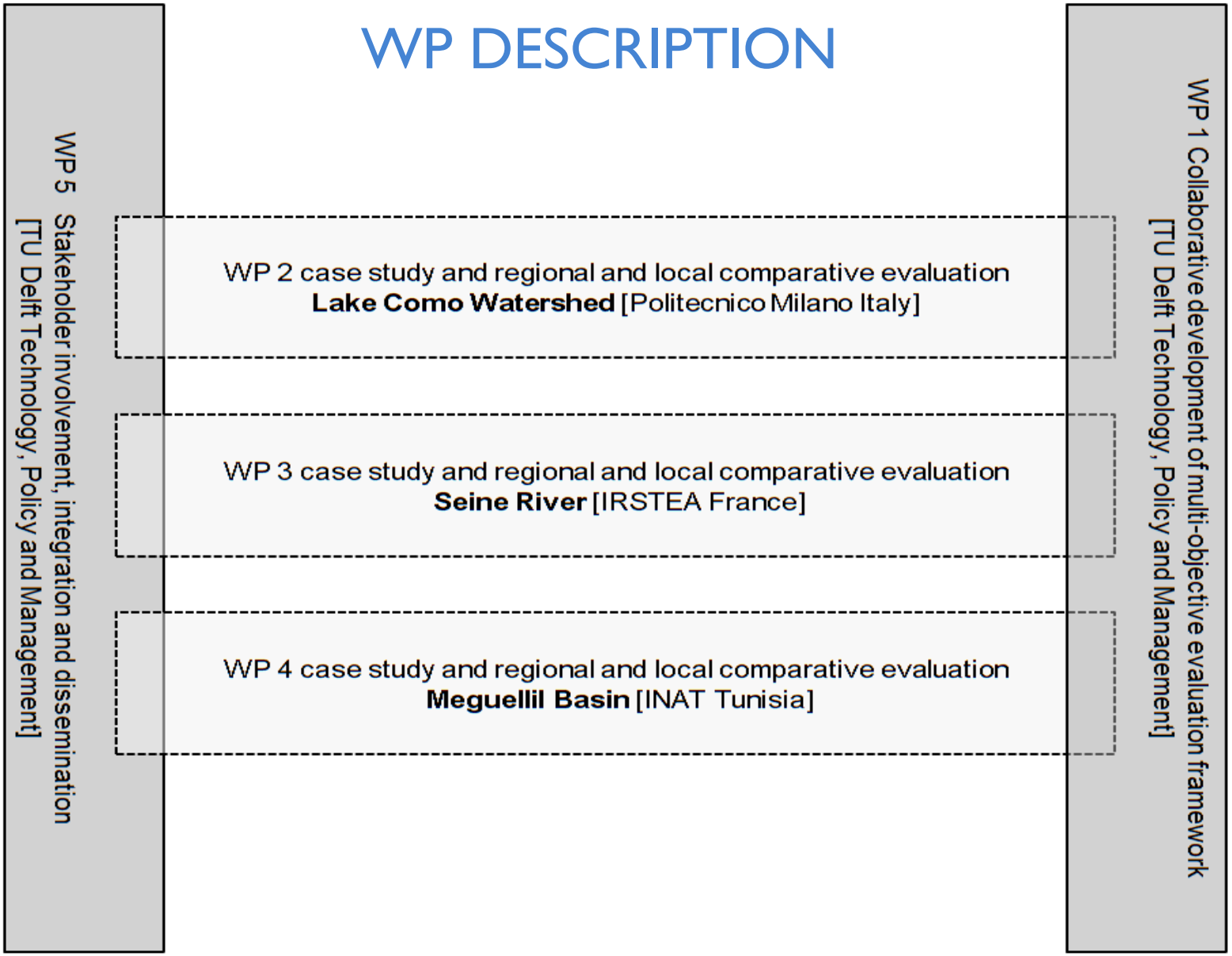
OBJECTIVES

1. Complement the integrated water resources management models in our case study areas with a many-objective formulation and solve these using state-of-the-art MOEAs

2. Assess the degree to which pre-mature aggregation of performance metrics in one or more composite objective functions
   - Negatively effects the identification of innovative solutions
   - Reduces the alignment with interests and preferences of the various stakeholders,
   - Ethically more defendable.

3. To disseminate the new solutions as well as the methods used to operational water managers and policy makers in our case study areas and countries and beyond.

WP DESCRIPTION



COVID

COVID-19 is strongly affecting research execution

- All planned stakeholder engagements are delayed and severely limited due to online only nature
- Exchange and cross partner collaboration is also severely affected by shift to online only
  - No field visits
  - No physical exchange or research visits
- Hiring of staff delayed or cancelled due to travel bans

RESULTS

WP1 (TU Delft)

- Conceptual paper published on ethically informed many-objective optimization for water researches management using the Nile as example
- Covid-19 induced shift to developing a stylized proof of principle case study
  - Drawing on earlier work of partners
- Ongoing work on developing the Nile conceptual work into a quantitative case study

WP2 (Politecnico di Milano)

- Scoping and stakeholder identification is complete, being validated with stakeholders
- Model development is near complete and being validated against newly collected data and by stakeholders
- 4 many-objective optimization experiments have been designed. First results expected before the summer

RESULTS

WP3 (INREA & Artelia)

- Meeting with key stakeholder (EPTB Seine Grands Lacs) refocussed case study to climate change induced floods for the greater Paris region
- Refocusing case study implied novel model development, data gathering, calibration and validation, and downscaling state of the art climate information
- Novel model development is progressing and first results are emerging. To be presented at EGU over the coming days
- Novel climate information is near ready for use
- An additional novel tool is being developed in order to quantify both flood and draught objectives, this tool will be fed by the aforementioned model
- First comprehensive results are expected in in second half of 2021.

WP4 (INAT)

- Scoping and stakeholder analysis completed using desk research, but to be finalized with in person meetings post covid-19
- Model development with help of Politecnico di Milano is ongoing

Collaboration, coordination, mobility, synergies

Within project consortium

All planned exchanges, research visits, field visits, etc. have been canceled because of Covid-19

TU Delft and Politecnico di Milano are collaborating on the stylized case study

- Aided by a novel staff member in Delft who previously was a postdoc in Milan
- First results expected by late summer 2021

INAT and Politechnico di Milano are collaborating on the setup of the many-objective optimization for the Megeuelil Basis case study. Idea is to mimic and re-use as much as possible materials from the Lake Como case study

Beyond project consortium

- SIMTWIST (JPI) on modelling with stakeholders
- DAFNE (H2020) Zambezi case study

Impact and knowledge output

General

- Empirical assessment whether theoretical potential of MOEAs can be realized in practice
- Mainstreaming many objective optimization in IWRM
- Responsible water management innovations / value sensitive design

Cases

- Extensions of existing models to enable many-objective optimization
- Identification of case specific innovative solutions
- Improved alignment of expected consequences of solutions with interests and preferences of the various stakeholders

Progress so far

- Conceptual paper on theoretical potential is published
- Extension of existing models is progress in all three case study areas
- Stakeholder engagement is ongoing but constrained by Covid-19

Looking ahead

2021

- Stylized case study for proof of concept / principle to be ready after the summer break
- Preliminary results are expected this year for the three case study areas
- Hopefully, in person stakeholder meetings in the fall for the three case study areas

2022

- Expanding many-objective optimization setup for three case studies in light of stylized case study
- Dissemination workshops in three case study areas
- Cross comparison of cases

Societal and case area impacts heavily dependent on how covid-19 situations evolves in coming months, because it benefits greatly from in person interaction

Any comments?

Water JPI

Reducing the effects of forest management to inland waters (REFORMWATER)

Jukka Pumpanen

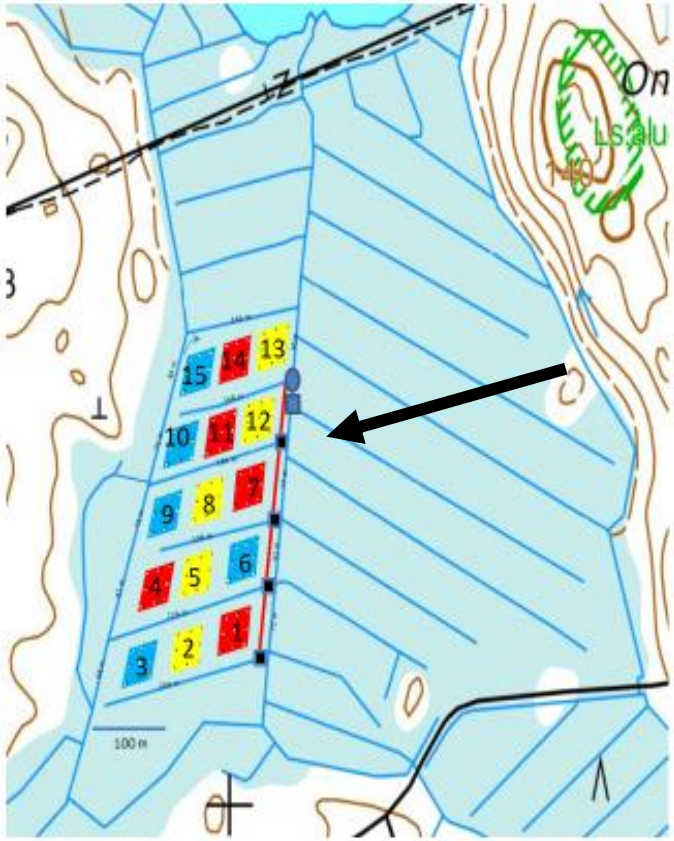
Water JPI 2018 Joint Call

Mid-term evaluation meeting
19-20 April 2021 Online

Kickoff meeting in Helsinki, May 2019

Scientific and technological results

- Finland, Paroninkorpi



5 plots/treatment

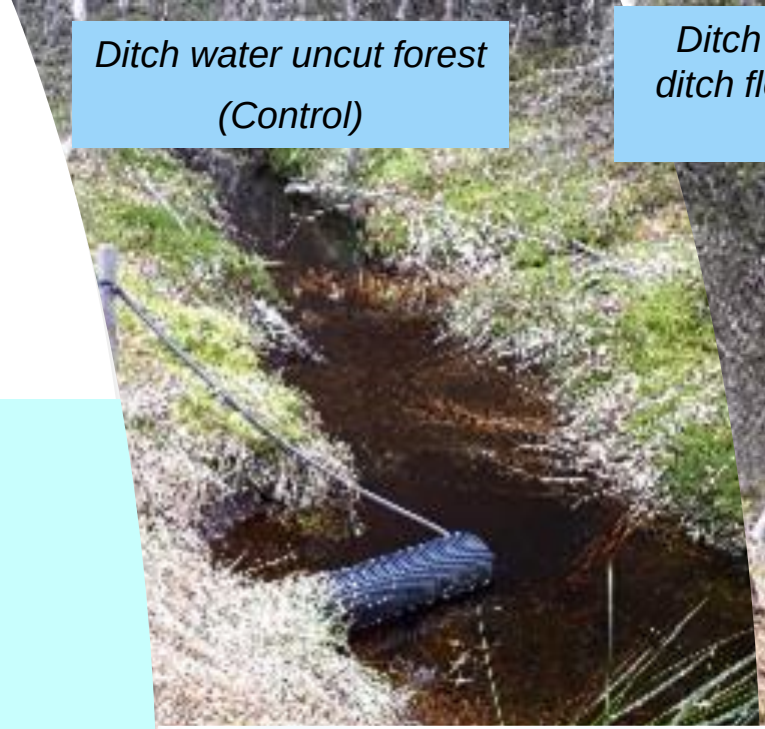
Blue = Control (uncut forest)
Yellow = Continuous cover forestry (CCF)
(basal area of 12 m^2/ha)
Red= No samples

Clear-cut area

Finland, Paroninkorpi

Water sampling & incubations

- Study period: June 2019-May 2020
- Ditch water samples from 3 places
- 9 ground water tubes/plot →pooled to 1 sample/plot →3 replicate bottles/plot in each incubation
- Incubated at +15℃, 24h
- Gas samples in the beginning and in the end
- CO_2 concentrations were analyzed with gas chromatograph
- Timepoints: 1, 3, 7 and 21 days



Ditch water uncut forest (Control)

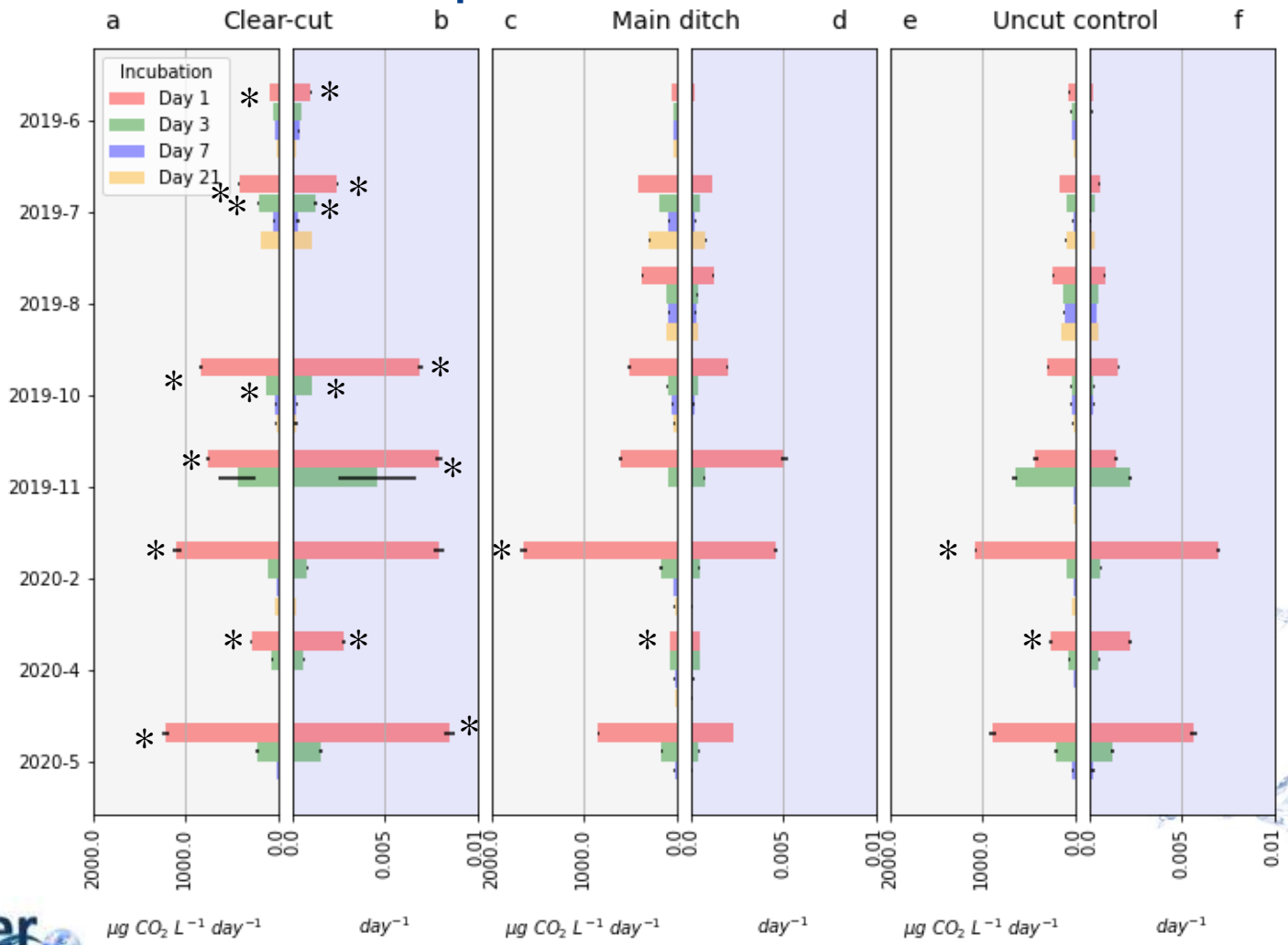
Ditch water from main ditch flowing through the study area

Ditch water next to the clear-cut area

Scientific and technological results

- Finland, Paroninkorpi

Ditch water incubation results



Scientific and technological results

- FINLAND, Biochar

Our results indicated efficient adsorption of N onto biochar surfaces.

Biochar was capable of adsorbing NO_3-N.

water

MDPI

Article

Purification of Forest Clear-Cut Runoff Water Using Biochar: A Meso-Scale Laboratory Column Experiment

Elham Kakaei Lafdani [1,*], Taija Saarela [2], Ari Laurén [1], Jukka Pumpanen [2] and Marjo Palviainen [3]

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ORIGINAL ARTICLE

Biochar as adsorbent in purification of clear-cut forest runoff water: adsorption rate and adsorption capacity

Taija Saarela[1] · Elham Kakaei Lafdani[2] · Ari Laurén[2] · Jukka Pumpanen[1] · Marjo Palviainen[3]

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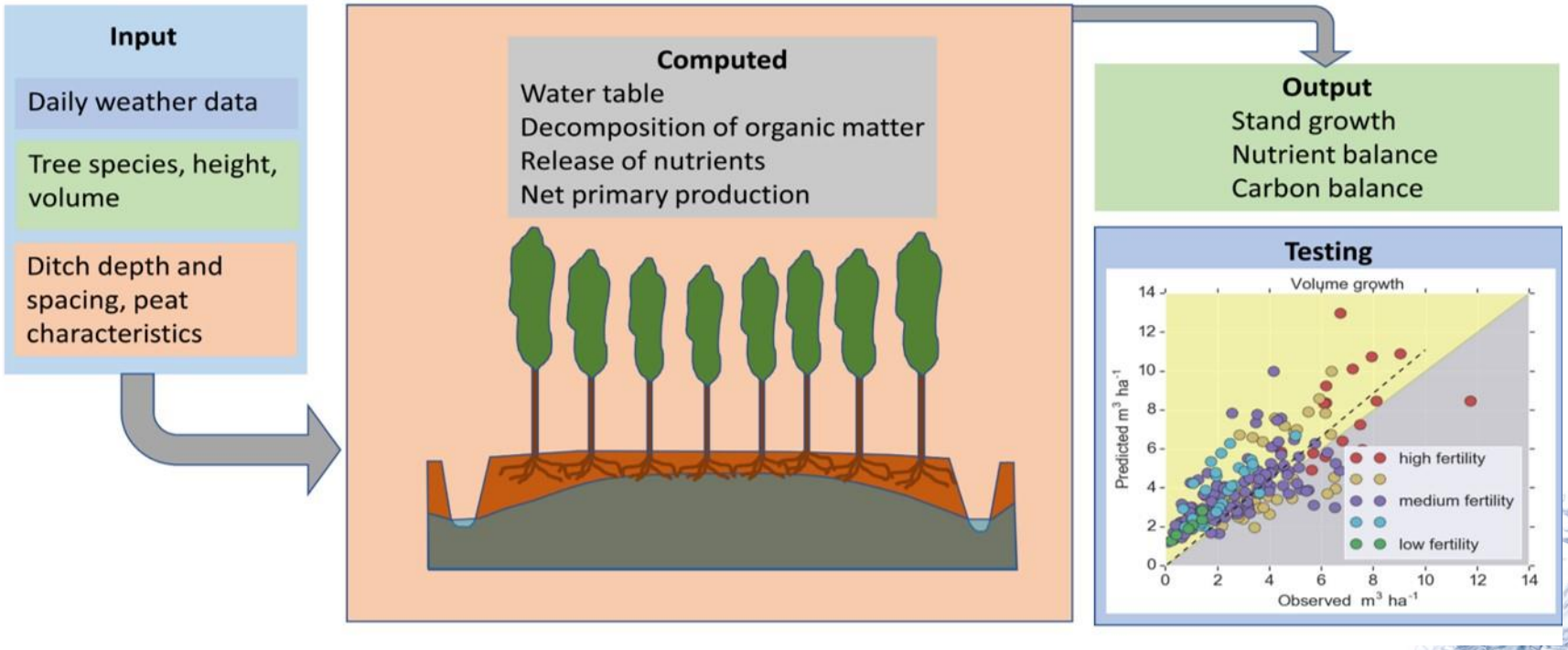
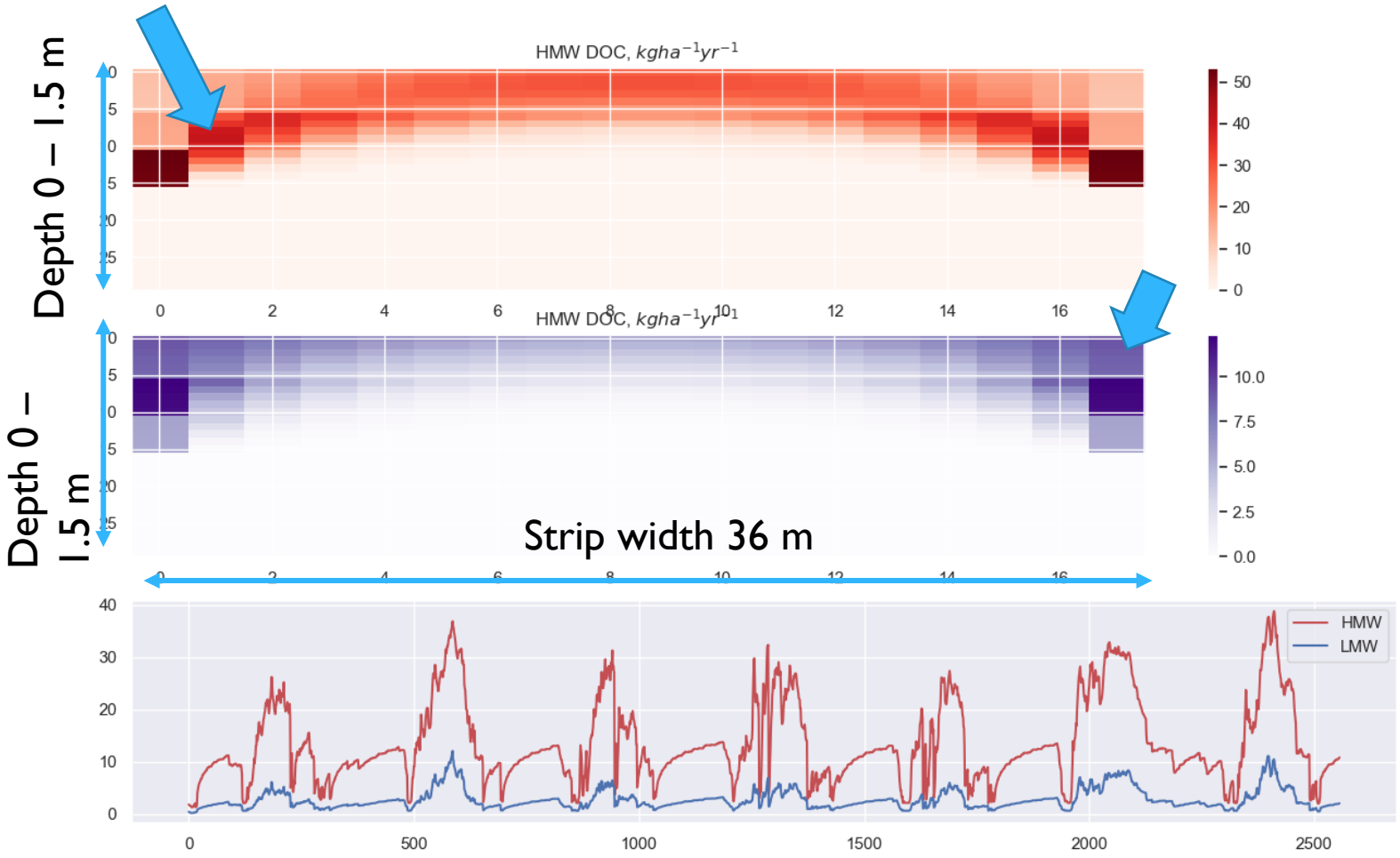
Scientific and technological results

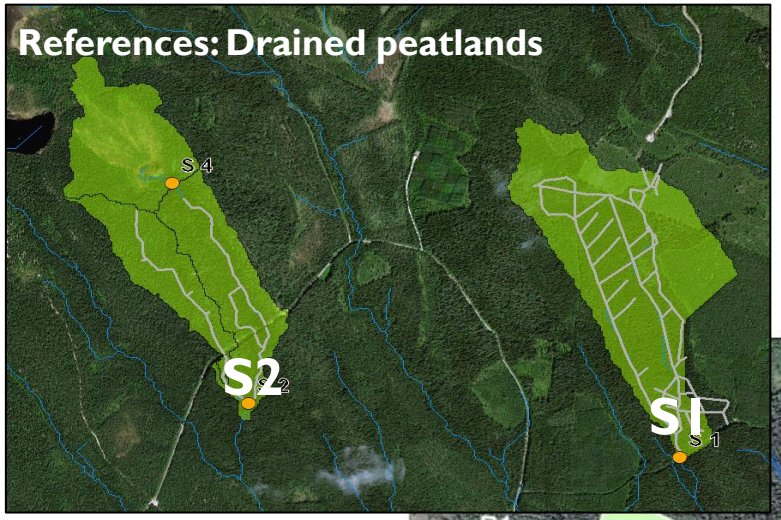
- Finland, modelling



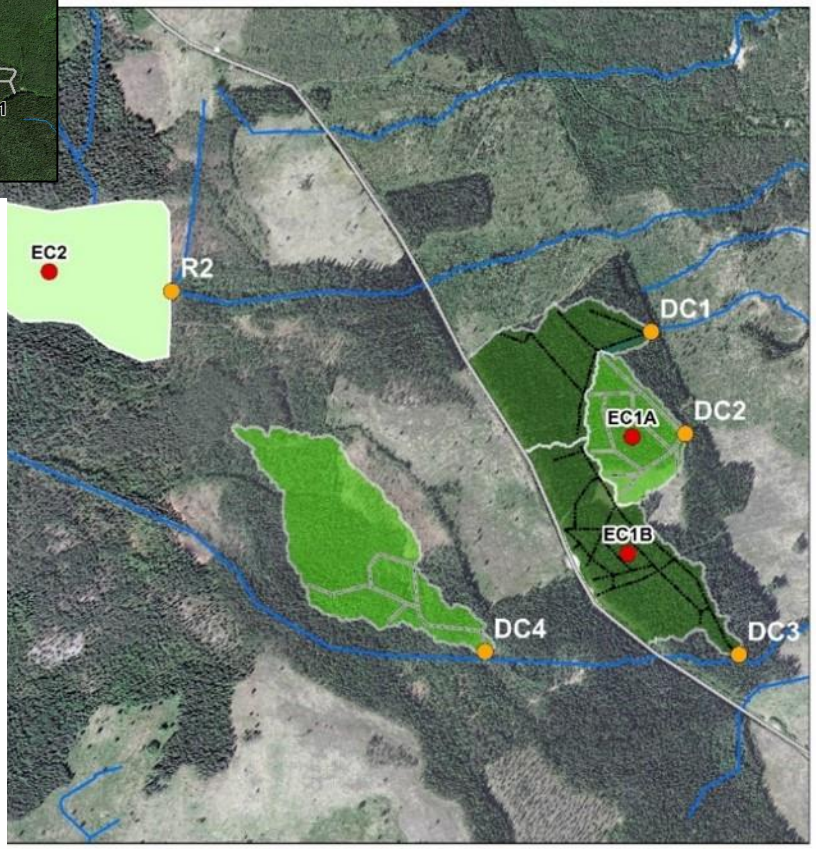
DOC release pattern

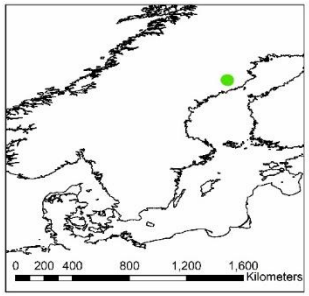


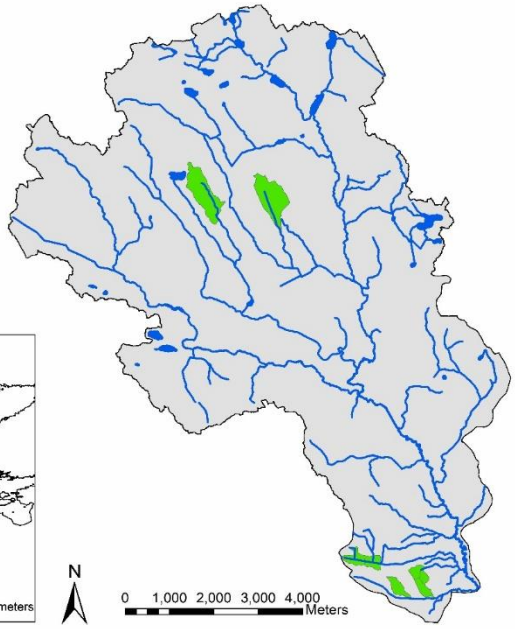
SWEDEN, experimental sites



- six catchments total, two controls within the Krycklan Catchment study (S1 and S2), and four within the Trollberget Experimental Area (TEA)
- Take a virtual tour of the site here





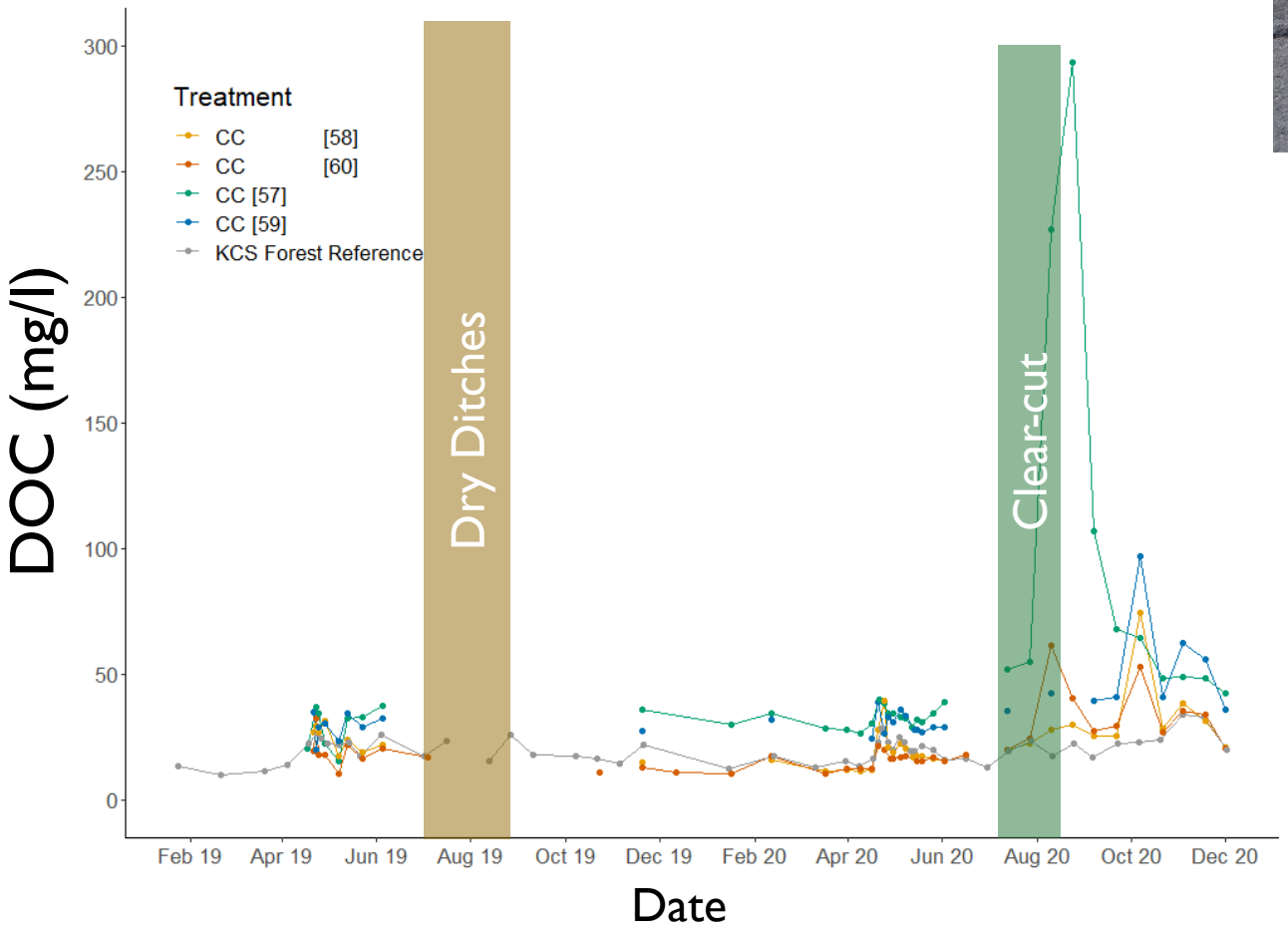


FIELD SITES AND FIELD WORK

- Swedish TEA was harvested in Summer of 2020
- Ditches will be cleaned in September of 2021

Groundwater well transects
(different distances to ditch)

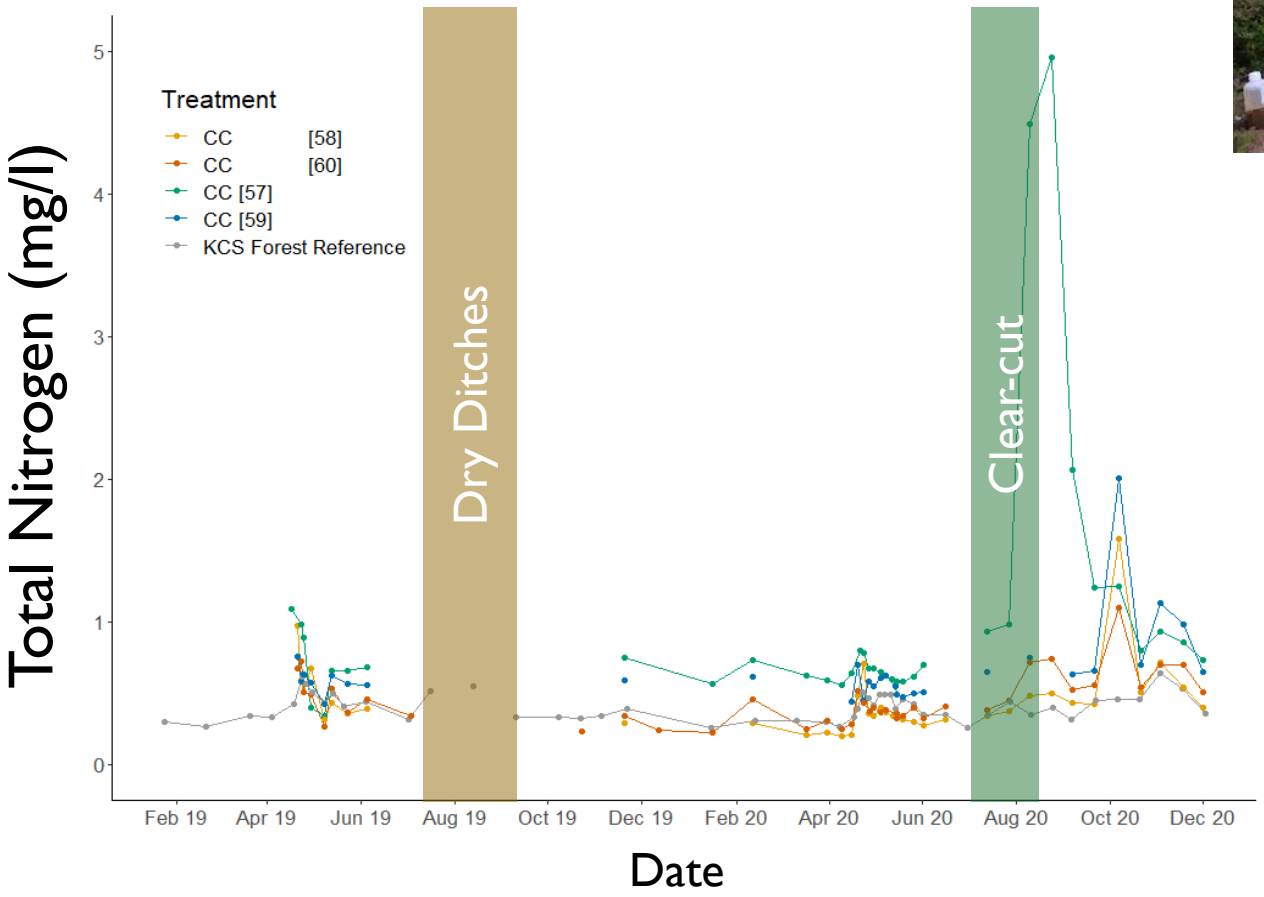
SWEDEN Scientific results



DOC of Experimental Catchments is already reacting to the clear cut.

- In 2019, for the same period - the ditches were dry.
- In 2020, higher concentrations of DOC compared to the reference site

SWEDEN Scientific results



TN of Experimental Catchments is already reacting to the clear cut.

- In 2019, for the same period - the ditches were dry.
- In 2020, TN peaking just one month after clear-cut

ESTONIA, Scientific results

Two study sites

Ullika

Drainage gradient measurements from heavily drained stand to the undrained natural bog forest

Three subplots were set along the drainage gradient:

intensively drained (U-8; 8 m from the ditch),

moderately drained (U1; 5 m from the ditch)

undrained, nearly natural (U3; 40 m from the overgrown ditch) forests

two sampling points:

excavated and maintained working ditch (U)

overgrown ditch, excavated more than 100 yrs ago (U0).

ESTONIA, Scientific results
Two study sites

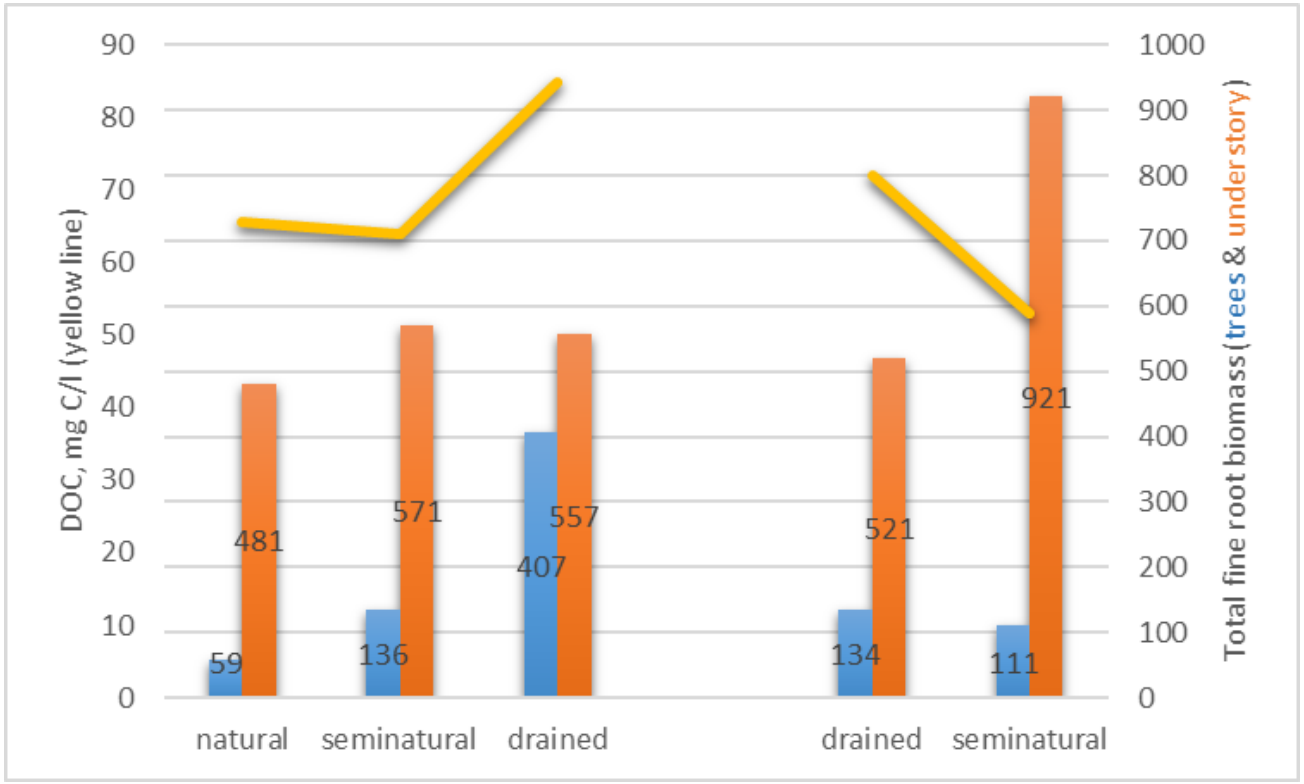
Ess-soo

For estimating clear-cut effect in peatland forests, we have set up two plots: **drained**: (ES-KR, ESKR2) **nearly natural**: (ES-D, ES-D2)

It is reference area for abandoned peat extraction sites that are under different restoration treatment.

The clear-cut was planned in winter 2020, but postponed to winter 2021 (due to unfrozen soil and Covid-19 restrictions).

DOC concentration was significantly higher in drained forests, while fine root biomass (g m^{-2}) increased same direction. A clear increase in the fine root proportion of tree's (approx. 7x) was estimated in Ullika, however, DOC concentration in ditch water was 80% lower compared to drained forest soil.



Ullika

Ess-soo

IRELAND Scientific results

- Three sites covering a range of management activities sampled monthly

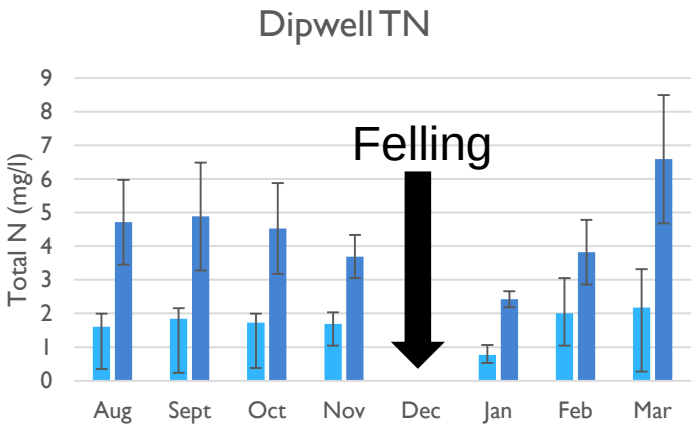
Site	Management	Species
Lake Atorick	Clearfelled 2015	Sitka Spruce
Lake Atorick	Forested, felled winter 2020	Sitka Spruce
Annaleaka	Clearfelled 2020	Sitka Spruce
Duffy	CCF	Sitka Spruce

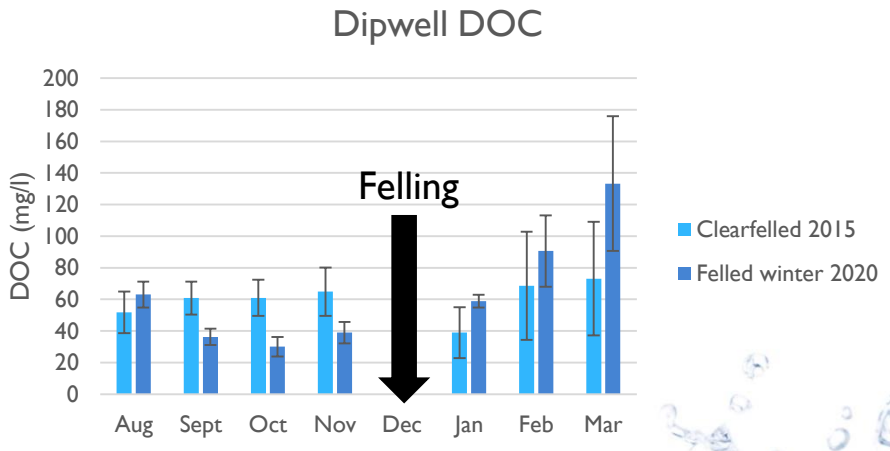
- Dipwells and ditches sampled for water chemistry:
  - DOC and $SUVA_{254}$
  - Nitrogen (TN, NH_4, NO_3, NO_2)
  - Phosphorus
  - Potassium
- Biochar lab experiment completed, field experiment being planned

IRELAND Scientific results

Core site: Lake Atorick

- DOC and TN has remained stable in the area felled in 2015, but has increased in the area recently felled.





- Concentrations at ditch outlets have also increased (DOC has doubled to ~65 mg/l and TN has increased from 0.6 mg/l to 1.6 mg/l.
- Biochar filters will be installed shortly and absorption of TN and DOC will be monitored.

JOINT COLUMN EXPERIMENT

Photo: Xudan Zhu

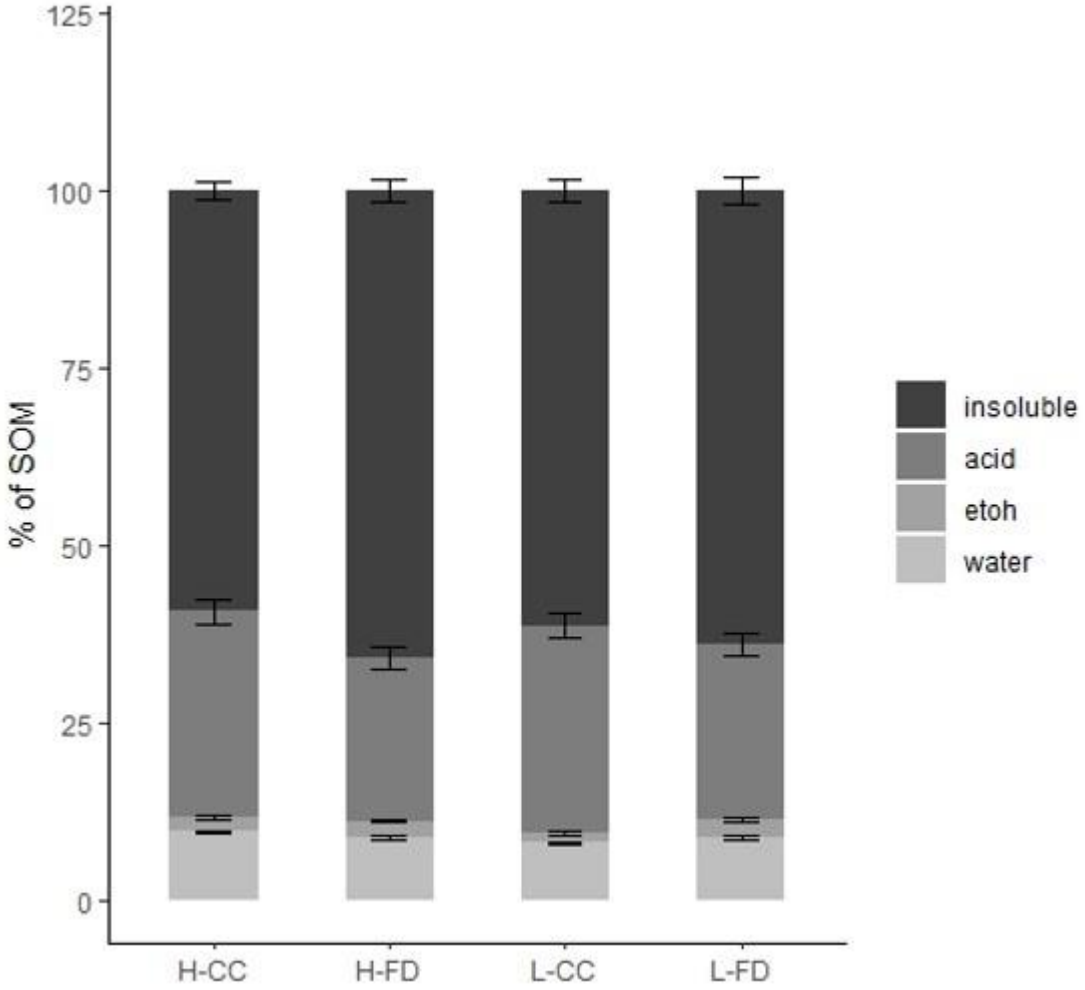
- ~150 peat columns were collected from sites altogether. were collected from Finnish, Swedish, Estonian and Irish sites between August 2019-January 2020.
- The effects of water level and carbon input was studied in a 6-month incubation experiment.
- Water quality, dissolved organic matter decomposition and quality were measured in Finland.
- Nutrients (nitrogen and phosphorous) from these experiments will be analyzed in Swedish lab soon.

SOM fractions in peat columns

- Water table level had a significant effect on water and ethanol soluble fractions (faster cycling SOM), acid soluble and insoluble fractions (slow cycling were affected by forest type (clear cut/forest with ditch).

- H= water level 30 cm
- L=water level 10 cm

- CC= clear cut
- FD= forest with ditches



MOBILITY

- Jukka Pumpanen and Anne Ojala visited all sites for collecting the peat columns in autumn 2019
- Anne Ojala, Jukka Pumpanen, Annamari Laurén, Elina Peltomaa and Marjo Palviainen visited Ireland in January 2020
- PhD student from Sweden, Virginia Mosquera, visited U of Eastern Finland to set up column experiment and present her research, February 2020
- Co-PI from Sweden, Eliza Maher Hasselquist, visited Finland January - March 2020.

EMH on campus in Helsinki

STAKEHOLDER ENGAGEMENT

- Stakeholder field trip to Paroninkorpi on 13 June 2019.
- 12 November 2019 a meeting of the National support group of JPI Water including the Finnish advisory board of JPI Water
- Participating several meetings of TAPIO (development organization of privately owned forests in Finland)
- Biochar presentation in "Water protection days" in Savonlinna, Finland 17.-18.9.2019
- Presentation in biochar company Carbofex 12.2.2020
- 16th annual Krycklan Symposium September 25, 2019 (Finnish partners attended)
- 17th annual Krycklan Symposium was held via Zoom webinar on the September 23rd, 2020
    - Focused on the effects of management of forest ditches on water quality and quantity.
    - 137 unique viewers from eight countries.
    - +145 individuals have watched on YouTube

Several field trips with stakeholders in Sweden

EFFECTS OF COVID-19

FINLAND

- Delays in lab work (Universities were closed from March 1, 2020 onwards for 2 months. Strict restrictions in access to labs.
- COVID-19 situation has complicated the activity of stakeholder advisory board

SWEDEN

- Only one exchange trip for PhD student from Sweden to Finland.
- Mobility of Swedish researcher, EMH, cut short.
- Erasmus Intern delayed until August 2020.
- Fewer Stakeholder meetings, but still regularly, every 3-months
- Lab analysis of samples slowed down
- Biochar experiment delayed (will happen this spring-summer)

IRELAND

- All work packages have progressed with some delay resulting in milestones and targets not being achieved. Delays have included
- Site selection and installation ('work from home' restrictions March-June 2020)
- Delayed field campaign and sampling
- Biochar experiment delayed
- Also, knock effects included changes in forestry management decisions and delayed licences for felling operations, meaning some plans had to be changed (e.g field sites).

Impact and knowledge output

- So far 4 scientific papers
- At least 3 papers in preparation

water

MDPI

Article

Purification of Forest Clear-Cut Runoff Water Using Biochar: A Meso-Scale Laboratory Column Experiment

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forests

MDPI

Article

Drainage and Stand Growth Response in Peatland Forests—Description, Testing, and Application of Mechanistic Peatland Simulator SUSI

Ari Laurén [1,*], Marjo Palviainen [2], Samuli Launiainen [3], Kersti Leppä [3], Leena Stenberg [3], Iñaki Urzainki [3], Mika Nieminen [3], Raija Laiho [3] and Hannu Hökkä [3]

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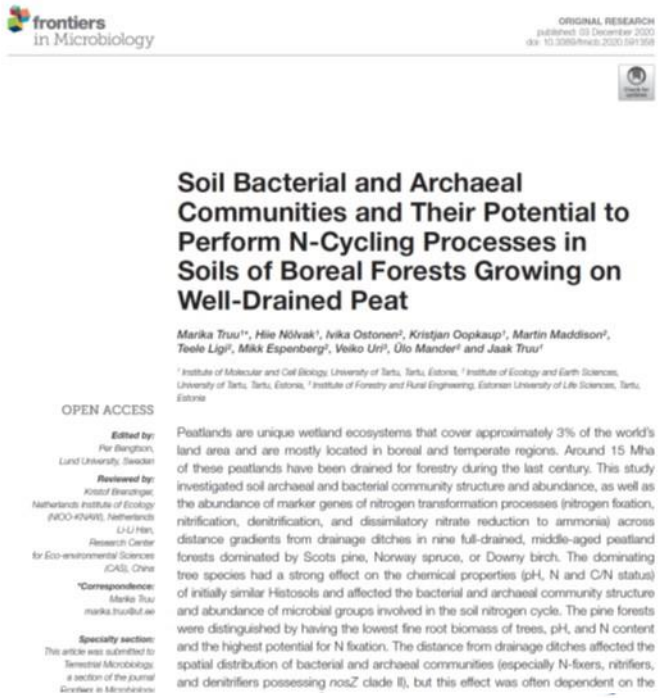

frontiers in Microbiology

ORIGINAL RESEARCH

Soil Bacterial and Archaeal Communities and Their Potential to Perform N-Cycling Processes in Soils of Boreal Forests Growing on Well-Drained Peat

Marika Truu[1*], Hiie Nõlvak[1], Ivika Ostonen[2], Kristjan Oopkaup[1], Martin Maddison[2], Teele Ligi[2], Mikk Espenberg[2], Veiko Uri[3], Ülo Mander[2] and Jaak Truu[1]

[1] Institute of Molecular and Cell Biology, University of Tartu, Tartu, Estonia, [2] Institute of Ecology and Earth Sciences, University of Tartu, Tartu, Estonia, [3] Institute of Forestry and Rural Engineering, Estonian University of Life Sciences, Tartu, Estonia

OPEN ACCESS

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Specialty section:
This article was submitted to Terrestrial Microbiology, a section of the journal Frontiers in Microbiology

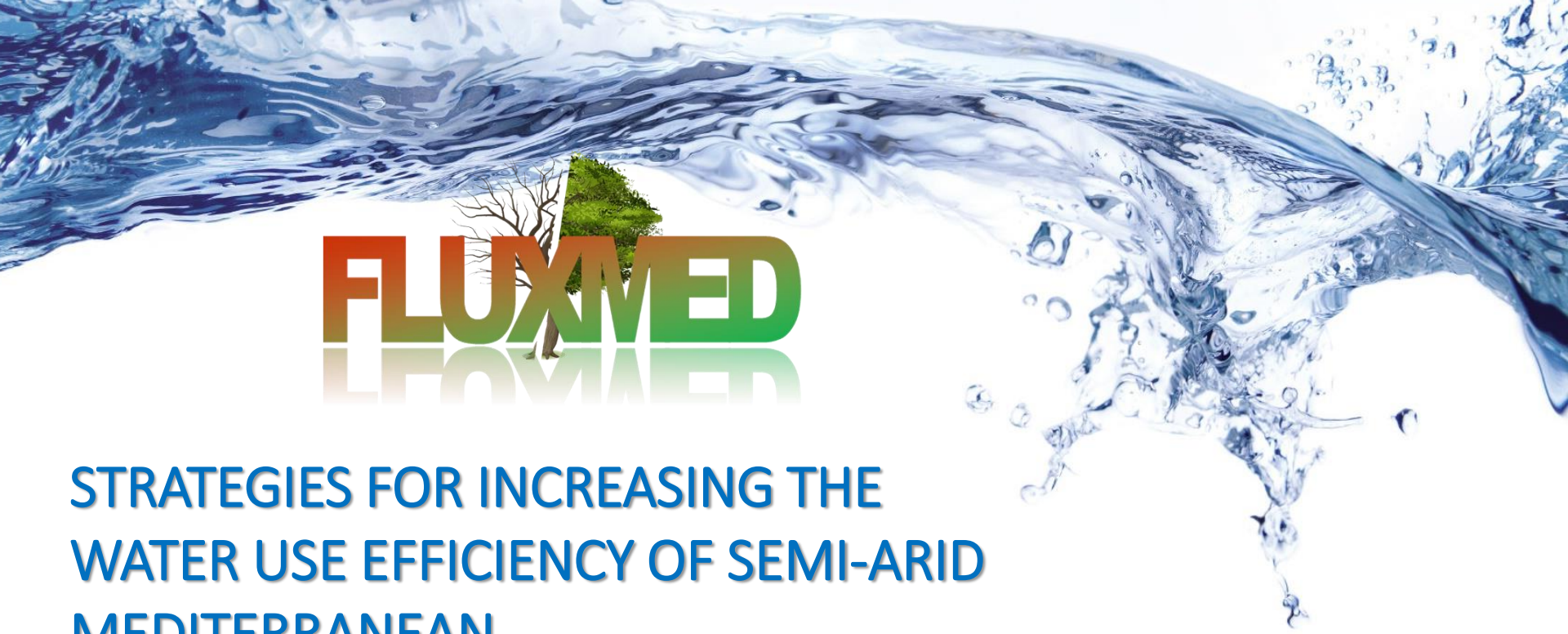
Peatlands are unique wetland ecosystems that cover approximately 3% of the world's land area and are mostly located in boreal and temperate regions. Around 15 Mha of these peatlands have been drained for forestry during the last century. This study investigated soil archaeal and bacterial community structure and abundance, as well as the abundance of marker genes of nitrogen transformation processes (nitrogen fixation, nitrification, denitrification, and dissimilatory nitrate reduction to ammonia) across distance gradients from drainage ditches in nine full-drained, middle-aged peatland forests dominated by Scots pine, Norway spruce, or Downy birch. The dominating tree species had a strong effect on the chemical properties (pH, N and C/N status) of initially similar Histosols and affected the bacterial and archaeal community structure and abundance of microbial groups involved in the soil nitrogen cycle. The pine forests were distinguished by having the lowest fine root biomass of trees, pH, and N content and the highest potential for N fixation. The distance from drainage ditches affected the spatial distribution of bacterial and archaeal communities (especially N-fixers, nitrifiers, and denitrifiers possessing nosZ clade II), but this effect was often dependent on the

Continuation of the work in the future

- Correlations between DOC quality and CO_2 production
- Temperature sensitivity of DOC decomposition
- The development of DOC model
- Biochar experiments in Sweden and Ireland in 2021
- Writing scientific manuscripts and best practice guidelines

Any comments?

Water JPI



STRATEGIES FOR INCREASING THE WATER USE EFFICIENCY OF SEMI-ARID MEDITERRANEAN AGROSILVOPASTORAL SYSTEMS UNDER CLIMATE CHANGE

PI: Nicola Montaldo

Università di Cagliari (Italy)

Water JPI 2018 Joint Call

Mid-term evaluation meeting
19-20 April 2021 Online

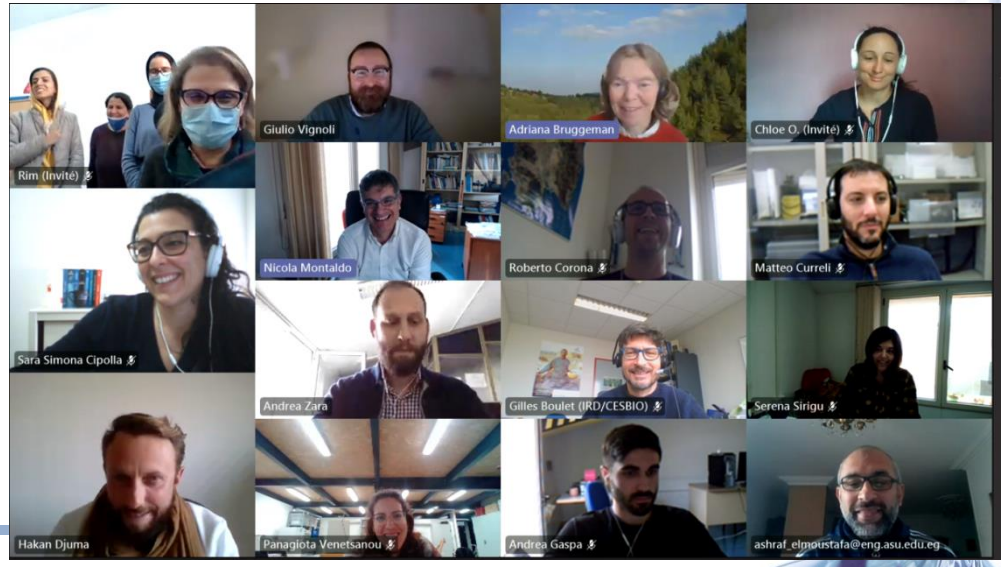
Water 2017 Works

Water JPI

CONSORTIUM DESCRIPTION

- *Coordinator*: ***UNICA*** - University of Cagliari (Italy) - Dipartimento di Ingegneria civile, ambientale ed architettura- Coordinator; Nicola Montaldo
- *Partner-1*: ***CyI*** - Energy, Environment and Water Research Center, The Cyprus Institute; Adriana Bruggeman
- *Partner-2 -*: ***UNIAS*** - Irrigation and Hydraulics Dept. (Egypt) - Faculty of Engineering, Ain Shams University; Ashraf El-Moustafa
- *Partner-3*: ***CESBIO*** - Centre d'Etudes Spatiales de la Biosphère (France); Gilles Boulet
- *Partner-4*: ***INRGREF*** - Institut National de la Recherche en Génie Rural, Eaux et Forêts (Tunisia). Rim Zitouna

Starting date: **January 2020**
Duration: **30 months**
Request of extension due to COVID pandemic impacts



OBJECTIVES

The overarching goal is to develop and apply innovative methodologies to increase the social-ecological Water Use Efficiency of managed ecosystems along the Mediterranean biome and climate types.

- **OB1**: to develop and implement innovative methodologies for evapotranspiration measurements and estimate in typical heterogeneous Mediterranean agrosilvopastoral systems;
- **OB2**: to improve the eco-hydrologic monitoring in ephemeral rivers and wadis along the Mediterranean biome and climate types, establishing a transnational Mediterranean watershed monitoring system;
- **OB3**: to develop data assimilation systems for assimilating remotely sensed and field data into ecohydrological models at the watershed or agricultural district scales for optimal characterization of soil water balances;
- **OB4**: to identify the impacts of contrasting vegetation and crop types on the soil water balance, surface runoff, and water use under current and past Mediterranean climates;
- **OB5**: to predict the impact of future climate scenarios on soil water balance, runoff, and water use;
- **OB6**: to develop a set of land cover change strategies (e.g. forestations/deforestation, use of more drought-tolerant crops and woody vegetation) for climate change scenarios that optimize the water uses and increase system resilience;

Scientific and technological results: Workpackages

WP1 - ***Management and Coordination:*** coordination of the activities - organization structure and supervision of the results - administrative management ;

WP2 - ***Monitoring of experimental fields and hydrological basins:*** monitoring of experimental fields - monitoring of hydrologic basins - analysis of field observation data;

WP3 - ***Ecohydrological modeling:*** LSM-VDM calibration and validation at field scale –distributed ecohydrologic model at basin scale - LSM-VDM calibration and validation at basin scale - model intercomparison and optimazion ;

WP4 - ***Remote sensing and data assimilation:*** acquisition of satellite images - estimation and validation of Ts and LAI - development of a data assimilation system;

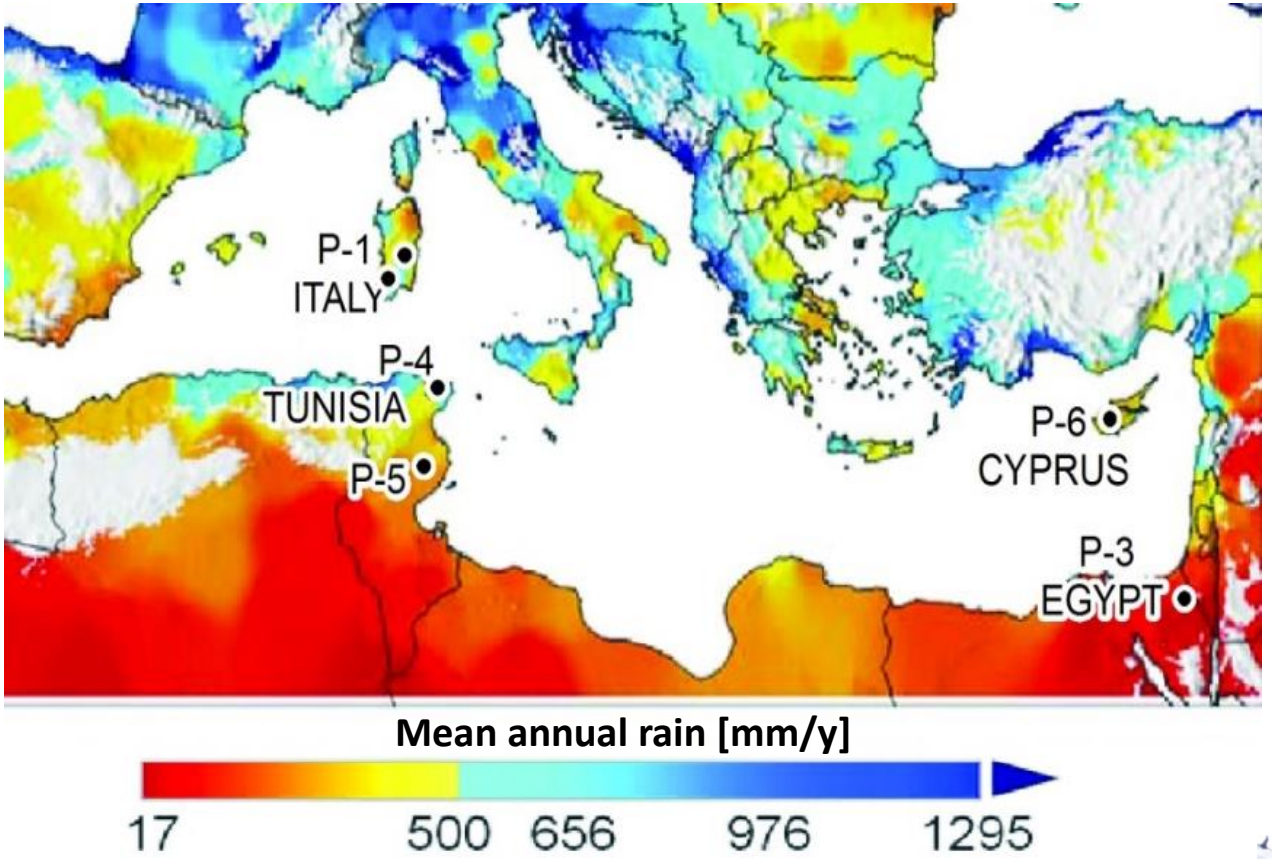
WP5 - ***Analysis of land cover change strategies and climate change scenarios****: analysis of historical hydrologic data, generation of the future climate change scenarios, effects of land cover changes strategies and climate change scenarios*

WP6 - *Development of water management and planning systems:* *water resources management models for case studies, strategies for water resources optimization*

WP7 - Quantifying benefits and sharing methodologies with stakeholders, dissemination and communication

WP2 - Monitoring of experimental fields and hydrological basins

The transnational Mediterranean river monitoring network

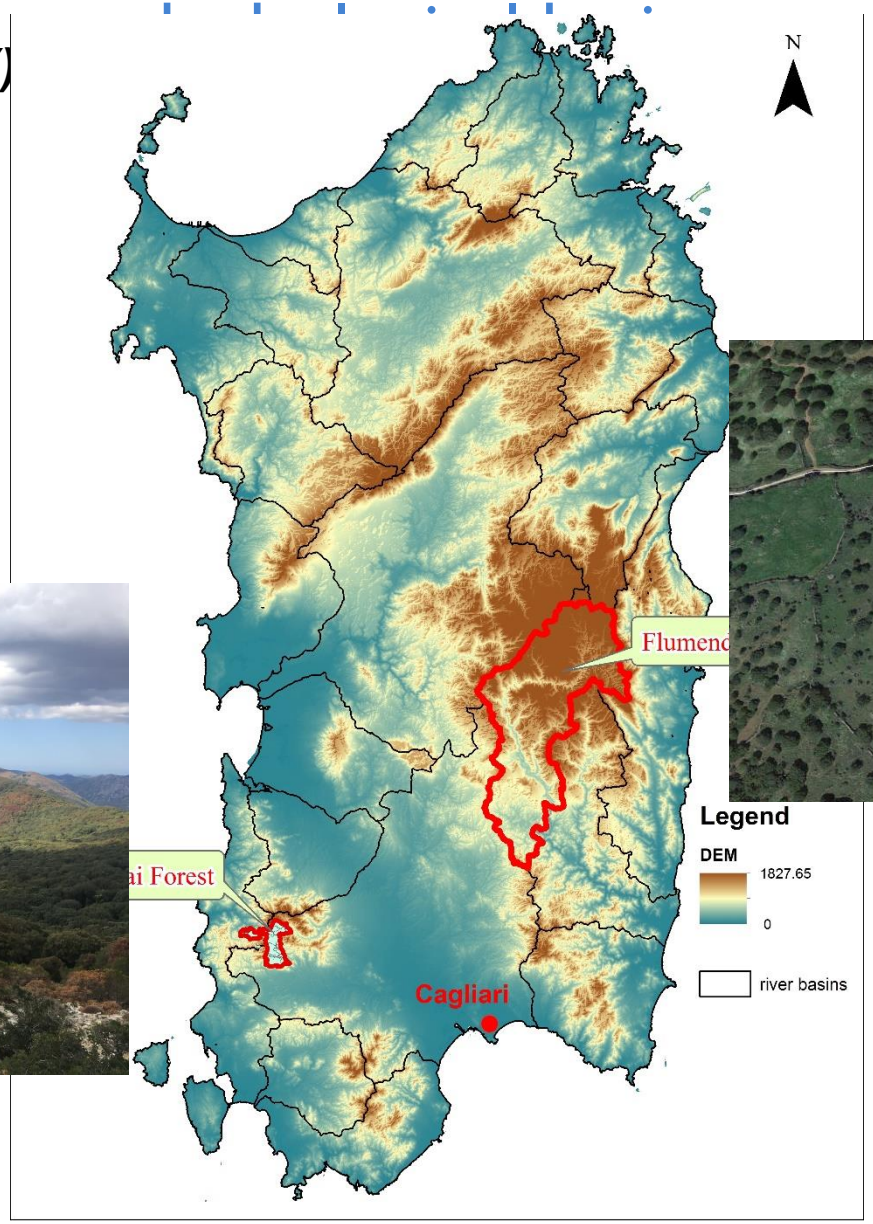


P-1: ***UNICA;*** *P-3*: ***UNIAS;*** *P-4*: ***INRGREF;*** *P-5*: ***CESBIO;*** *P-6*: ***Cyl;***

WP2 - Monitoring of experimental fields and

P-I and II: ***UNICA (ITALY)***

Marganai forest



Flumendosa basin Orroli micrometeorological tower

WP2 - Monitoring of experimental fields and hydrological basins

Orroli site: ***UNICA (ITALY)***

The site monitored from May 2003 to July 2018. Started again in September 2020

Eddy covariance tower

Ecosystem:

patchty mixture of tree and grass;

Main species:

wild olive (*Olea sylvestris)*

Soil: Silt Loam (19% sand, 76% silt, 5% clay)

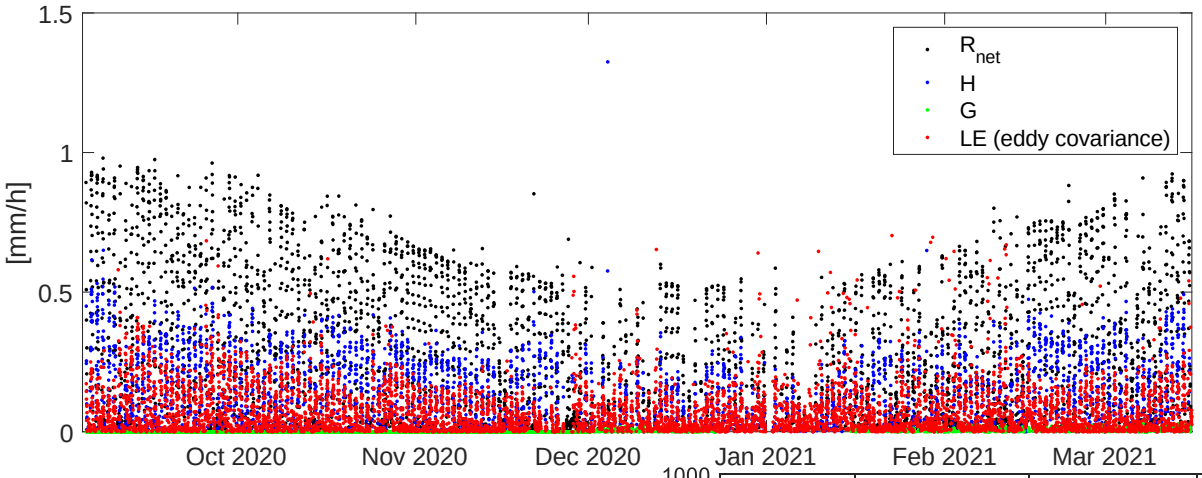
Mean depth : 17 cm

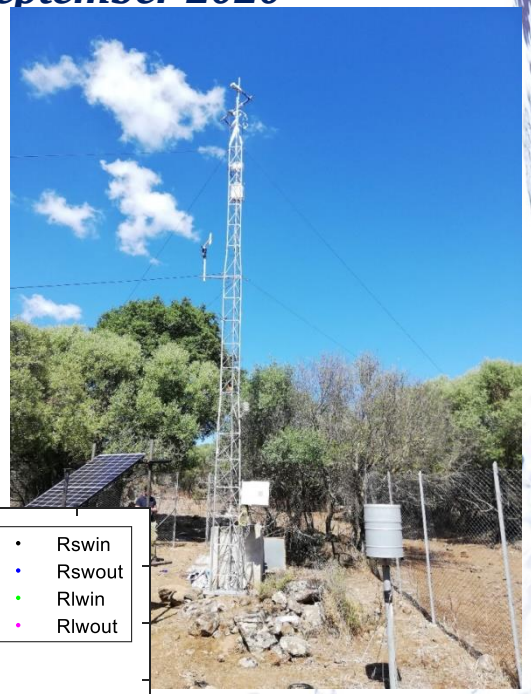
Basement: Fractured basalt

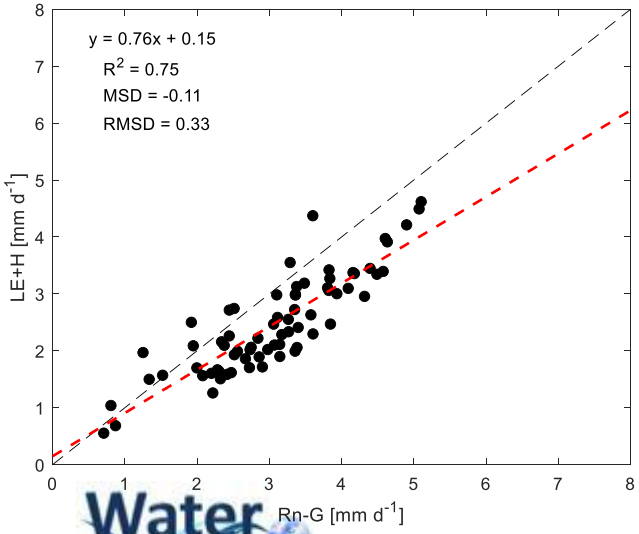
WP2 - Monitoring of experimental fields and hydrological basins

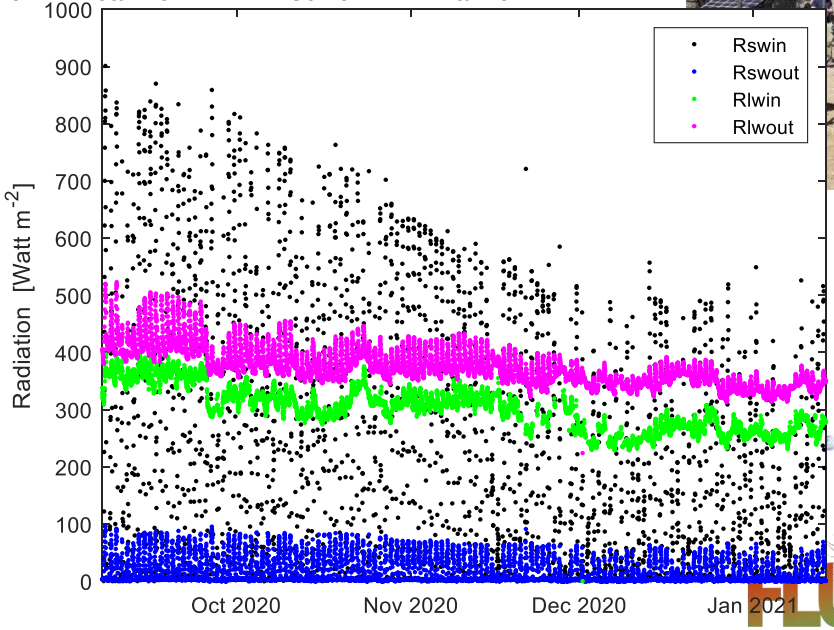
Orroli site: ***UNICA (ITALY)***

The site monitored from May 2003 to July 2018. Started again in September 2020



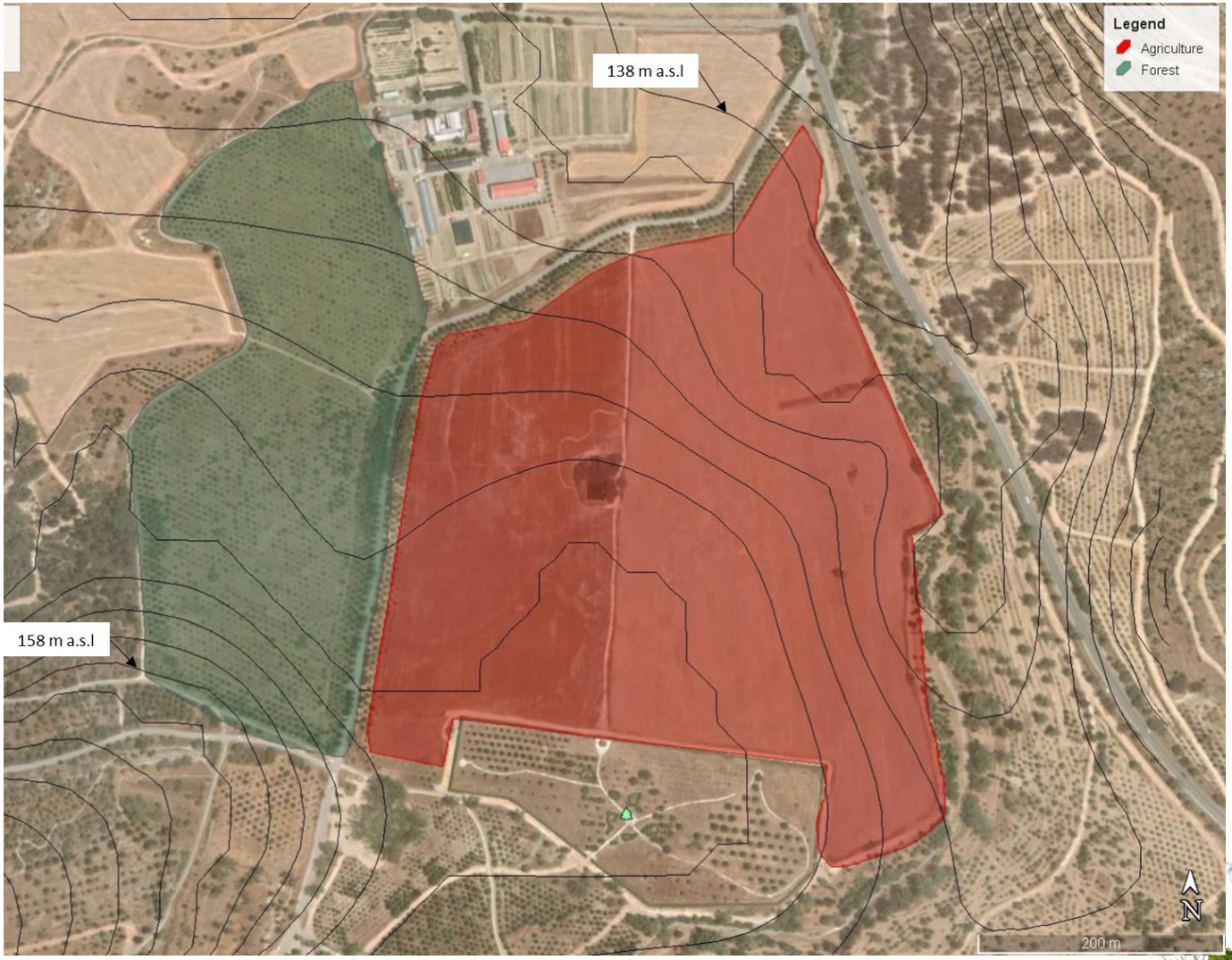






WP2 - Monitoring of experimental fields and hydrological basins

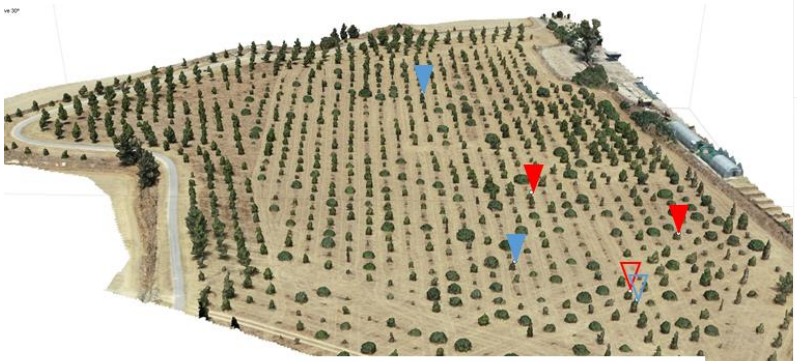
Athalassa site: ***Cyl (Cyprus)***



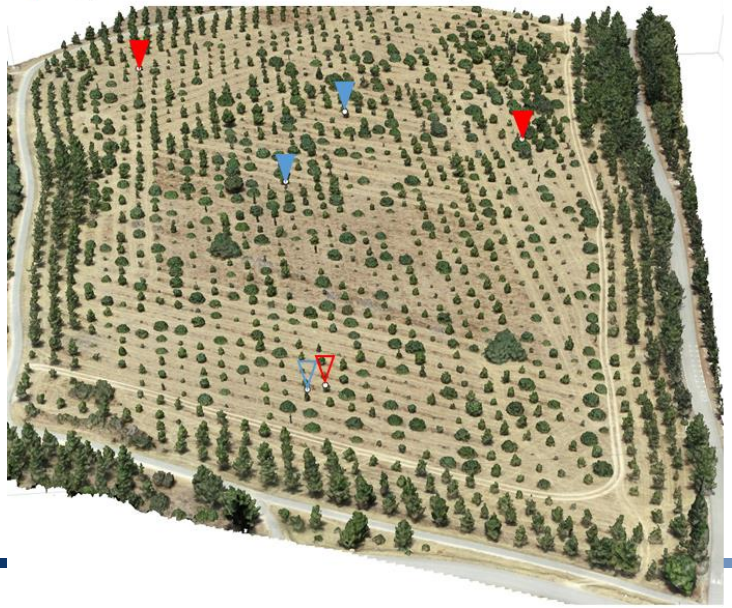
WP2 - Monitoring of experimental fields and hydrological basins

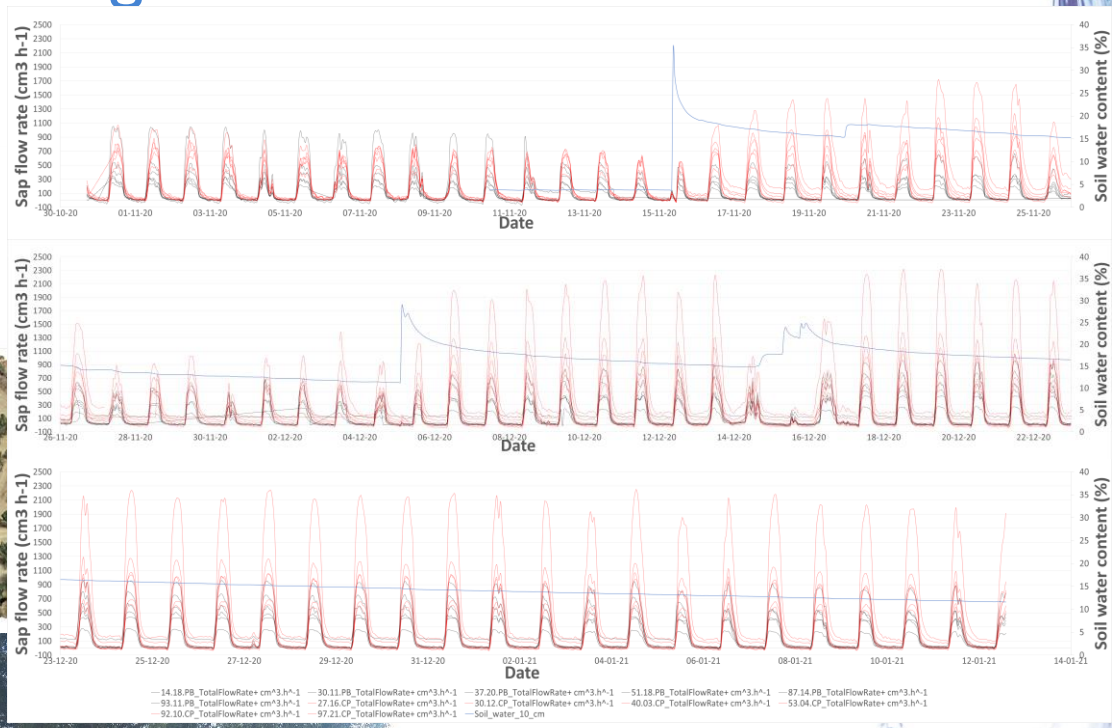
Athalassa site: ***Cyl (Cyprus)***

Forest site



- Pine with sap flow sensor in roaming cluster
- Cypress with sap flow sensor in roaming cluster
- Pine with sap flow sensor in permanent cluster
- Cypress with sap flow sensor in permanent cluster





FLUXMED

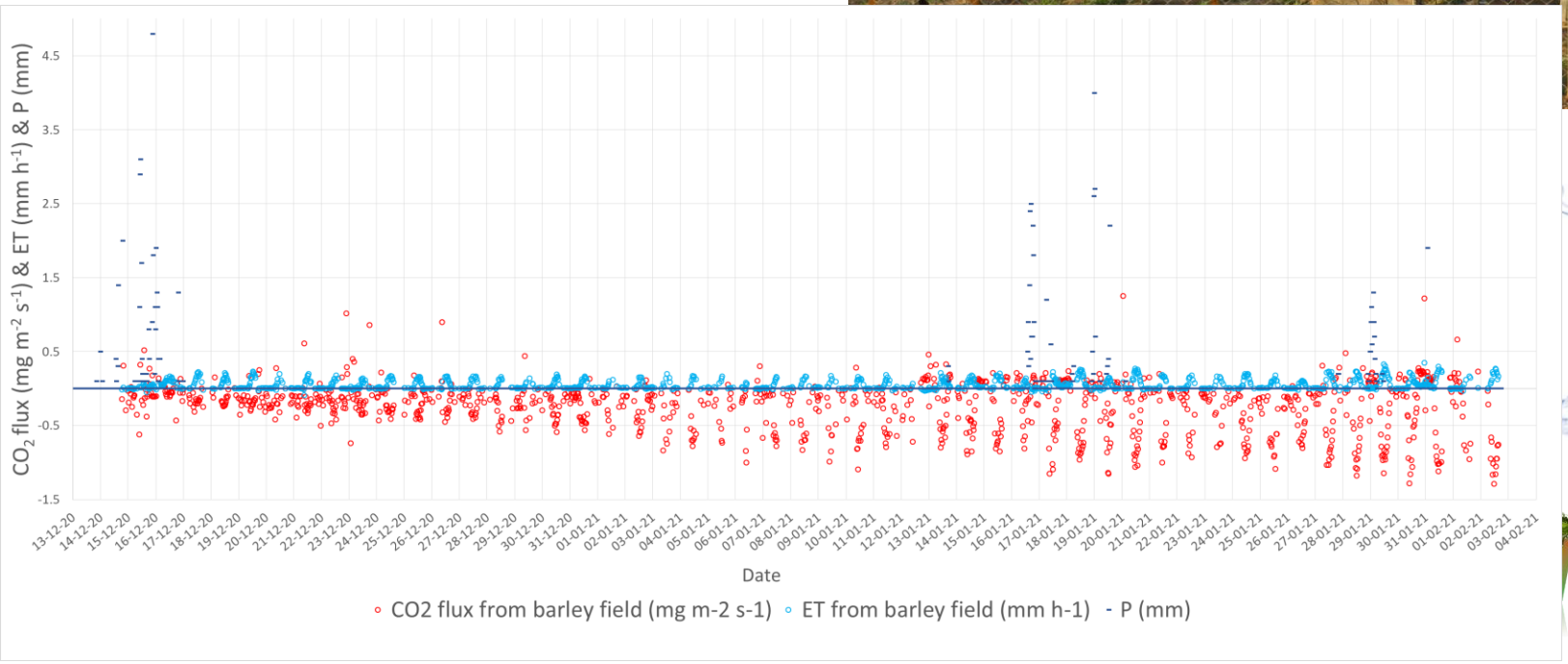
WP2 - Monitoring of experimental fields and hydrological basins

Athalassa site: ***Cyl (Cyprus)***

Agricultural site: Eddy covariance tower

Started in October 2020

Barley field



WP2 - Monitoring of experimental fields and hydrological basins

Taous site in central Tunisia

CESBIO (France)

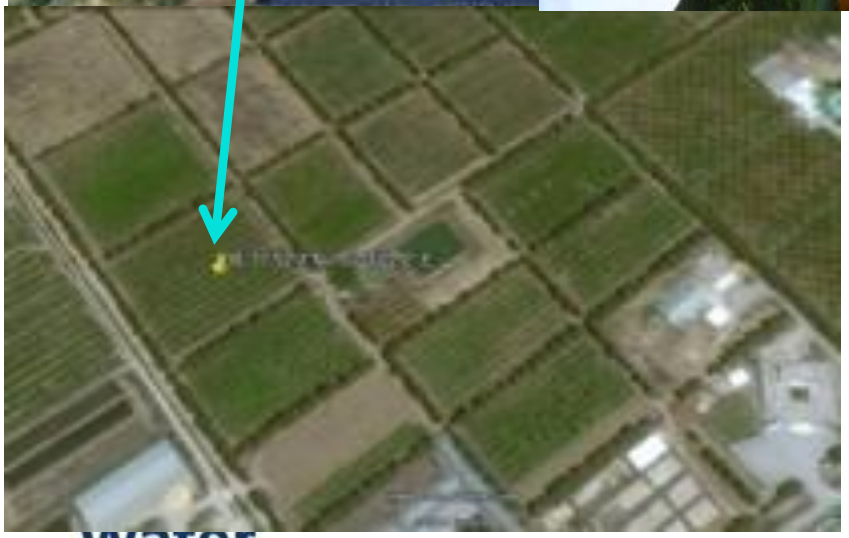
Eddy covariance tower - Olive Trees

WP2 - Monitoring of experimental fields and hydrological basins

Cap Bon in Tunisia

INRGREF (Tunisia)

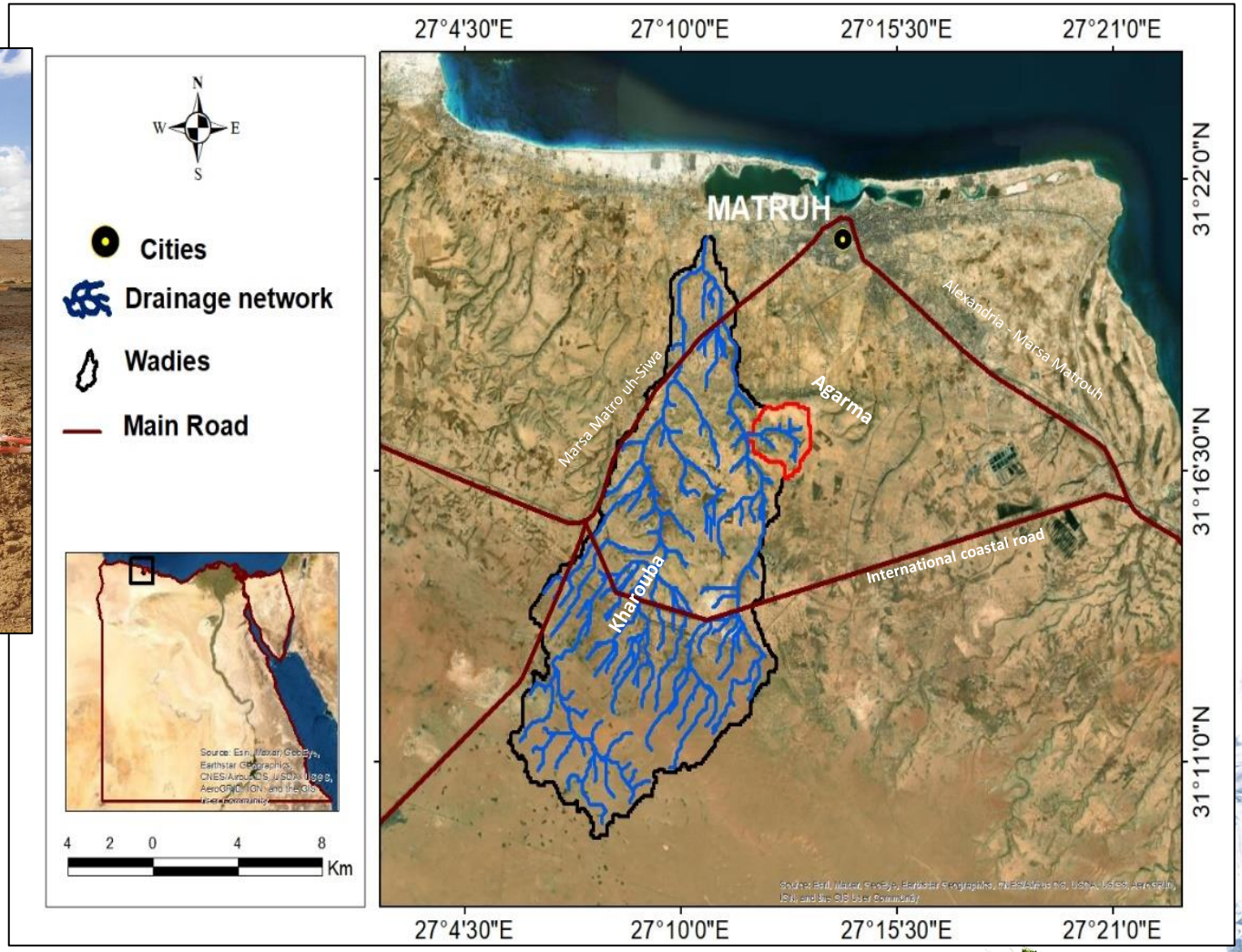
Eddy covariance tower – 20-years old navel orange orchard



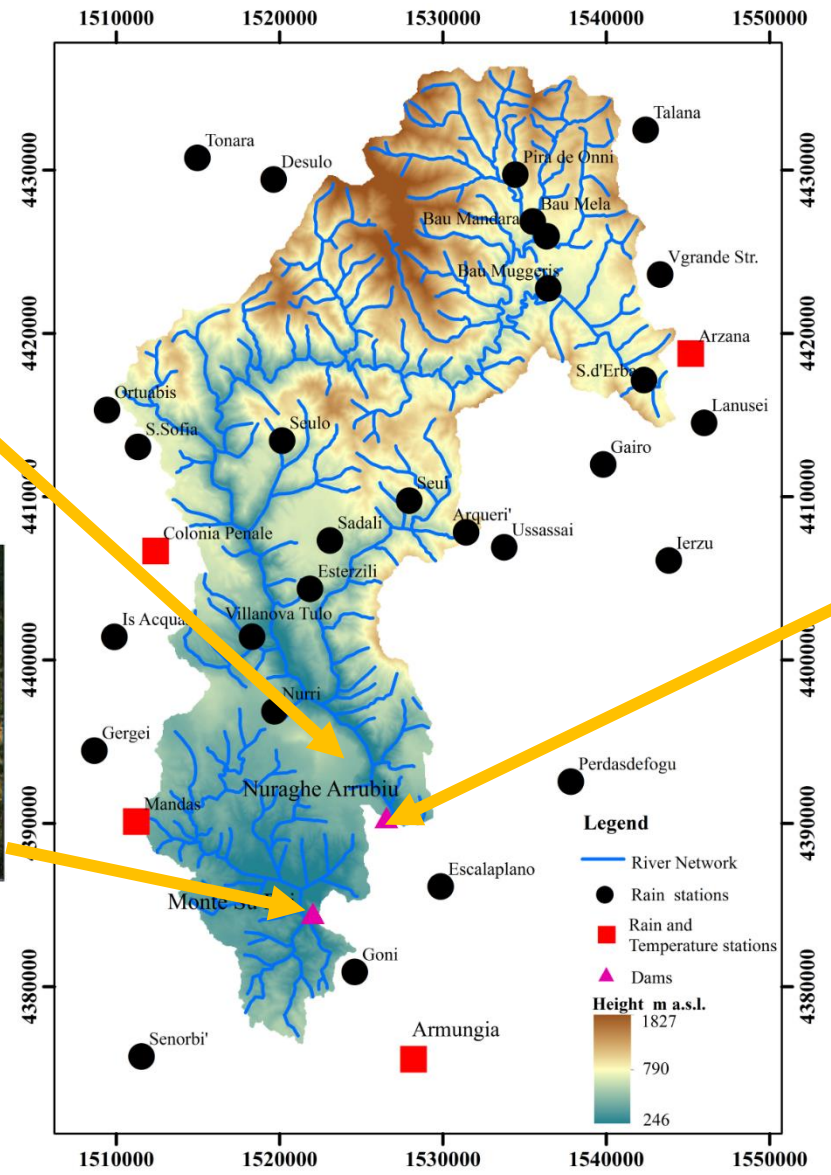
WP2 - Monitoring of experimental fields and hydrological basins

Agarma in Egypt
UNIAS (Egypt)

Wadi kharouba has an area is almost 123 km² and Agarma area is 4.5 km²



WP2 - Monitoring of experimental fields and hydrological basins



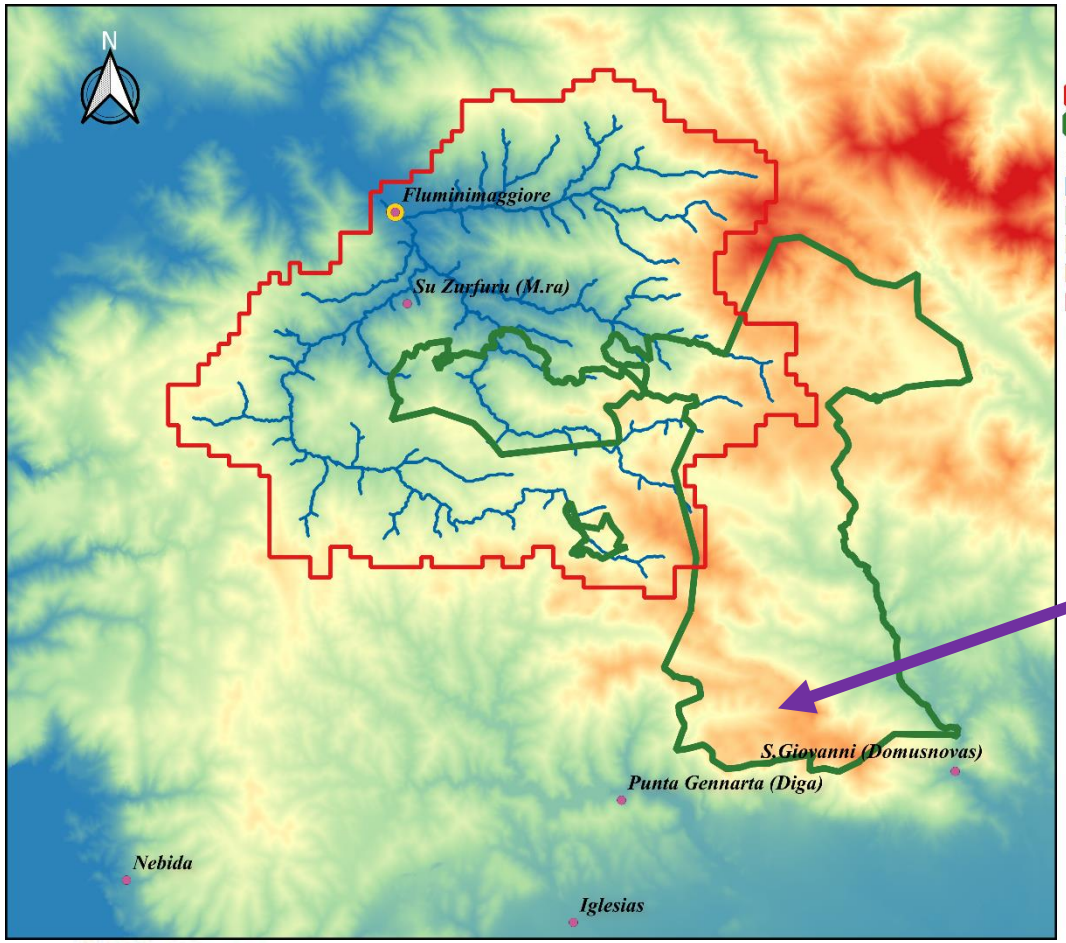
Flumendosa basin

Rain, runoff and air temperature data from 1922

Ente acque della Sardegna

WP2 - Monitoring of experimental fields and hydrological basins

Marganai Forest and Fluminimaggiore basin



Fluminimaggiore basin area of 80 km^2

Rain, runoff and air temperature data from 1922

Forestas
Agentzia forestale regionale pro s'isvilupu de su territòriu e de s'ambiente de sa Sardigna
Agenzia forestale regionale per lo sviluppo del territorio e dell'ambiente della Sardegna

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

SardegnaForeste

Site of Community Importance

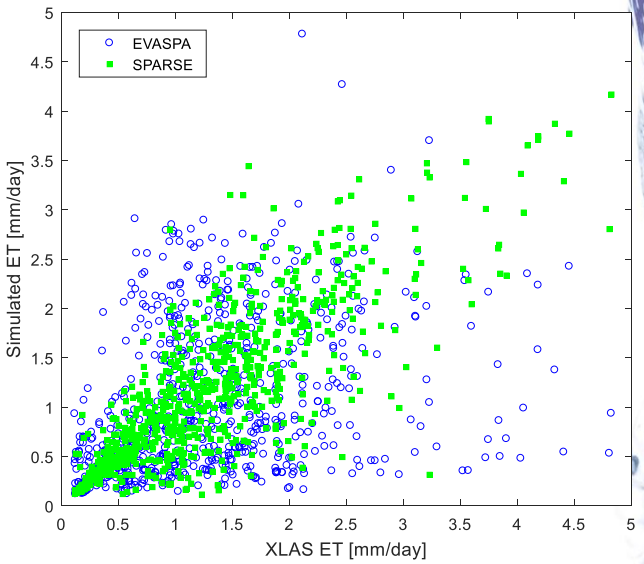
WP3 - Ecohydrological modeling

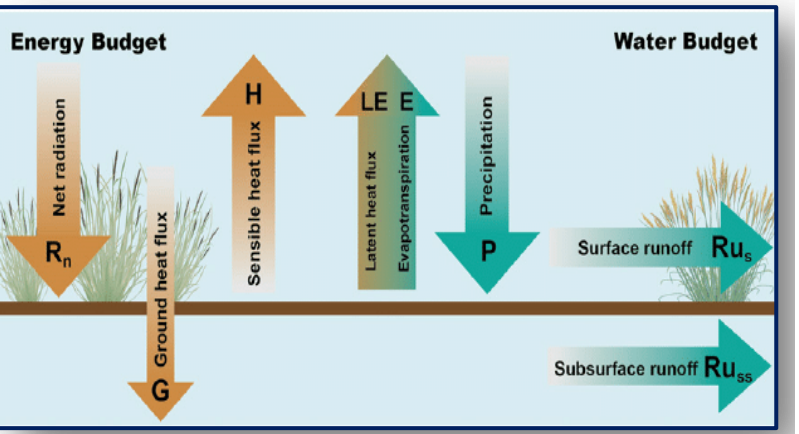
Several models at local and basin scales

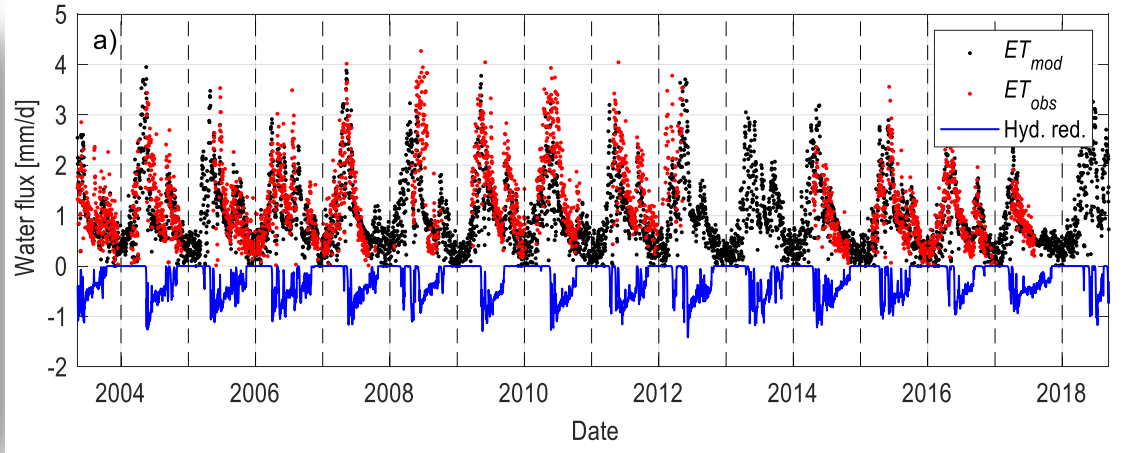
CESBIO: Two Source energy budget model SPARSE + contextual model EVASPA

UNICA: LDM+VDM of Montaldo et al. (2008) and distributed hydrological model of Montaldo et al. (2007)

UNIAS: eco-hydrological model

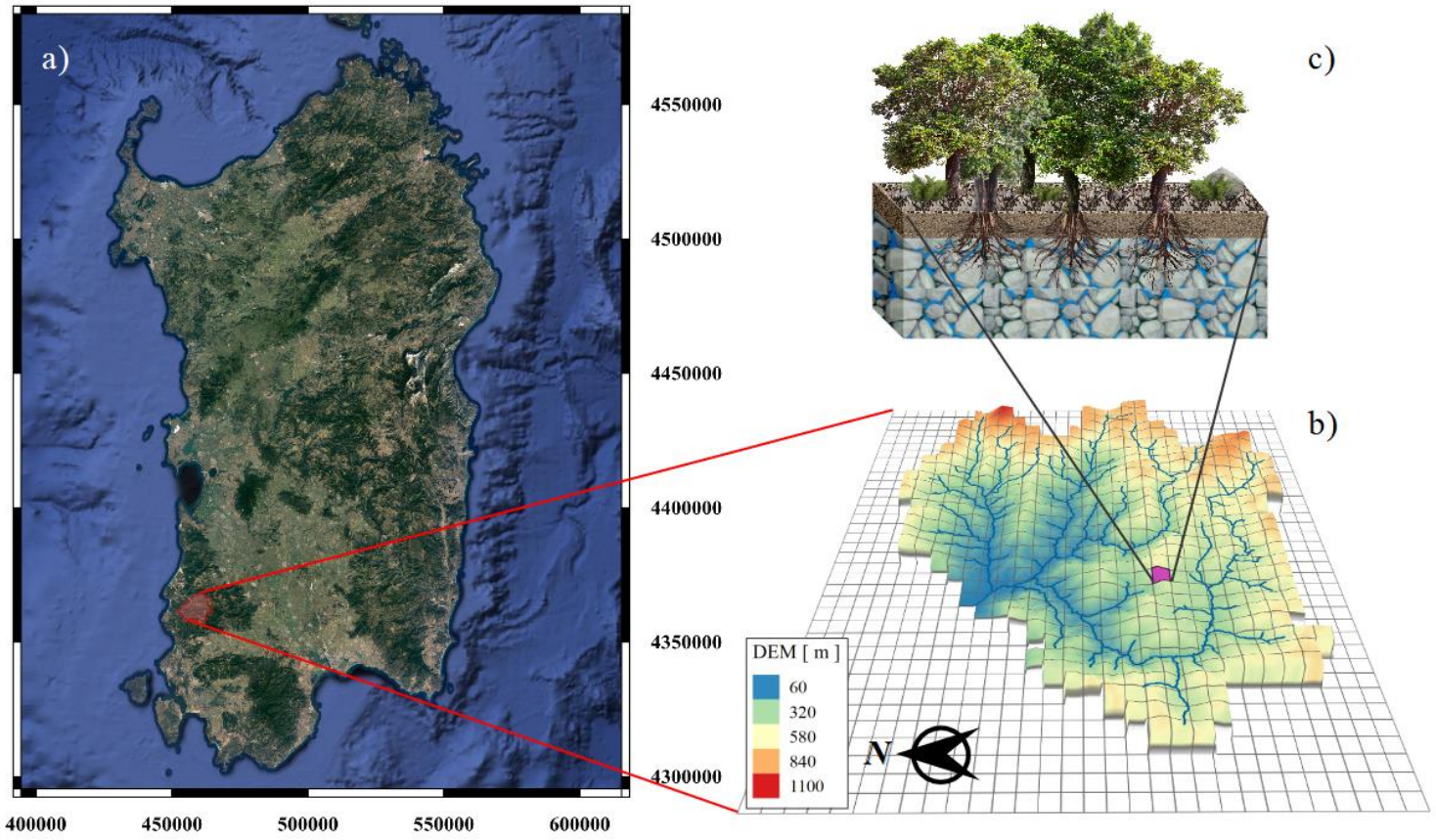






WP3 - Ecohydrological modeling

Distributed ecohydrological models at basin scale



WP4 - Remote sensing and data assimilation

Acquisition of Remote sensing Historical data :

Kairouan plain (2013-2015) Tunisia

MODIS : MOD11A1 and MYD11A1 for Terra and Aqua, respectively (surface temperature Tsurf, surface emissivity and viewing angle); MOD13A2 and MYD13A2 for Terra and Aqua, respectively (NDVI); and (iii) MCD43B1, MCD43B2 and MCD43B3 (albedo).
SPOT5, SPOT4-Take5, L8

Marganai forest (2020) Italy

Sentinel-2, Sentinel-3, MODIS, AVHRR

Flumendosa basin (from 2003) Italy

Sentinel 2, Sentinel 3, MODIS, Landsat, ASTER, QUICKBIRD

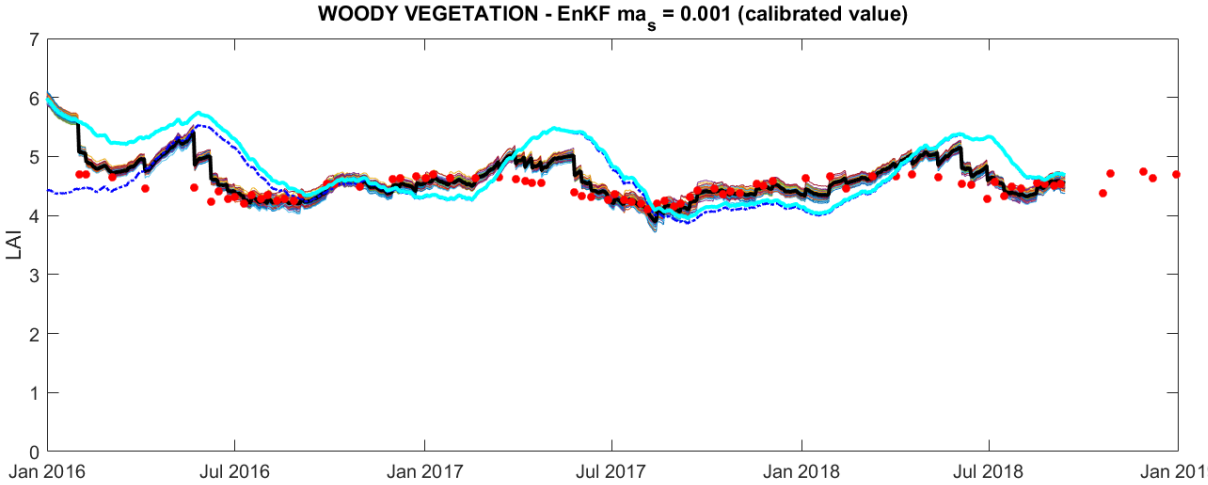
Agarma site (2020) Egypt

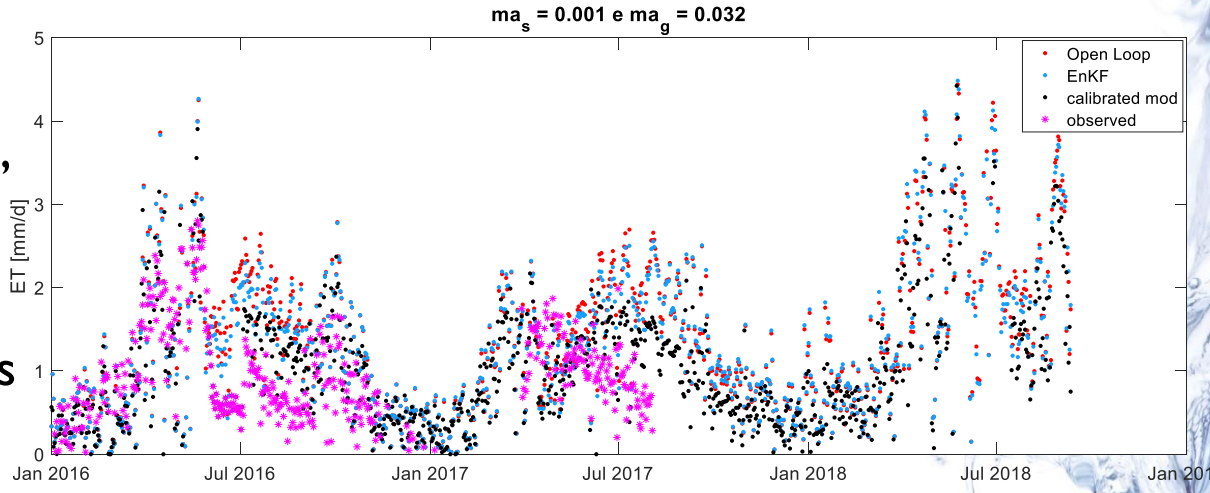
ALEXI, MODIS, SW-ASCAT, Landsat

WP4 - Remote sensing and data assimilation

Data assimilation

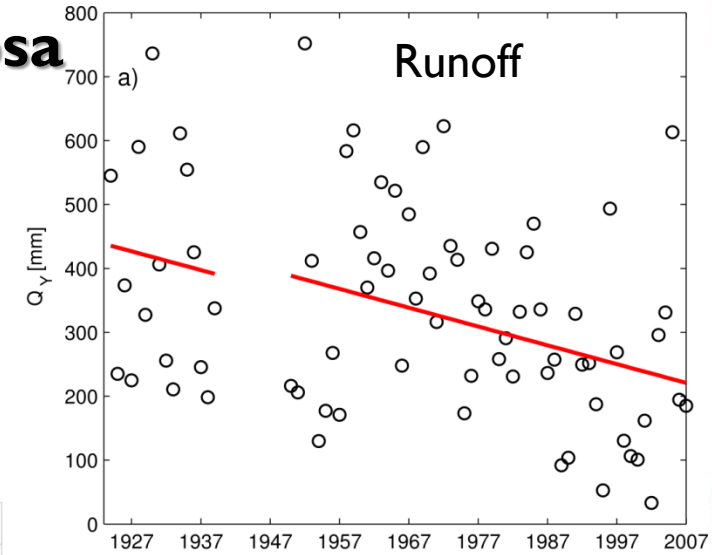
- Assimilation of remote sensing data to estimate system state and uncertainties
- Particles filter- EnKF
- CESBIO: SAMIR
  - → state variables (4)
  - → parameters : plants (6), soil (10) , irrigation (7)
- Uncertainties :
  - → inputs forcings, process model, measures model



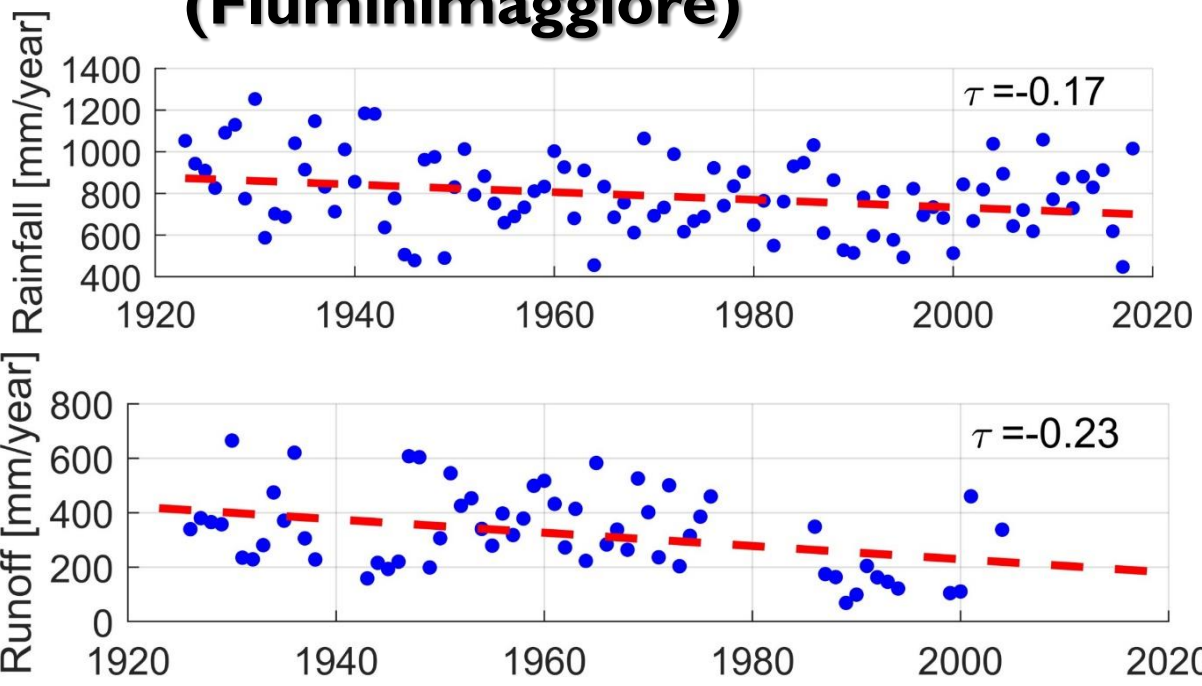


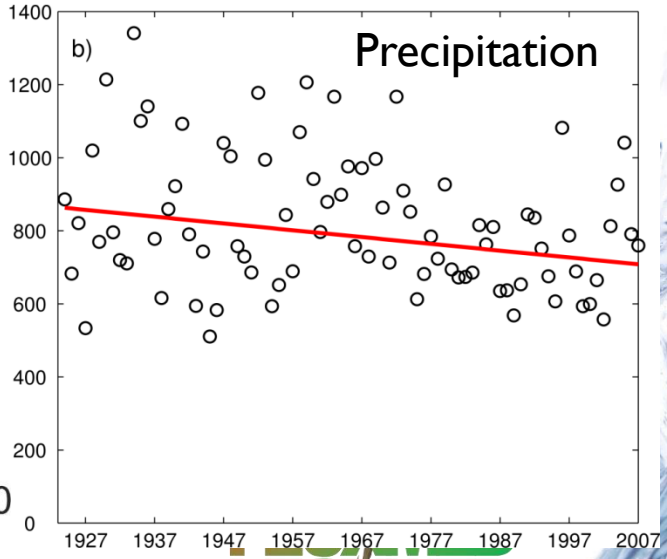
WP5 - Analysis of land cover change strategies and climate change scenarios

Flumendosa basin



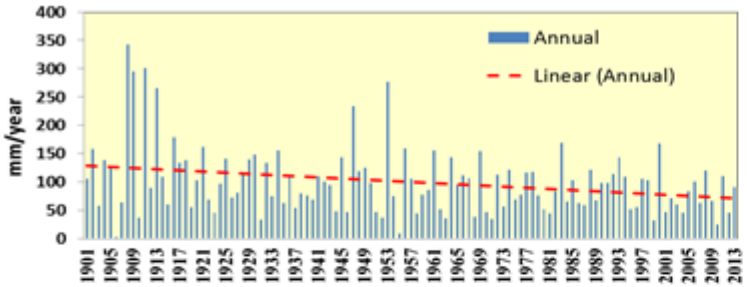
Marganai basin (Fluminimaggiore)



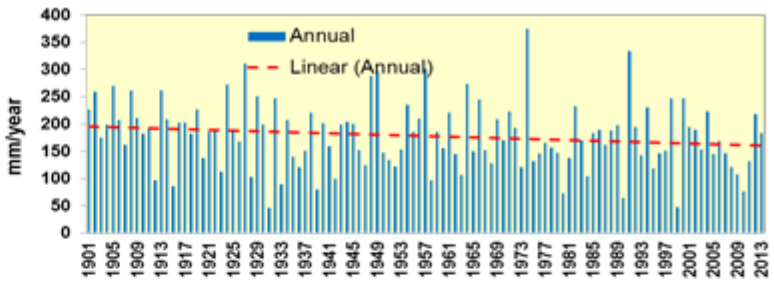


WP5 - Analysis of land cover change strategies and climate change scenarios

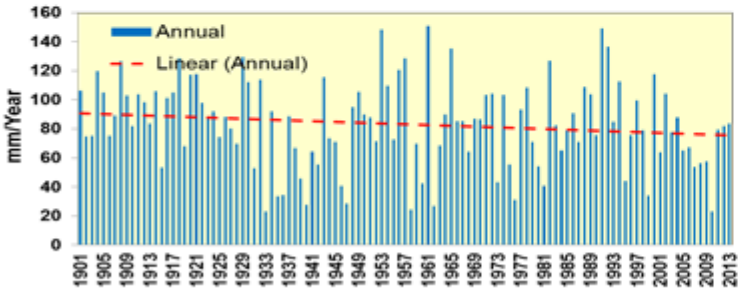
Egypt



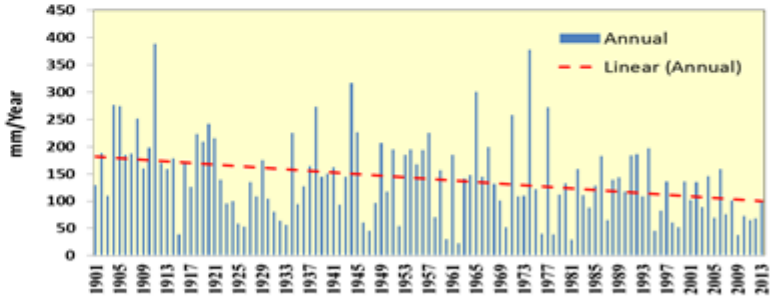
Salloum (West North Coast)



Alexandria (North Coast)

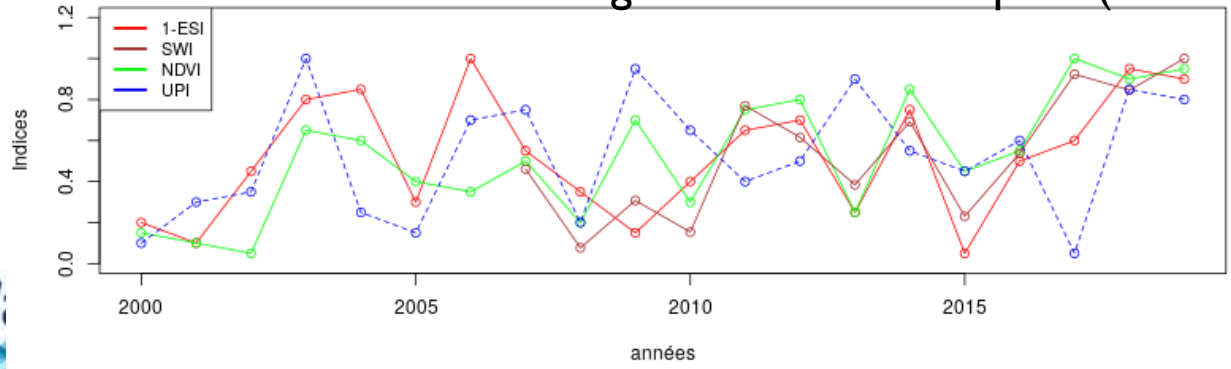


Damietta (Delta North Coast)

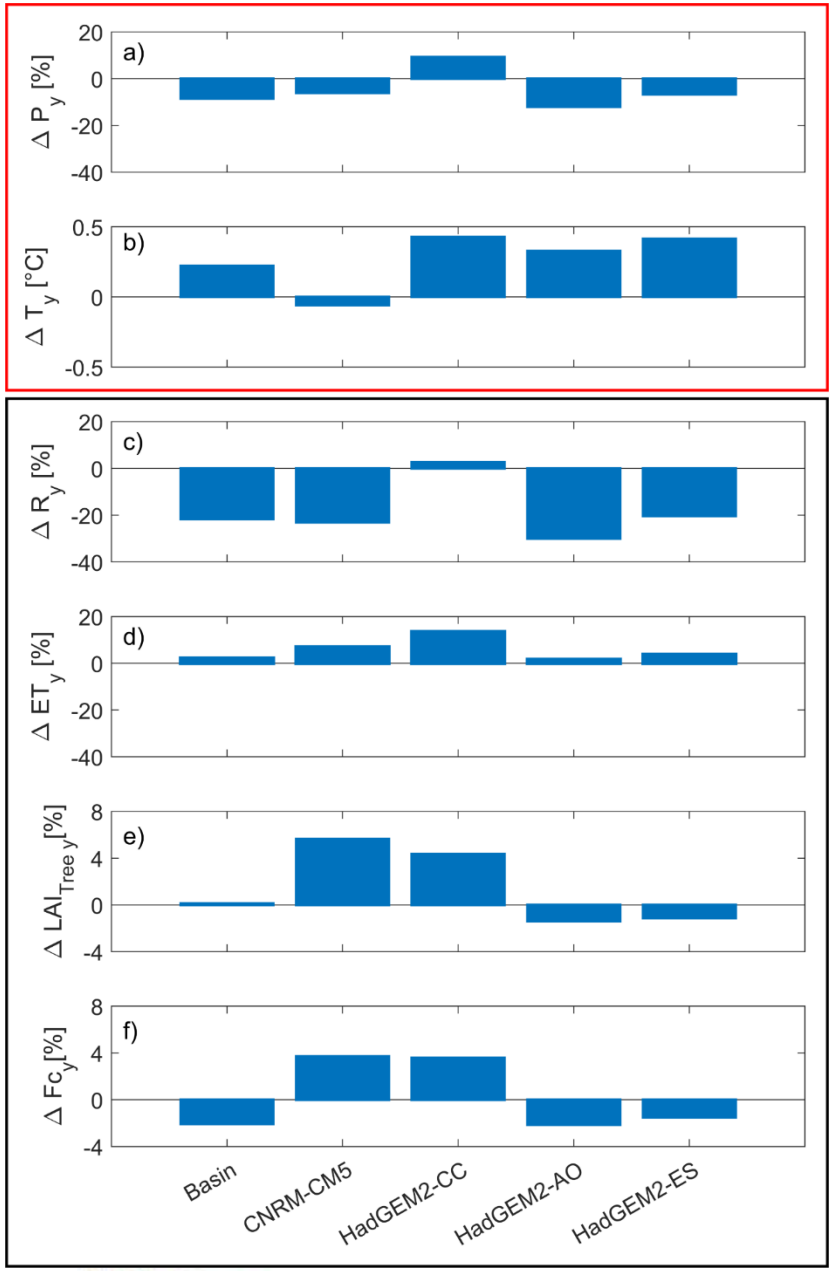


Al Arish (North Sinai)

Identification of historical droughts over Kairouan plain (Nesrine Fahrani) Tunisia



WP5 - Analysis of land cover change strategies and climate change scenarios

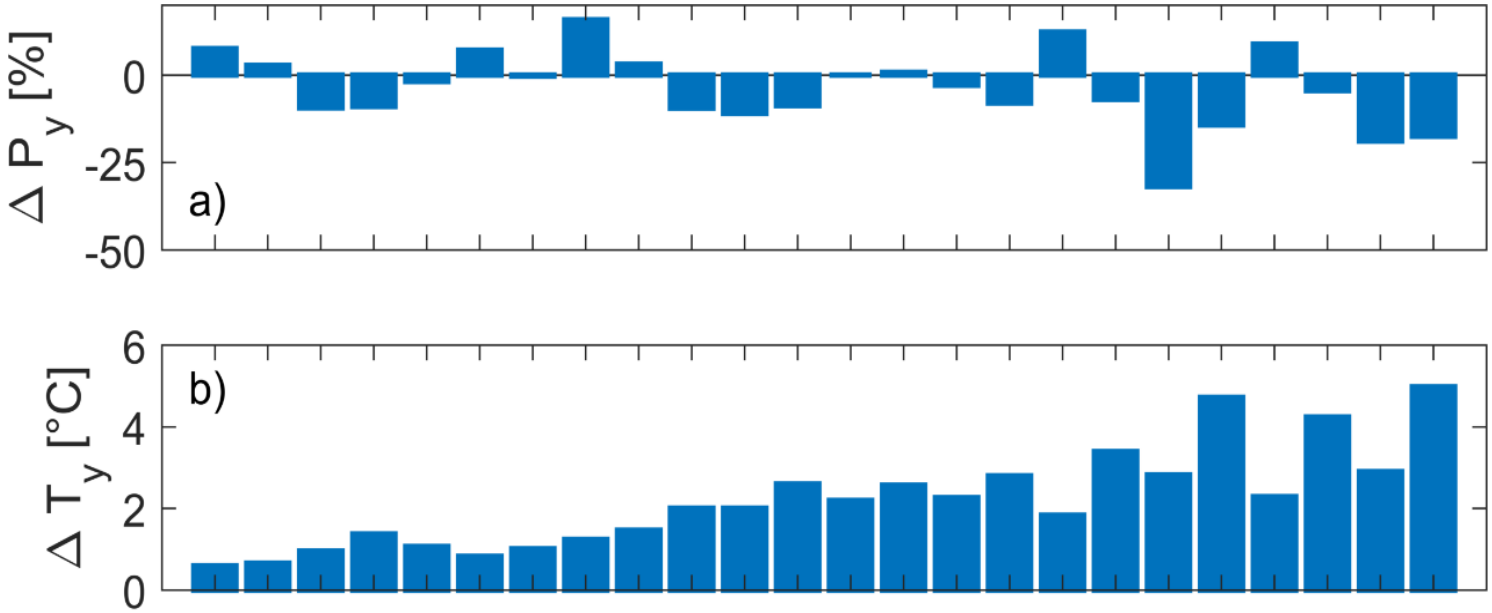


Marganai basin (Fluminimaggiore)

Test of GCM for past climate: Comparison of 1976-2000 period with 1951-1975 period

WP5 - Analysis of land cover change strategies and climate change scenarios

Marganai basin (Fluminimaggiore)



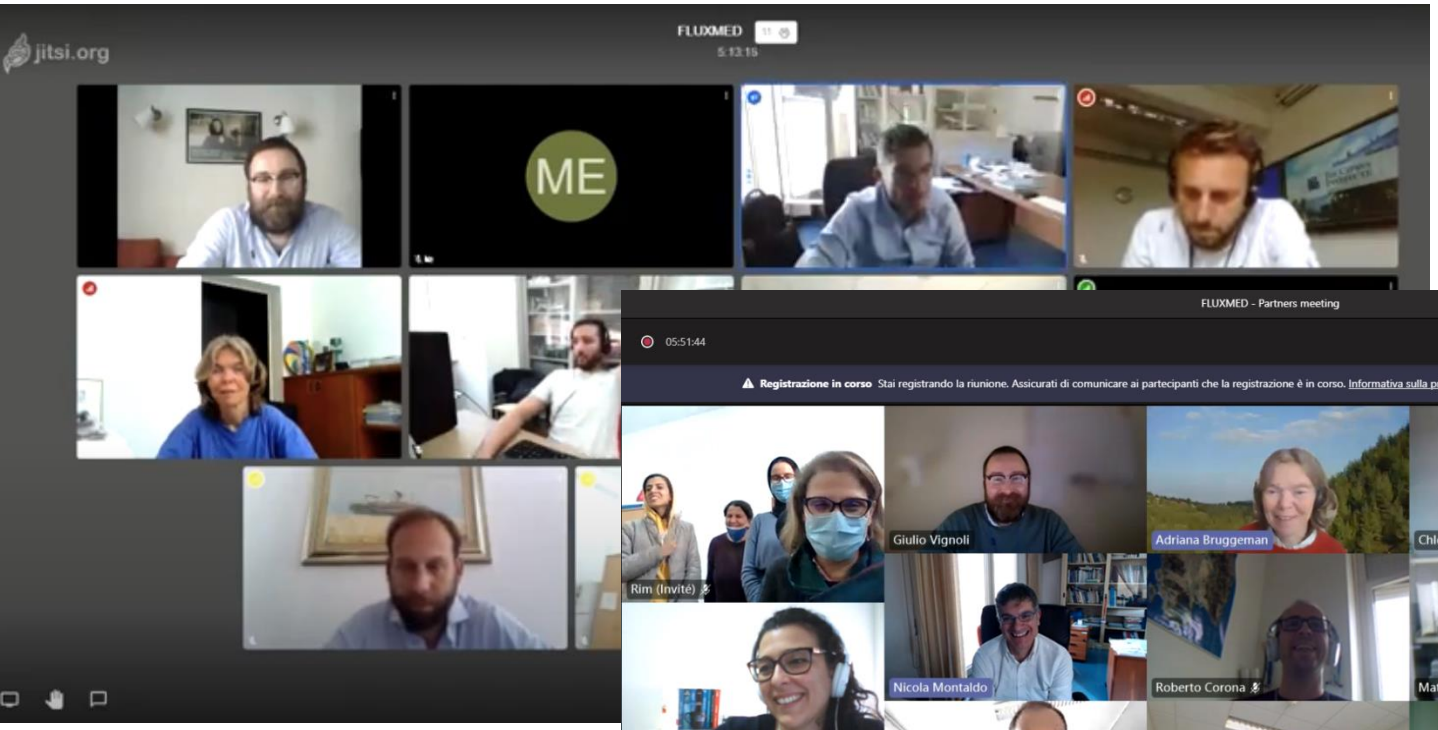
Future scenarios of selected GCM

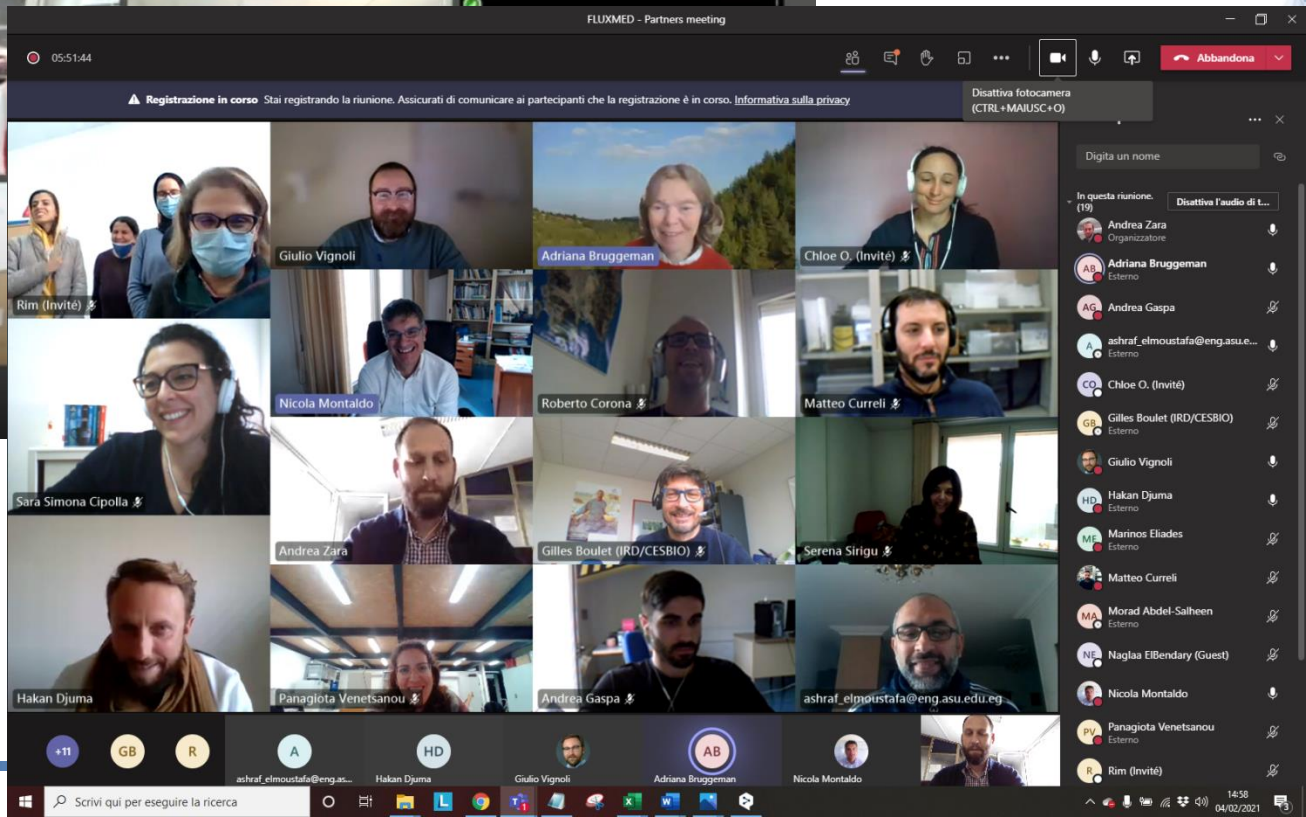
Collaboration, coordination, mobility, synergies

ON LINE Meetings

+ 2020 02 18 on-line Kickoff meeting

+ 2020 07 08 on-line meeting





+ 2021 02 04 on-line mid-term meeting

Collaboration, coordination, mobility, synergies

- From July 2020 assistant project manager: Dr. Andrea Zara
- Data management plan
- Mid term report, done in October. We are updating it
- Box.com for sharing data, analysis and results
- Data base server
- Collaboration and synergies:

- CESBIO and INRGREF
- INRGREF with CTA and bewireless solution (Tunisian startup locally manufacturing sensors – wireless devices)
- CESBIO and UNICA for data assimilation and remote sensing
- CyI and UNICA for Eddy covariance tower installation and data analysis, ecohydrological modeling
- UNIAS, UNICA and CESBIO for ecohydrological modeling
- UNICA, INRGREF, CyI and UNIAS for geophysical studies

- Student mobility:

Giuseppe Murrocu is spending 3-month in CESBIO Lab although COVID restrictions

Stakeholder engagement

CyI in Cyprus: on-site meetings and collaboration with the Department of Forests and the Department of Agriculture, both part of the Ministry of Agriculture, Rural Development and Environment, for the exchange of data and knowledge, for sharing research ideas and knowledge and for improving the research design. Tower and field activities. We will share our findings with the Departments at the end of the first monitoring season.

UNIAS in Egypt:
meeting was held with the Sustainable Development Centre in the area and a Memorandum of Understanding is planned to be signed with them for future cooperation during the project

CESBIO in Tunisia: The Taous Flux Tower site is managed together with the Institut de l'Olivier in Sfax, which is interested on the quantification of water use

Stakeholder engagement

INRGREF in Tunisia:
Agreement with CTA and the Bewireless solution start-up company.
A learning-dissemination session was carried out at 28/08/2020 in the agroclimatic laboratory (INRGREF),that lasts 4 hours with the presence of 8 young researchers. The main goal was to learn how to download ERA5 data using multiple methods (Copernicus Climate Data Store, Toolbox Editor, and CDS API), and then read and process these data using R software.
Workshop with stakeholders was planned in Tunisia, on April 12, but postpone due to COVID

UNICA in Italy:

- FORESTAS (Sardinian Forestal agency): several meetings for sharing research activities. Tower in Marganai will be installed in the FORESTAS forest. They are interested for environmental planning also under climate change

- ENAS (Sardinian water authority): meeting and sharing data. Flumendosa basin is ENAS experimental basin with 3 dams. They are interested for water resources management and planning also under climate change

Ente acque della Sardegna

Forestas
Agentzia forestale regionale pro s'isvilupu de su territòriu e de s'ambiente de sa Sardigna
Agenzia forestale regionale per lo sviluppo del territorio e dell'ambiente della Sardegna

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

SardegnaForeste

FLUXMED

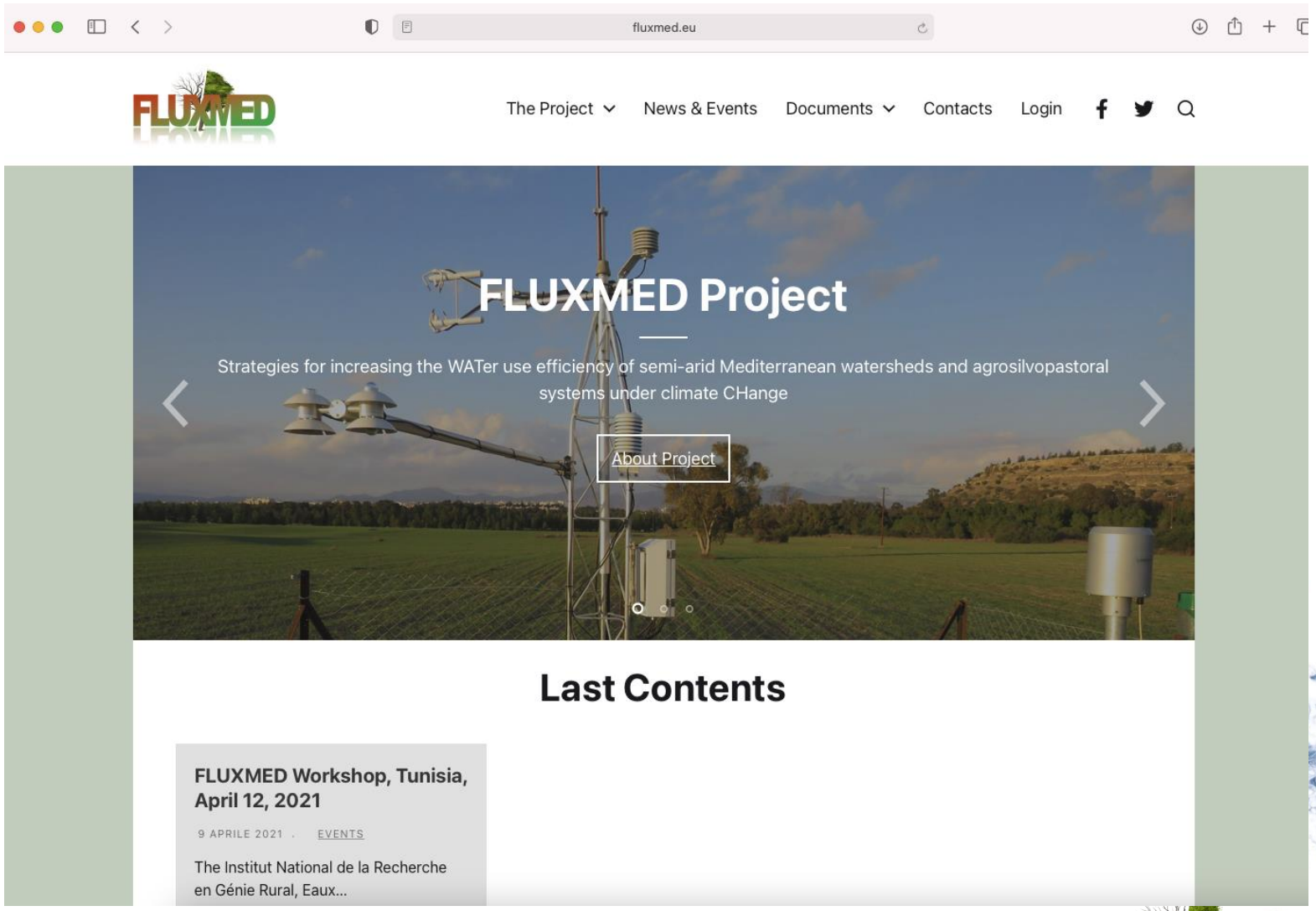
Impact and knowledge output

- Dissemination and communication plan

- Project web site
- Facebook page
- Twitter page
- Peer-reviewed journals

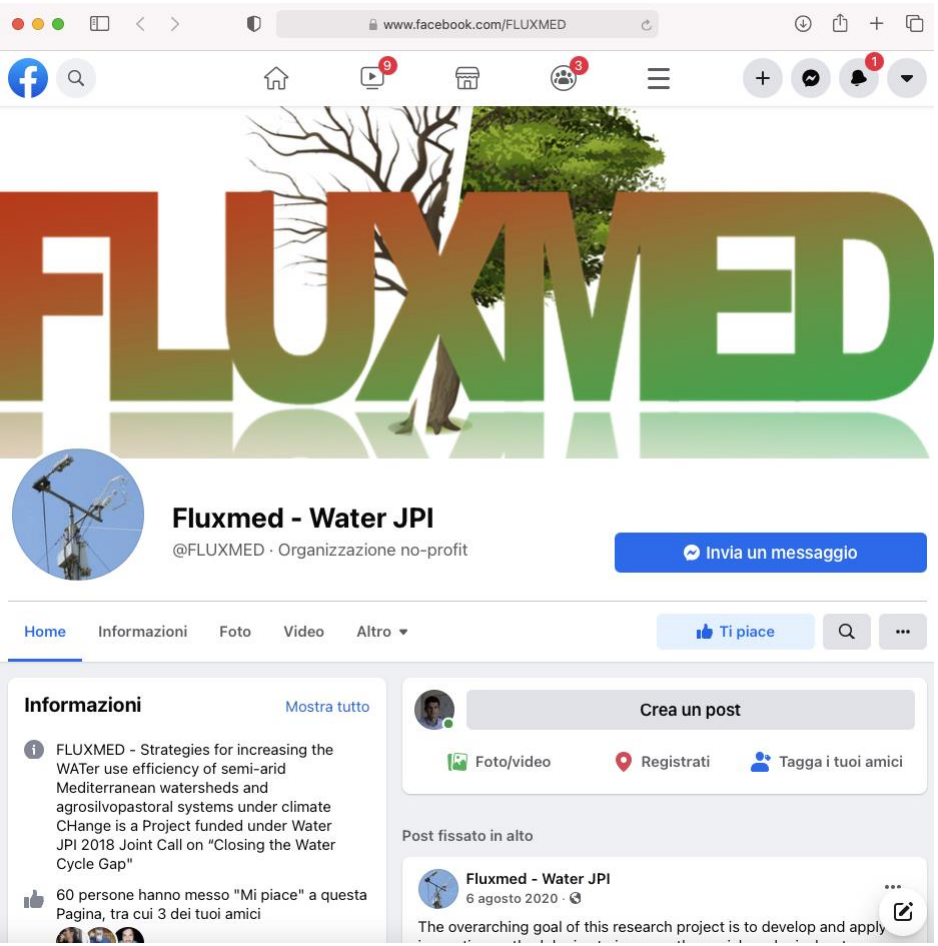
1) Chebbi, W., Rivalland, V., Fanise, P., Boone, A., Jarlan, L., Chehab, H., Chabaane, Z. L., Le Dantec, V., and Boulet, G.: Modelling of water and energy exchanges over a sparse olive orchard in semi-arid areas, Hydrol. Earth Syst. Sci. Discuss., in review, 2020.
2) Montaldo, N., Curreli, M., Corona, R., Oren, R., Fixed and variable components of evapotranspiration in a Mediterranean wild-olive - grass landscape mosaic, Agricultural and Forest Meteorology, 280, 2020, 107769, 10.1016/j.agrformet.2019.107769
3) Montaldo, N., Curreli, M., Corona, R., Saba, A., Albertson, J.D., Estimating and modeling the effects of grass growth on surface runoff through a rainfall simulator on field plots, Journal of Hydrometeorology, 21, 6, 2020, 1297-1310, 10.1175/JHM-D-20-0049.1
4) Corona, R., Montaldo, N., & Albertson, J. D. (2018). On the role of NAO-driven interannual variability in rainfall seasonality on water resources and hydrologic design in a typical Mediterranean basin. Journal of Hydrometeorology, 19(3), 485–498. https://doi.org/10.1175/ JHM-D-17-0078.1

Dissemination, comunication



Dissemination, comunication

facebook



twitter

Dissemination, comunication

Conferences, meetings

- **EGU 2020**

Hakan Djuma, Adriana Bruggeman, Marinos Eliades, Panagiota Venetsanou, Christos Zoumides, and Melpomeni Siakou, Transpiration rates of pine (Pinus brutia) and cypress (Cupressus sempervirens) trees in a Mediterranean mixed plantation forest, https://meetingorganizer.copernicus.org/EGU21/EGU21-9525.html

- **AGU 2020**

Matteo Curreli, Roberto Corona, Serena Sirigu, Ram Oren and Nicola Montaldo, The role of rock moisture in supporting the evapotranspiration under different climatic conditions, H122-09, https://agu.confex.com/agu/fm20/webprogram/Paper775766.html

- Long-term monitoring on the evapotranspiration rates of a Pinusbrutia forest, Marinos Eliades. Presentation at **2nd meeting of Cyprus Association of Professional Foresters**, November 2019

- **AGIC 2021** (Atlas Georesources International congress)

Geophysical monitoring of the soil moisture spatial and temporal dynamics to improve the accuracy of the water balance assessment Zayneb HAMMAMI, Gaghik HOVHANISSIAN, Oussama KORTAS, Imene MAHJOUB, Mohamed DHAOUI, Rim ZITOUNA-CHEBBI Insaf MEKKI, Abdel-Aziz ZAIRI

Analysis of citrus actual evapotranspiration from different fao56 crop coefficient approaches and eddy covariance observations under different water availability conditions,
Amani BELGACEM1, Valérie LE DANTEC, Imen MAHJOUB, Insaf MEKKI and Rim ZITOUNA-CHEBBI

Continuation of the work in the future

GANTT CHART

Month / Work Package	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
WP 1																														
WP 2																														
WP 3																														
WP 4																														
WP 5																														
WP 6																														
WP 7																														
Deliverable	D1.1		D7.2.1			D1.2.1, D7.1.1	D7.1.2					D4.3.1	D7.1.2		D1.2.2, D2.1, D4.1,	D3.1, D3.2	D5.1	D4.2.1	D1.2.3	D2.2, D6.1	D5.2			D3.3, D3.4		D4.3.2	D4.2.2, D5.3	D7.1.2		D1.2.4, D2.3, D6.2, D7.2.2
Milestone			MS1	MS8																	MS4	MS2	MS3	MS5	MS6		MS7			
Risk management			R9	R6		R4, R5	R2	R6	R9	R1		R9,R10		R4, R5	R2, R3, R6	R7		R9		R1, R8	R4, R5	R2	R7	R6, R9, R10			R9		R4	R1

Any comments?

EnTruGo

To Ally Technology, Nature and Society for integrated urban water management (ATENAS)

Kinga Krauze

Water JPI 2018 Joint Call

Mid-term evaluation meeting
19-20 April 2021 Online

ATENAS

Water Works 2017

Water JPI

The project

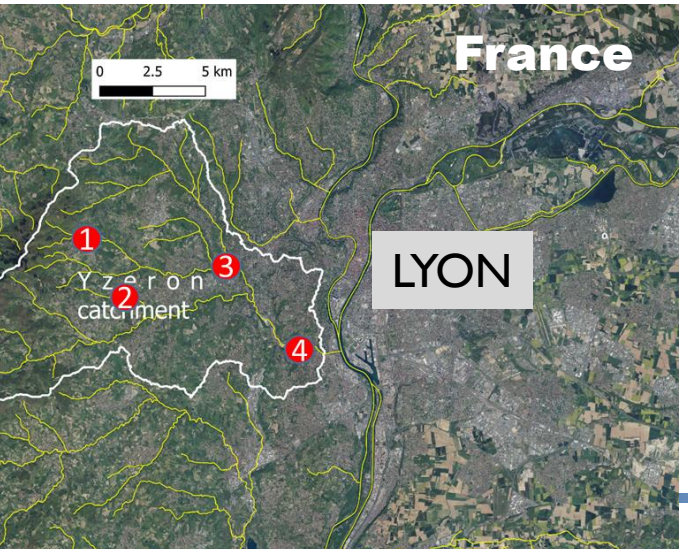
Political, formal, cultural setting
WP1

Values, attitudes, societal engagement
WP5

Urban NBS Cook Book
WP3

Biophysical context
WP2

Upscaling
WP4



Timline & actions

Start
- 6 - month late start

Dec 19
- D.5.1 Identification of stakeholders and ways to engage them in co-design actions

June 20
- D.1.1.Report on critical factors and indicators in NBS planning, implementation, maintenance
- D.2.1 Report describing implementation and results of the "Model for NBS suitability" in the form of decision maps
- D.5.2 Online events, courses and guidance materials, such as videos

Dec 20
- D.1.2 Factsheets on barriers and ways to overcome them
- D.2.2 Report describing design, implementation, construction phases and monitoring strategy of performances for the new build NBS

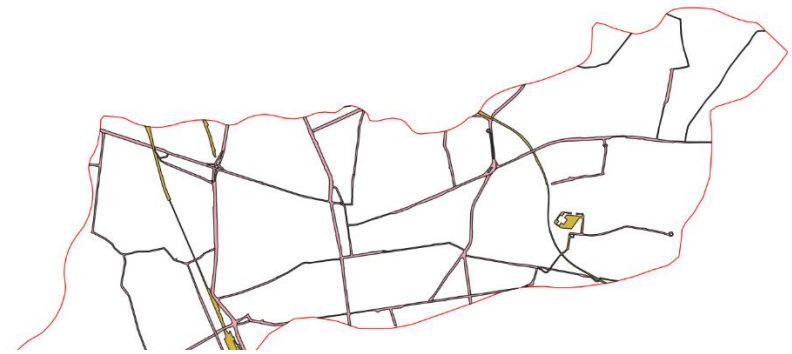
June 21
- D.4.1 Report on SMART visions in demo sites
- D.5.3 Publication and commenting of descriptions of demonstrations in Oppla portal
- D.5.4 Presentations and discussions on project outcomes in the events organised by the project or the stakeholders, connecting particularly companies and universities

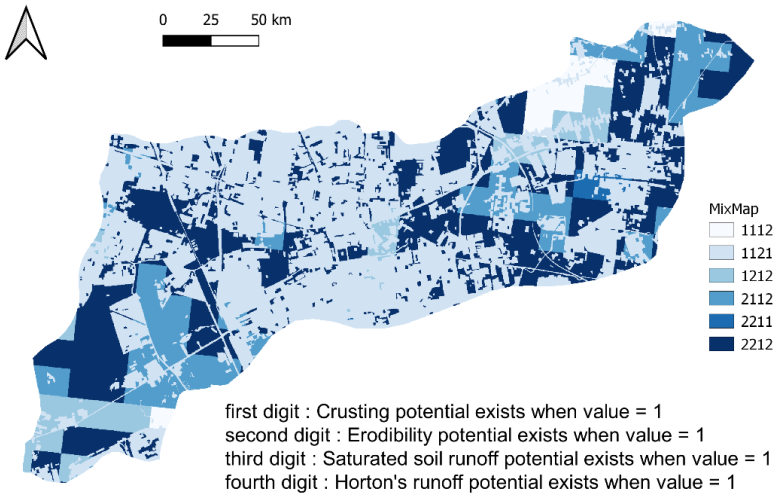
Dec 21
- D.5.2 Online events, courses and guidance materials, such as videos
- D.5.5. Report on stakeholder assessments of project outcomes

June 22
- D.4.2 Final report on upscaling possibilities and cumulative effect of NBS in demo sites
- D.5.6. Long-term plan to use project results in cities, companies and research networks (ALTER-Net,PEER; EurAqua, ESP, LTER-Europe etc.)
- D.3.1 TheNBS"cookbook"

?

Baseline by IRIP model - Indicators of Intense Pluvial Runoff





first digit : Crusting potential exists when value = 1
second digit : Erodibility potential exists when value = 1
third digit : Saturated soil runoff potential exists when value = 1
fourth digit : Horton's runoff potential exists when value = 1

IRIP model implementation in selected catchments in each partners' country

Intense runoff production areas

ATENAS intervention areas (from K Krauze)

Accumulation-deposition prone areas (left) & Transfer-erosion – solid transport provisioning areas (right)

Pulling together know-how: NBS pros and cons

ATENAS

D1.2 Factsheets on barriers and ways to overcome them

8. Denitrification barriers for nitrogen removal from groundwater

Figure 1. Location of barrier - Czarnocin Reservoir. Project GEOFIBRUS „ Development of model geofibrous, biodegradable fold of biological nitrogen and phosphorus pollution remediation to in the affected areas of the agricultural landscape" (No N R14 0061 06/2009) National Centre for Rese 2009-2012; *property rights:* P.404407

Figure 2. Location of barrier – Orla River, Łaszczyn Village (Rawicz). Project: RPWP.0 Development and optimization of an innovative method for reducing signific pollution in rural areas". Wielkopolska Regional Operational Programme 201 Innovative and competitive economy. Action 1.2 Amplification the innovation p companies).

Challenge: Runoff from agricultural or nitrogen polluted areas:

- increased possibility of nitrates outflow in groundwaters from the catchme
- with a high level of fertilization
- high rate of infiltration in poor sandy soil

11. Climapond – biological pond for roof stormwater retention and infiltration and biodiversity support

Picture 1, 2. Climapond in the Public Kindergarten No 16 in the city of Radom, Poland (construction: FPP Enviro, Poland within an EU project LIFE-RADOMKLIMA-PL, LIFE14CCA/PL/000101; property rights: P.419910, 20/12/2016).

Type: Onsite stormwater capturing from roofs by retention-infiltration ponds, supporting local biodiversity, connected to raingarden with infiltration trench and emergency outflow to sewage system.

Location: City of Radom, Poland, in various locations in public space, in districts of the city with mixed landuse.

Scale: Local; handling rain falling from roofs of buildings.

Problem: Roofs are one of the critical elements of urban space, contributing to excessive runoff,

Pulling together know-how: NBS pros and cons

ATENAS

D1.1 Critical factors in NBS planning, implementation and maintenance

Antti Rehunen, Kati Vierikko, Kinga Krauze, Pascal Breil, Iwona Wagner, Panu Kontio

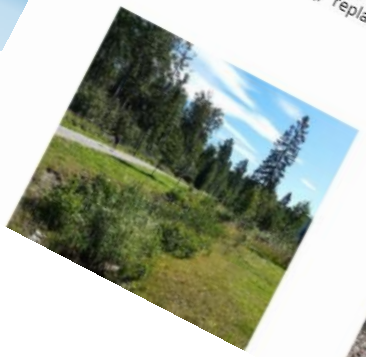
Critical factors

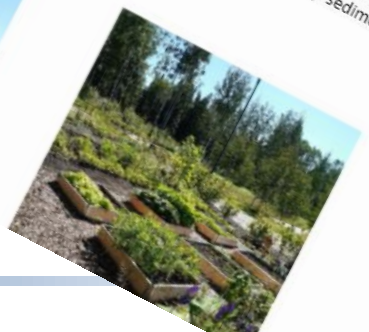
Adoption of NBS as regulating stormwater and runoff water in a new Kivistö sub-center in Vantaa

Kivistö is a recently built new neighborhood, where different nature-based stormwater management solutions are strongly adopted in the planning phase. The area is still under the large development projects and growing fast. Current NBS for stormwater management in Kivistö include e.g. biofiltration, green roofs, permeable surfaces, urban farming, and open-faced stream that leads to a retention basin. The area was previously covered by forests and fields, so the development will add lots of impervious surfaces, so need for stormwater handling increases. Stormwater is meant to be handled by block but if that is not possible, the excess is led to regional retention basin via an open-faced stream (City of Vantaa 2015).

Kivistö area has some special construction principles like 70% of parking house roof area needs to be covered by green roofs and every block should have at least 20 meters of continuous green space (Vantaa City Council 2015, City of Vantaa 2020). Part of the neighborhood used green index for planning the green structures on the properties (Sanaksenaho 2015).

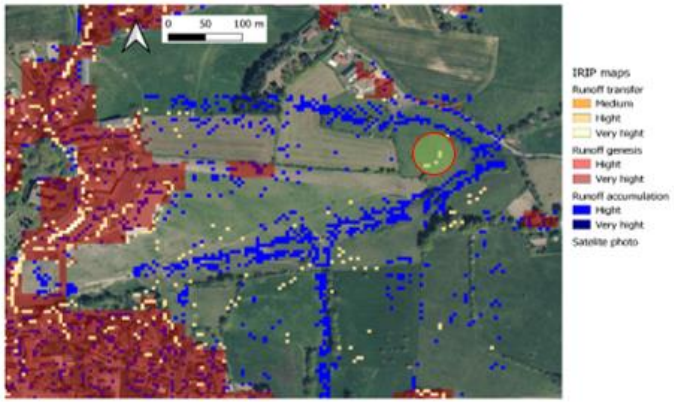
The NBS structures have been integrated into parks, roadsides, children's playground, roundabouts and rooftops in the residential area (Figure 6). The NBS provides green and blue elements in the densely built blocks and encourage people to spend time outside, affect the air quality positively, and decrease the risk of flooding. Using lots of space for nature-based stormwater control and making the structures visible but integrated in the neighborhoods is part of the branding of Kivistö (City of Vantaa 2020). As for maintenance, the stream and retention basin water quality need to be monitored so that they will not release a nutrition load to Vantaanjoki river, and they will not start smelling. All the structures need regular maintenance like weeding, replanting, erosion control and removing sedimented material from the retention basin.





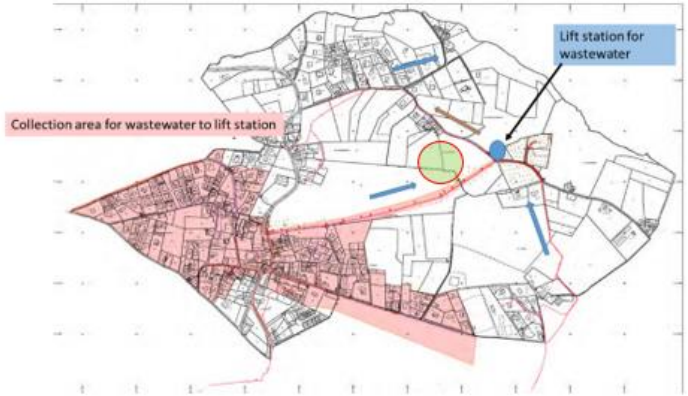
Scientific and technological results - LYON

Lyon Demosite 1



Diagnosis of runoff paths :
Modelling of intense overland runoff with highlighting of the production area coming from the village (red), erosion areas (yellow) and accumulation areas indicating the wetland (blue).

Problematic to solve:
Current situation with a very degraded combined sewer pipe, which runs from the village to the lift station. This causes drainage of the wetland area crossed and frequent overflowing of the lift station into the natural environment.



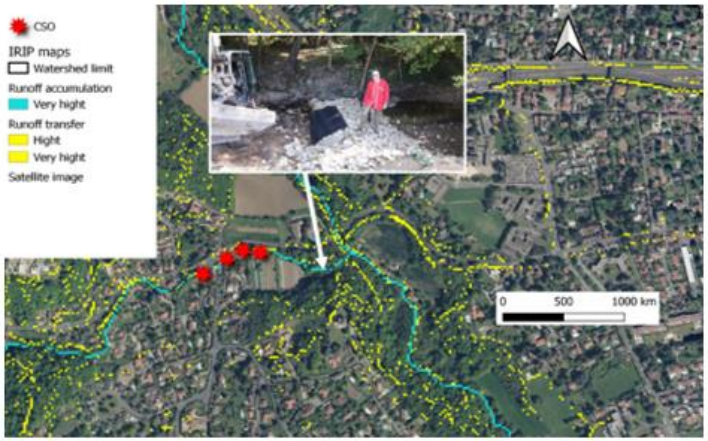
NBS solution under study:
construction of a treatment plant based on a filter planted with reeds. Replacement of the degraded network with a new wastewater network, which involves separating rainwater from wastewater from the village. Choice of the location of the planted filter to avoid its flooding and preserve the wetland.

Scientific and technological results - LYON

Demosite 3

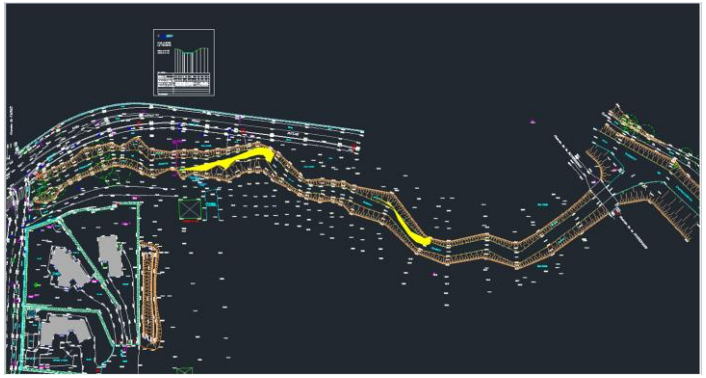
Diagnosis of runoff paths :
Modelling of intense runoff shows that there is no opportunity for gravity accumulation on the left bank. On the other hand, an accumulation process (blue) exists in the watercourse downstream of an erosion zone (light green).

Problematic to solve:
Frequent storm surges have an impact on the ecological functioning of this seasonal watercourse. These discharges are difficult to avoid. Replacement work for the severely degraded combined sewerage system will take time as it is very expensive. The numerous storm overflows along the river do not allow for the development of point-by-point solutions to pre-treat storm discharges.

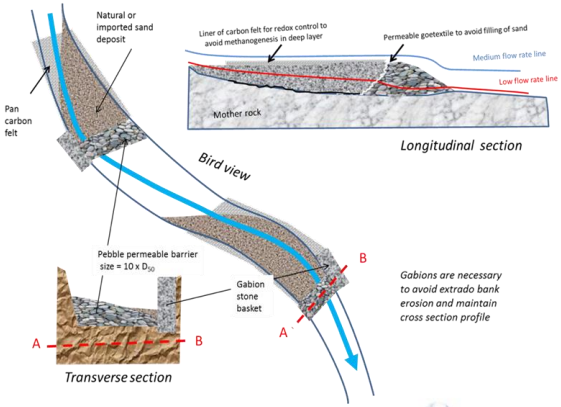


NBS solution under study:
A solution to amplify the self-purification capacity of the river was completed in September 2020. This consists of locally modifying the topography of the watercourse to promote the creation of hyporheic biofilters. A topographical study of the bed of the watercourse as well as a hydraulic study made it possible to specify the locations of devices called porous ramps.

Scientific and technological results - LYON

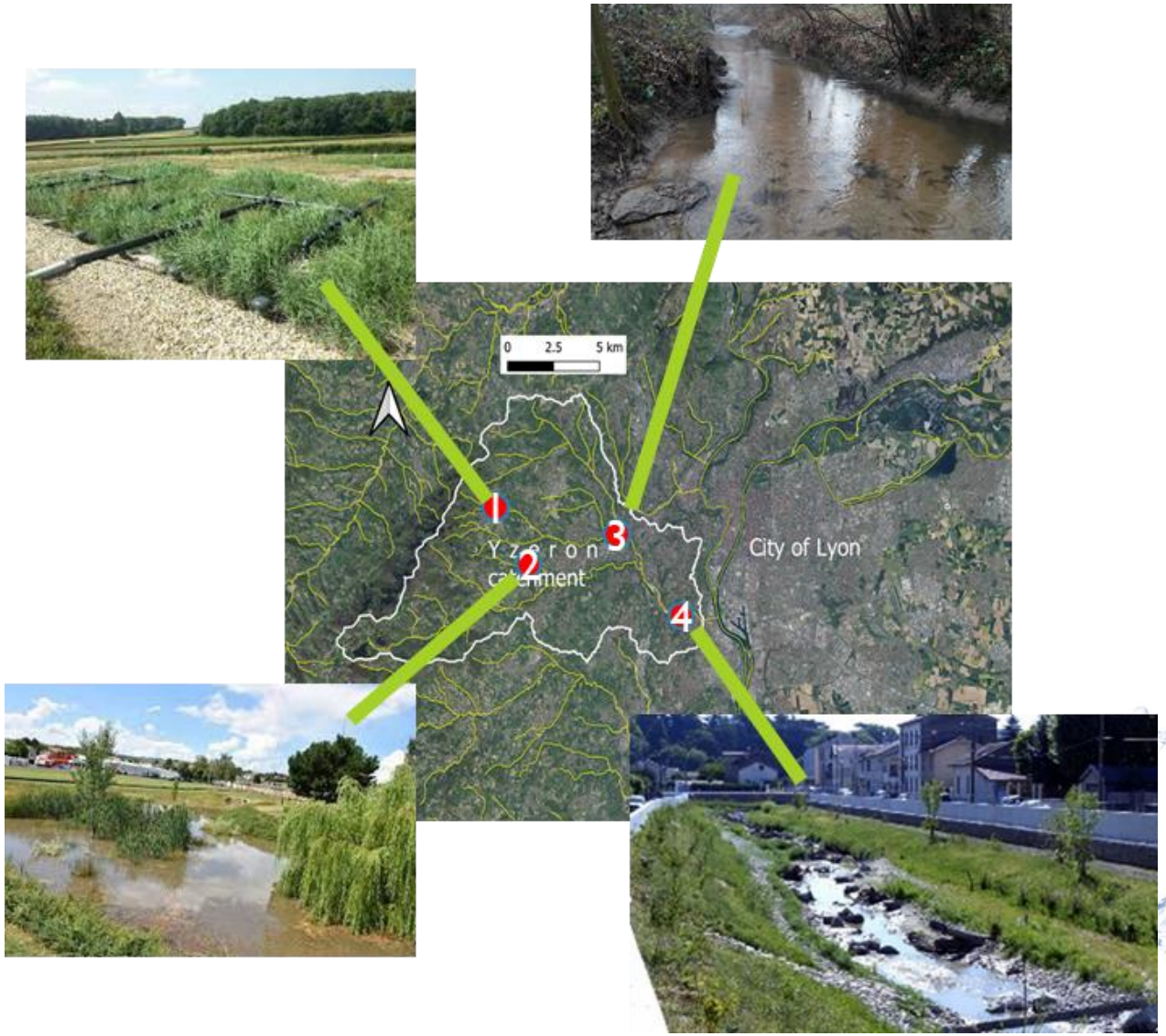


Principle of constructed porous ramps (P. Breil & Ph. Namour)



NBS design, implementation, construction phases and monitoring strategy

Scientific and technological results - LYON

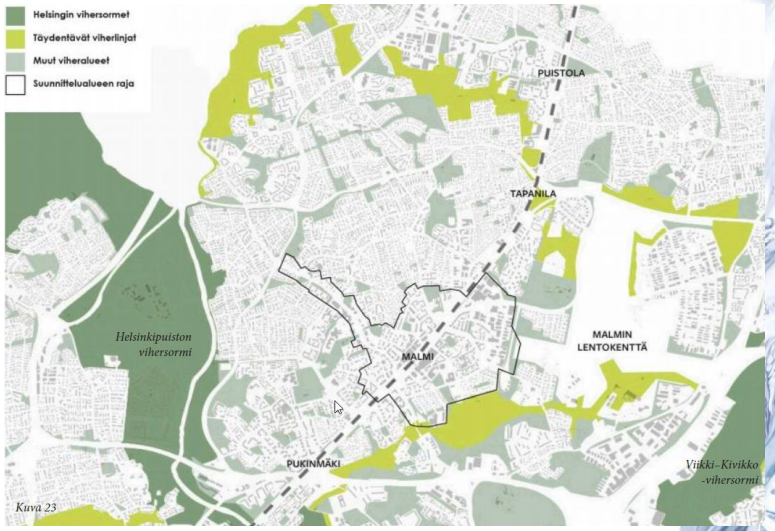


Scientific and technological results - HELSINKI

Malmi residential area

- Aim:
  - Assess benefits and limitations of different stormwater management scenarios (grey, green roofs, water retention structures, etc.)
  - Test and develop a novel assessment method for the multiple benefits of NBS
  - Timetable (Dec 2020 – Dec 2021)

- Tools and methods:
  - Green area factor for public places
    - Assessing and measuring (additional) benefits of NBS
  - Hydraulic modelling (SWMM)
    - How the scenarios impact stormwater quantity (flooding) and quality?
    - What is an acceptable level of preciseness of modelling and results in preliminary city planning and how this can be achieved with acceptable effort?

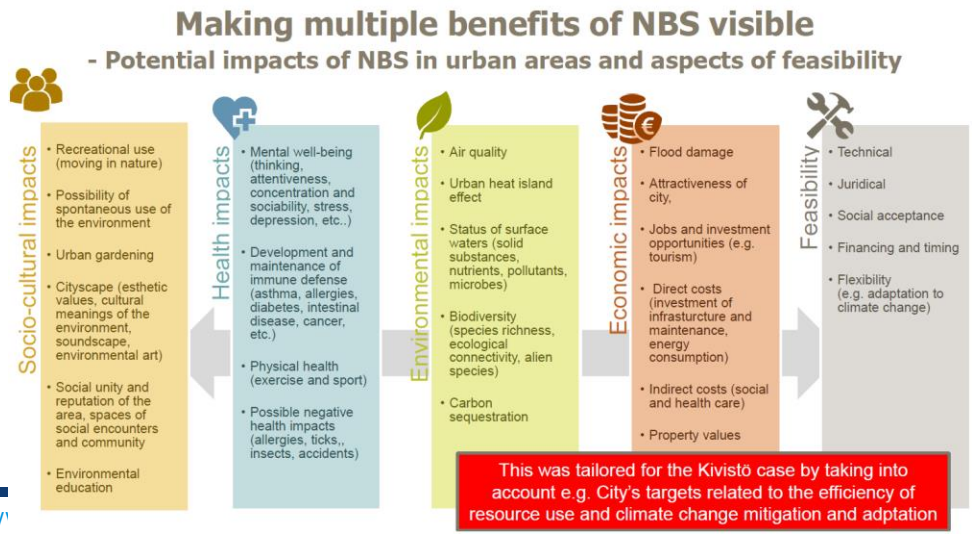


Scientific and technological results - HELSINKI

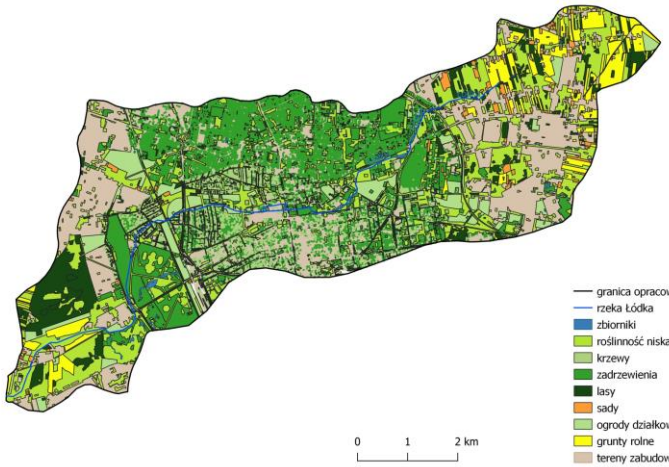
Stormwater park in Kivistö

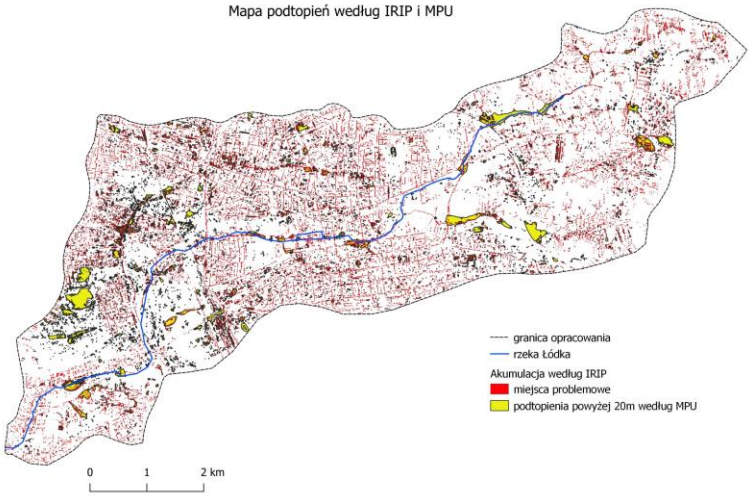
- Aim:
  - Develop solutions for flood protection in populated area based on comparison of NBS alternatives:
    - Natural (wetland, green park)
    - Functional + recreational
  - Considering multiple benefits and surrounding areas;
- Tools and methods:
  - Multicriteria decision analysis in assessing stormwater management scenarios

Photos: City of Vantaa

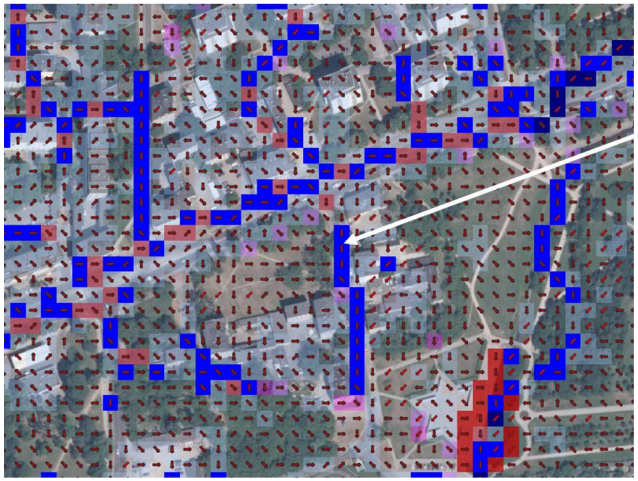


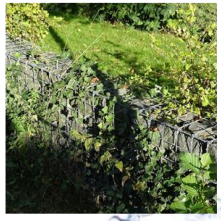
Scientific and technological results - ŁÓDŹ





IRIP implementation for pre- designing of stormwater NBS

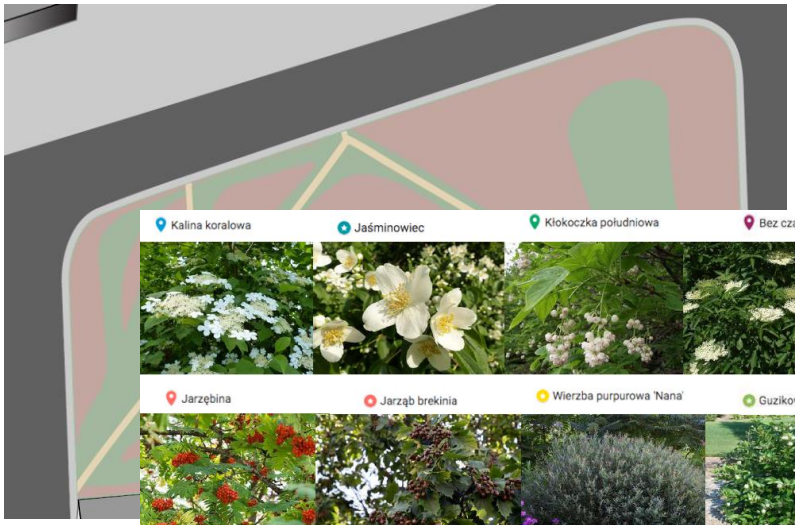


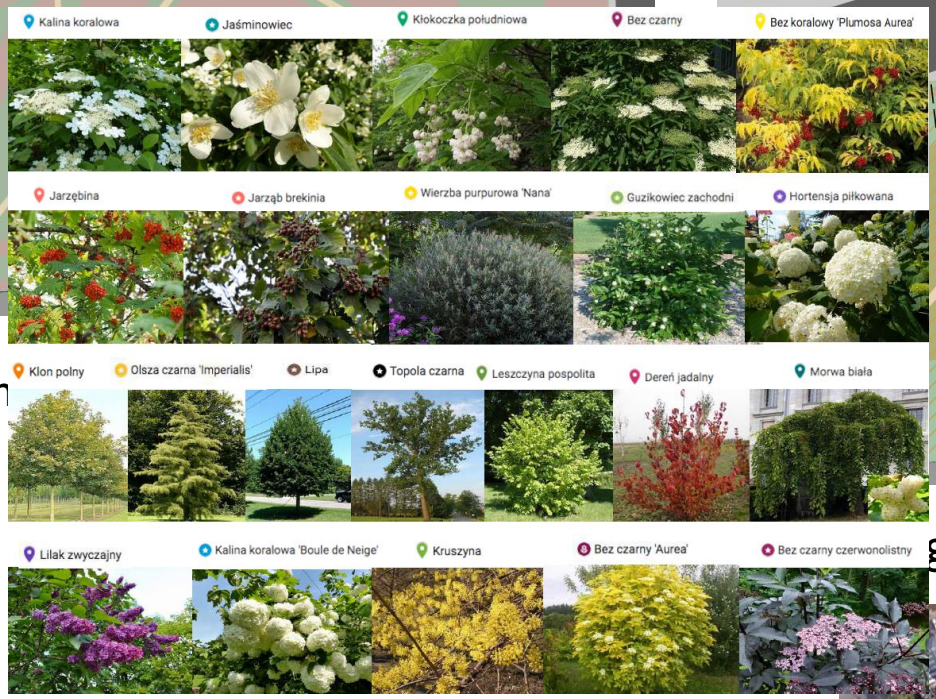


Options:

By FPP Enviro

Scientific and technological results - ŁÓDŹ





Green

g walking zones

Behavioural and attitudes mapping for user-frendly NBS planning

Scientific and technological results - ŁÓDŹ

- Economic approach – 3-scale NasCanvas

Cluster C. SUPPLY

STEP 4. WHO IMPLEMENTS

ERCE in the collaboration with The City of Łódź

STEP 5. KEY ACTIVITIES

1. Blue-green network; 2. Green ring around the city; 3. Woonerfs; 4. Pocket parks; 5. Green backyards; 6. River rehabilitation; 7. Reservoirs and biofilters in the city

6. KEY RESOURCES

Funds, human labour (academics, civil workers), new skills, enabling legal environment, awareness, commitment (at the political and civil society levels)

7. KEY PARTNERS

Experts (engineers, environmentalists, sociologists, facilitators to engage society,...), academics, people involved in education, companies providing Polish knowhow, NGOs, Housing and State cooperatives

Cluster A. FLOW OF ES SERVICES

STEP 1. PROBLEM TO BE ADDRESSED

Water overflow during the cloudbursts; degraded green space exposed to pollution and UHI

STEP 2. VALUE PROPOSITION

2A. Primary service and value	2B. Secondary service and value
Pluvial flooding reduction (Damage costs: infrastructure damage due to pluvial flooding) **Groundwater recharge** (Avoided costs: lower management costs for greenery)	**Reduced water logging** in water treatment plant (Value: avoidance of paying the fee for releasing low quality water); **Climate regulation; Aesthetics; Recreational places; Health benefits; Reduction of heatwaves; Availability of habitat for species; Educational values** (related to water harvesting and biodiversity); **Air cleaning; Noise reduction**

Cluster D. DEMAND

STEP 9.WHO OWNS THE PROBLEM

Citizens, particularly communities around the square
Municipality (as owner of some assets that get flooded).

STEP 10. CUSTOMER SEGMENTS

10A. Direct Beneficiaries	10B. Clients	10C. Extended Beneficiaries
All citizens, neighbourhoods nearby the planned NBS Risk prone building owners Departments which maintain infrastructure	Municipality, city companies	Municipality (because of the demonstration / educational effect and PR); SMEs which participate in the process as building CVs; Local activists through support in capacity building;

CLUSTER D. COST STRUCTURE

8a. Life cycle costs

1. Costs of preparatory work (removal of dead trees, removal of impermeable surfaces)
2. Costs of implementation ca 80 000 PLN
3. Maintenance costs ca 1000 PLN/year

8b. Opportunity costs

Not applicable

Cluster B. Regulatory context

STEP 3. REGULATION

National level: WFD, City climate adaptation plans, Polish Water Law
City level: Integrated Development Strategy of Lodz 2020+ (2012) (not very strong executing power); The Study of Determinants and Directions of Spatial Development.

Cluster E. Supply-demand interactions

STEP 11. CUSTOMER RELATIONSHIPS

Personal assistance (project co-designed by citizens)
Transactional (small grants given by the Municipality to the citizens).
Community (through Housing cooperatives)
Co-development (through workshops with citizens for rehabilitation).
Legal / economic / societal obligation of the City

STEP 12. CHANNELS

Workshops with citizens; Letters and official communications; Local activists and leaders; Social animators; Website and virtual meetings

Cluster G. REVENUE STREAMS

STEP 14. REVENUE STREAM

Expenditures by visitors entering nearby exhibition centre;
Attraction of more funding for implementation based on achieved impact;

STEP 15. FUNDING COMING FROM

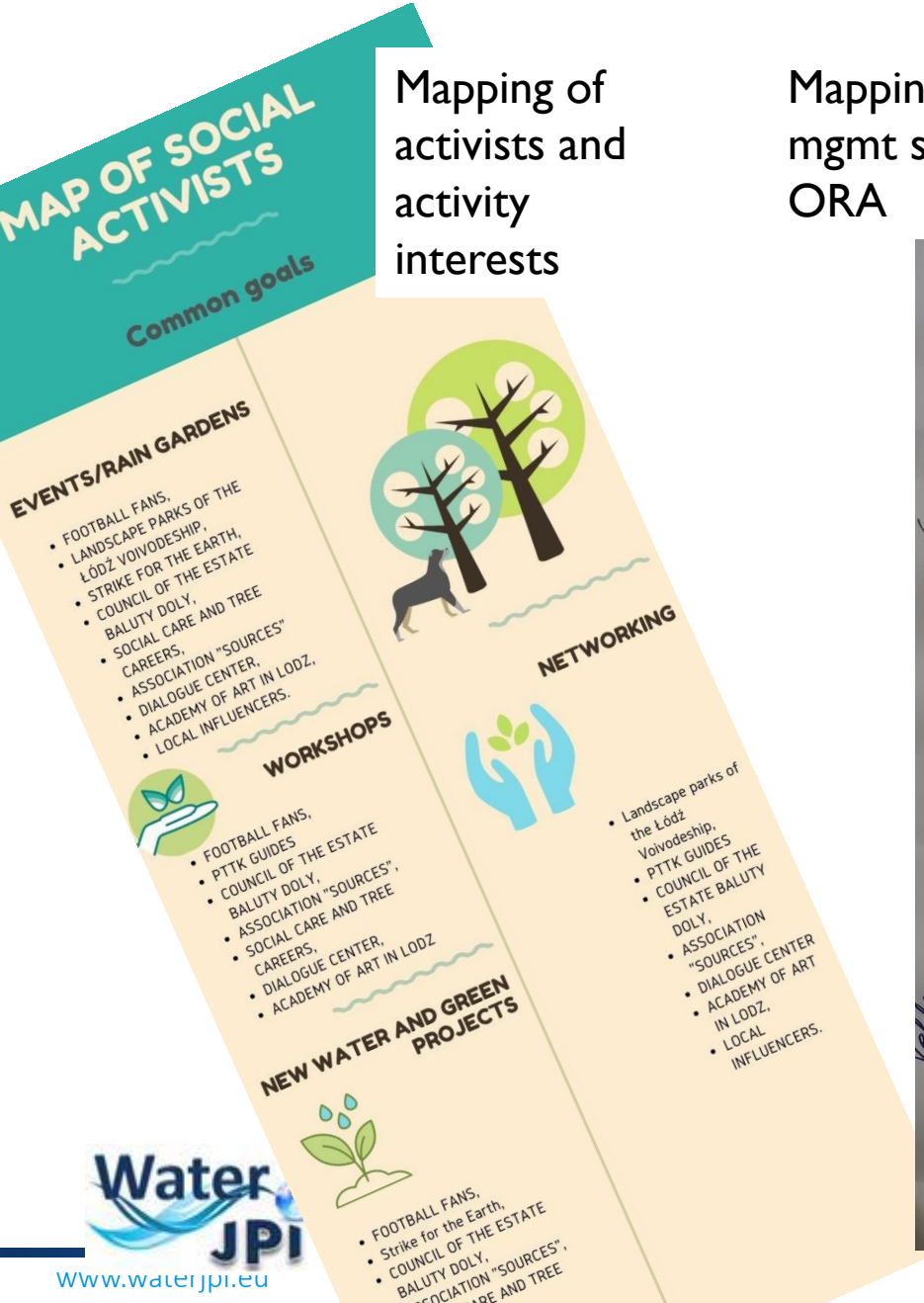
15A. Tariffs: NA
15B. Taxes: NA
15C. Transfers Transfers from the ATENAS budget: to municipality and citizens through direct NBS implementation;
15D. Private investors: Local owners investing in their own property – avoidance costs of releasing water to storm water system.

CLUSTER H. IMPACT through impact indicators

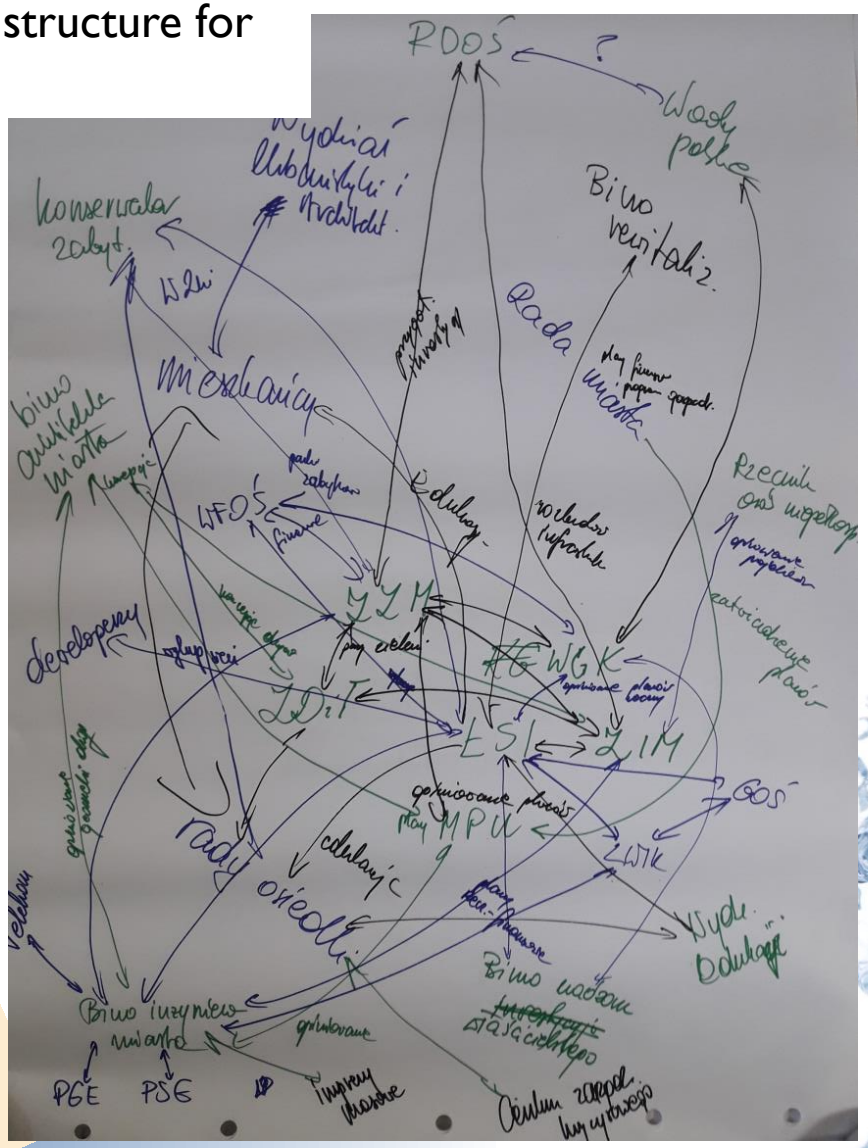
- Rainwater garden or retention basin (1)
- Increased capacity of rainwater infiltration (tbc)
- Diversity of habitats (at least 2 new habitats created)
- Noise reduction

Scientific and technological results - ŁÓDŹ

Mapping of activists and activity interests

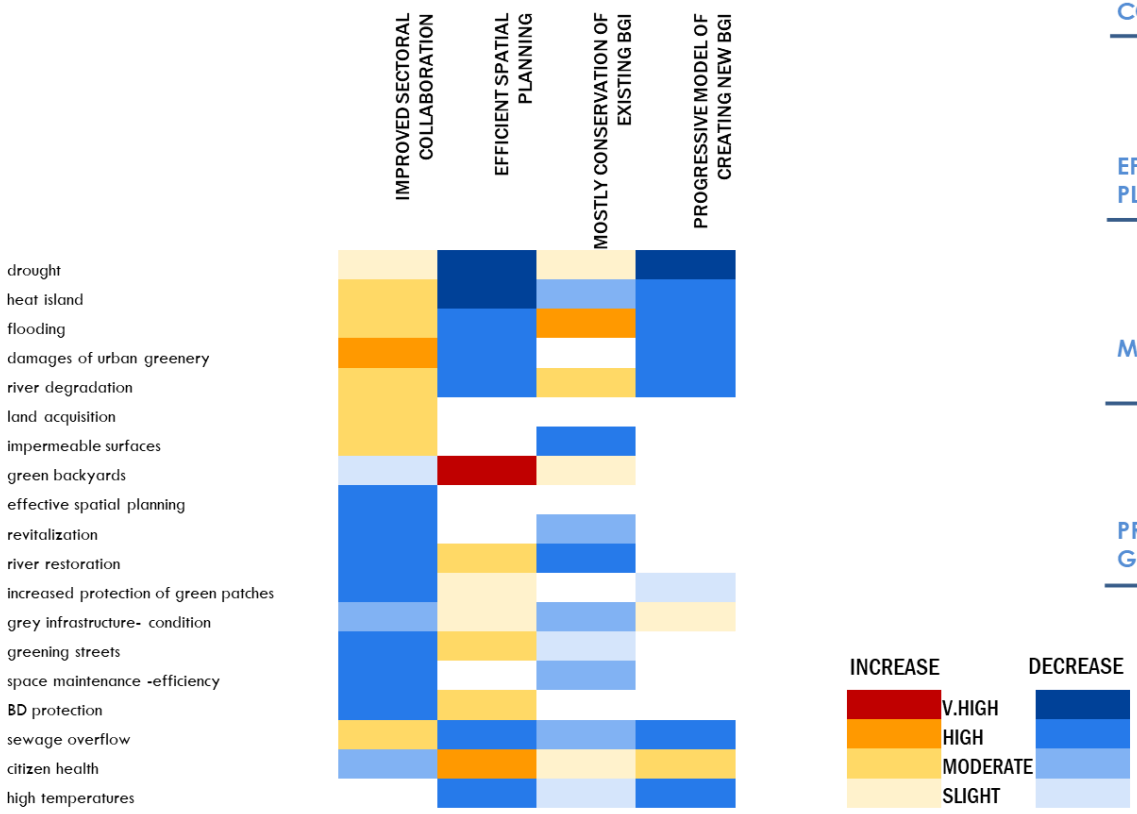


Mapping of nature mgmt structure for ORA



Scientific and technological results - ŁÓDŹ

Fuzzy Cognitive Mapping - analyzing impact of management approaches to key aspects of city adaptability



IMPROVED SECTORAL COLLABORATION

City uses its collaboration network in less than 20% (Kronenberg et al. 2015), scenario assumes 30% increase

EFFICIENT SPATIAL PLANNING

There is no systemic approach to spatial planning, with clear delineation of hot-spots requiring either protection or low-impact development & setting rules to development

MOSTLY CONSERVATION

Many citizens and NGOs focuses on protection of individual patches of greenery, they often don't consider city development and related impacts

PROGRESSIVE GREENING

Ecohydrological approach based on preservation of regulatory ecosystem services through development of BGN and systemic implementation of NBS

Stakeholder engagement

Literature

PHASE I

- Review of solutions;
- Pros & cons;
- Feasibility

Pre-selection

PHASE II

- Bio-physical context;
- Formal issues;
- Cultural preferences

Consultation

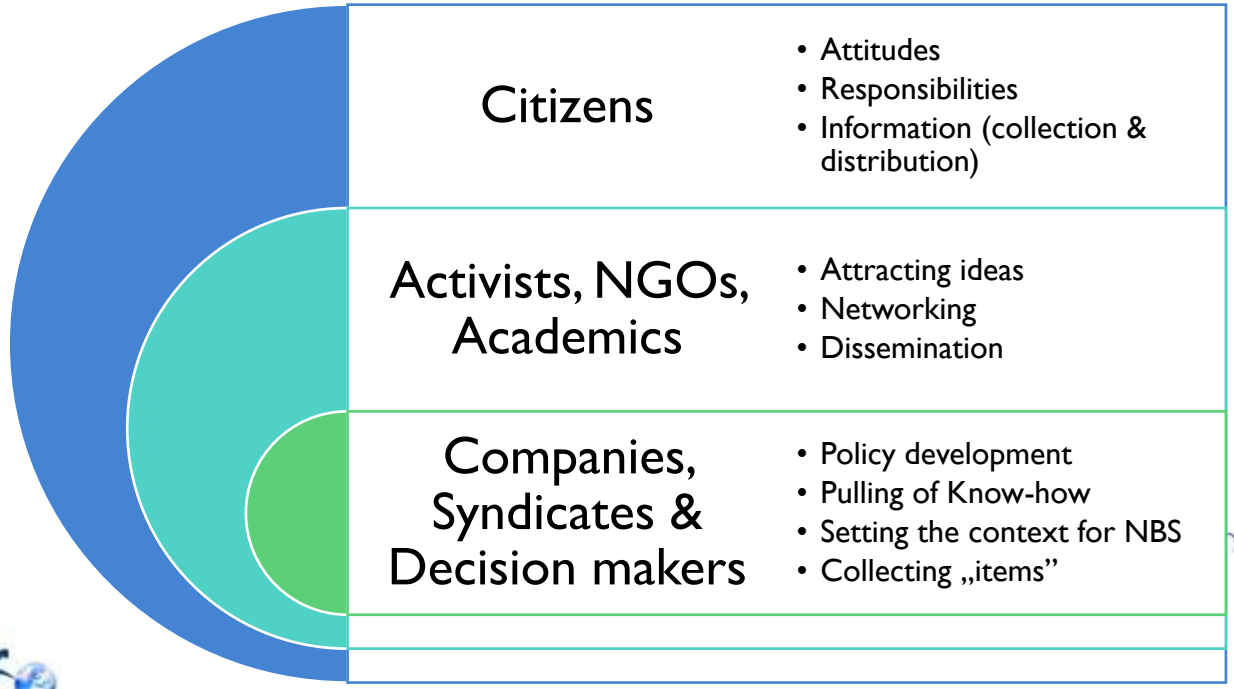
PHASE III

- Re[illegible]ing values
- Understanding needs;
- Co-designing solutions

Implementation

PHASE IV

- [illegible] engagement
- Activists involvement
- The Locals in action



Stakeholder engagement

Workshops on NBS visioning and codesign with river and sanitation syndicates of the river basin.

Lyon: 4 workshops over the period 2020-2021 in France on demonstration sites 1, 2, 3 and 4 with the river syndicate and the sewerage system syndicate.

Workshops on city visioning, NBS, NasCanvas and local synergies.

Łódź: 5 workshops with activists, 6 on NasCanvas with Łódź Revitalizatin School, 4 on spatial planning policy and its impact on NBS, 3 with NBS focused SMEs, 2 with the City of Łódź Authorities, 3 meetings with schools.

Collaboration, coordination, mobility, synergies

- Lyon – agreement with the sewage system union for ATENAS – based implementations
- Łódź – standards on NBS implementations for the City of Łódź, suport for societies & NGOs, SMEs
- Helsinki – agreements & collaborations with Malma and Kivisto

- Monthly meetings
- Dedicated methodology related trainings (stereotype analysis, MCDA, NasCanvas)
- Local stakeholders' meetings – steering & information gathering

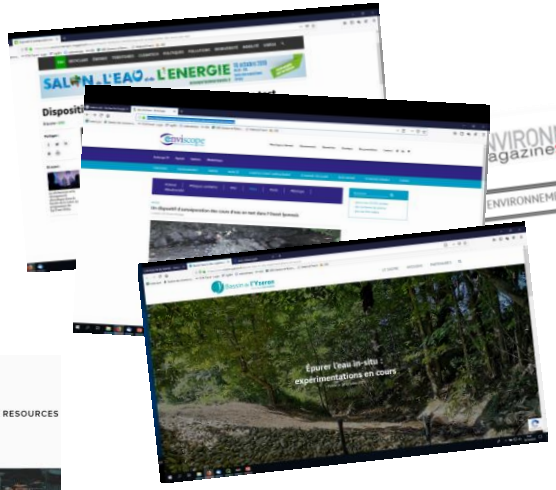
- Only local meetings
- Workshops with stakeholders
- Mostly virtual contacts
- Video site visits
- Planning for in-person meetings depending on COVID policies

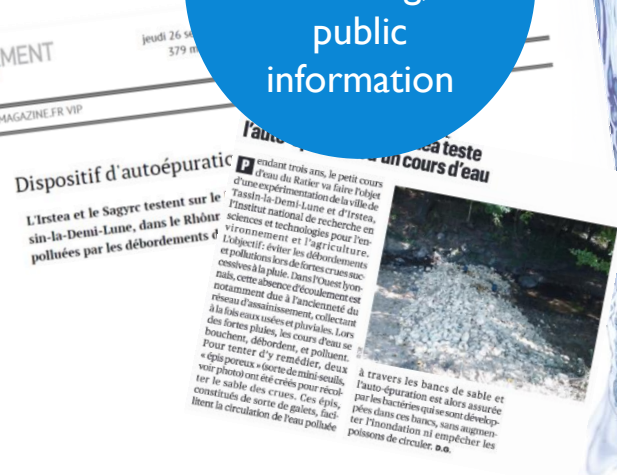
- H2020 NAIAD project: methodology & risk management issues
- H2020 Eupolis: spin-off of ATENAS approach
- Life RADOMCLIMA: policies, formal environment
- eLTER project on socio-ecological research infrastructure

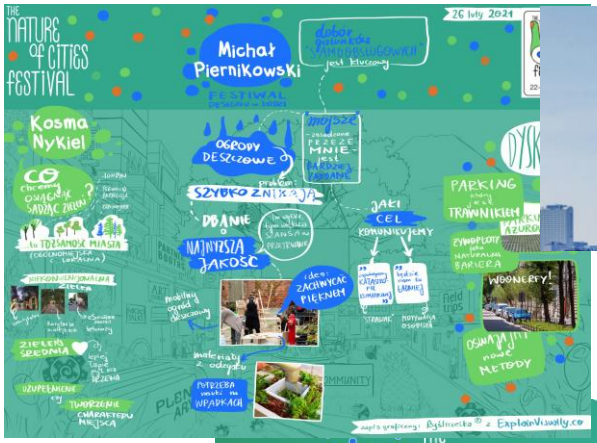
Impact and knowledge output

Presentation of the new implemented NBS on demonstration site number 3 in two trade journals and three online journals.

WP5 : Mutual learning, public information







International Conference "Cities as social-ecological systems" SURE 2020

Aug 21, 2020

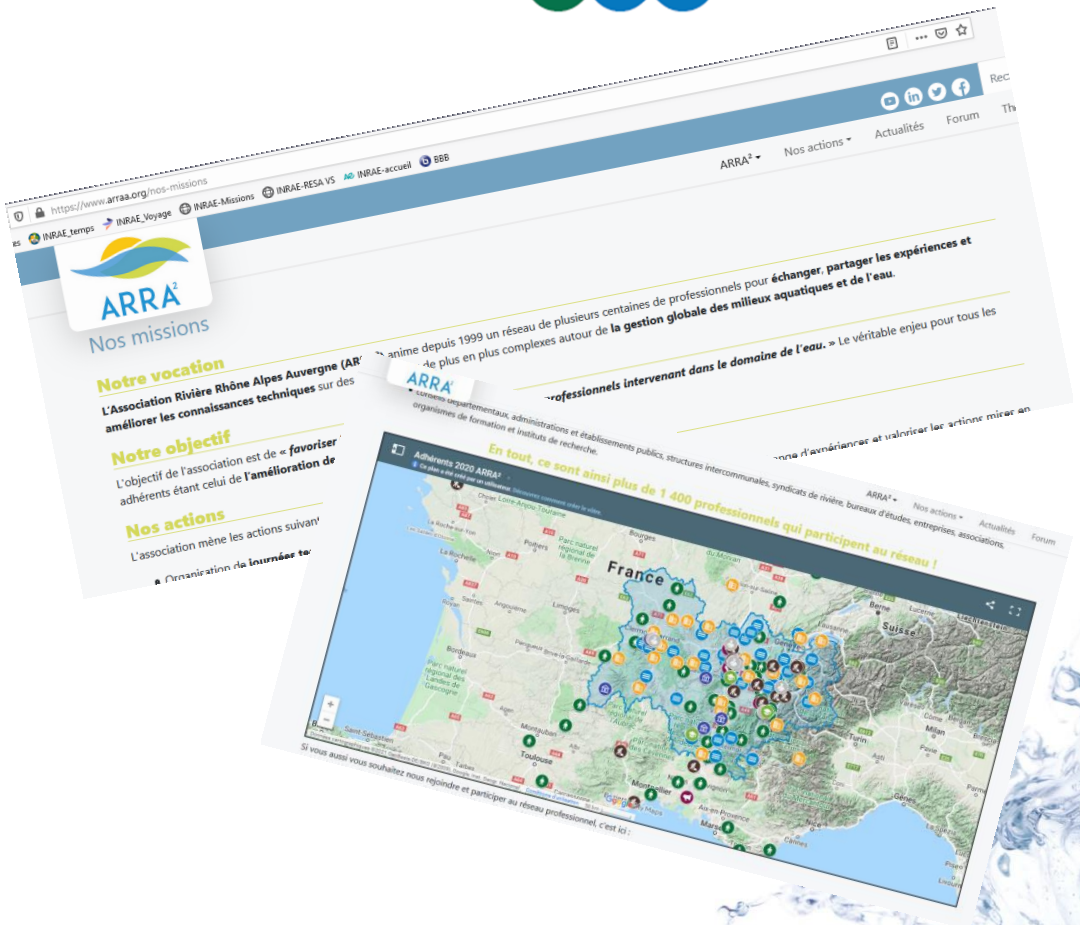
IALE 2022 European Landscape Ecology Congress: Making the future, learning from the past

Continuation of the work in the future

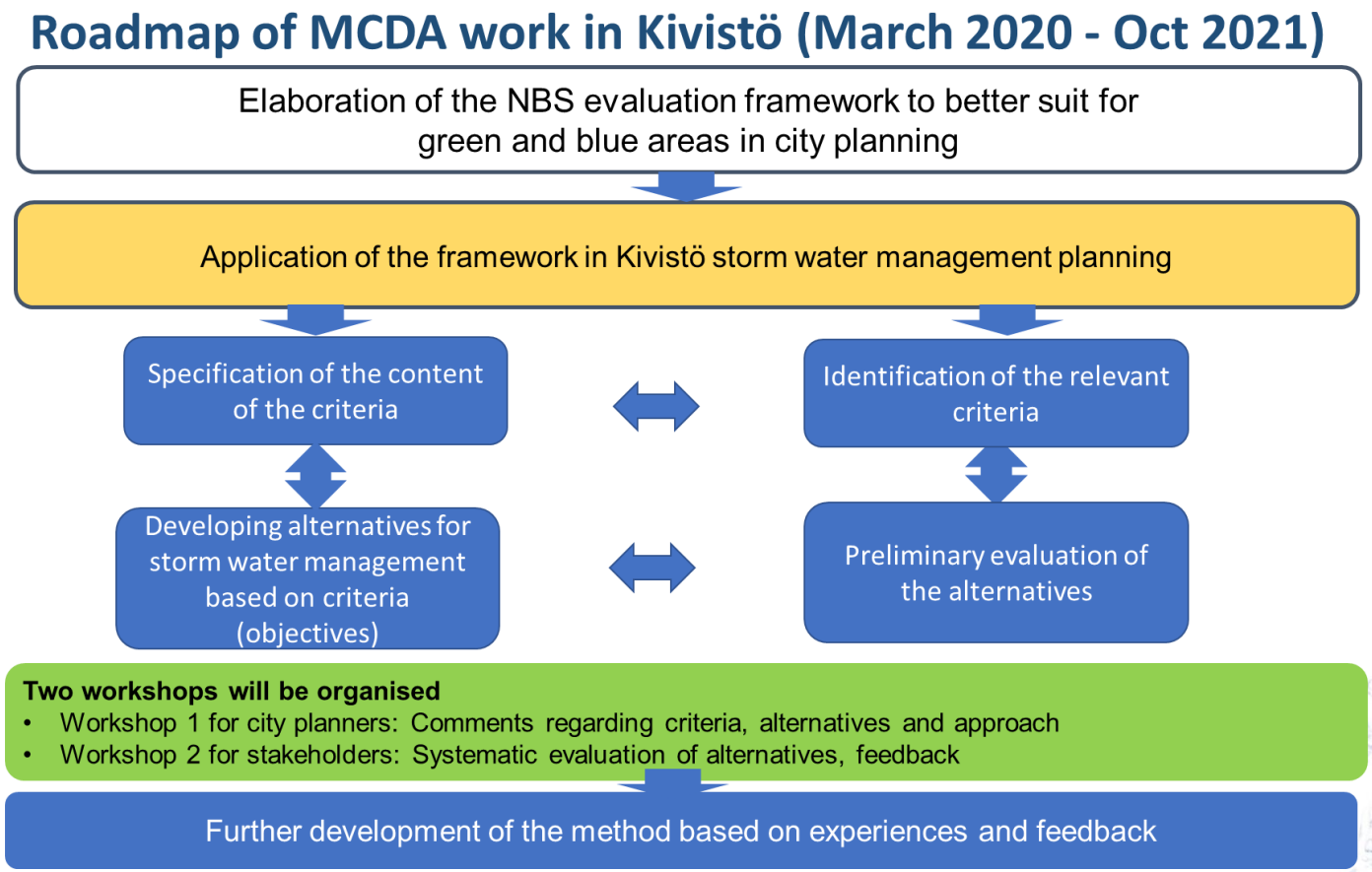
- Sociological approach – Stereotype analysis
- NasCanvas analysis for identification of economic framework and drivers for NBS implementation
- Social network analysis / ORA network analysis to detects risks or vulnerabilities of an organization's design structure
- NBS implementation decision tree
- Joint papers (by Dec 2021)
- NBS Cook book

Continuation of the work in the future - Lyon

In case the new NBS developed in France to increase or recover the self purification capacity of small river is effective (to be demonstrated using monitoring (D.2.2)) the solution will be replicated by the river basin syndicate and issued to the ARRA association which brings together 252 members who are both individuals (public and private employees) and structures (as legal entities): departments, administrations, public establishments, local authorities, river syndicates, consultancies, companies, associations, training organizations, research institutes
https://www.arraa.org/nos-missions



Continuation of the work in the future - Kivisto



Continuation of the work in the future - Łódź

Demo I

Fot. Michał Sikora

Demo II?

Pascal Breil, Gilles Armani, Philippe Namour and Fanny Courapied
Antti Rehunen, Kati Vierikko
Kinga Krauze, Agnieszka Bednarek, Katarzyna Perlińska, Wiktoria Czarnecka,
Renata Włodarczyk-Marciniak, Iwona Wagner, Robert Słupecki

https://atenasjpi.eu

Projects presentations on Topic 3- Supporting Tools for sustainable Integrated Management of Water Resources (15 min presentation+5 min for questions and answers)

FG members: Covaliova*, Lo Porto, Schirmer*, Suzenet, Vehanen
*absent

BlooWater

SUPPORTING TOOLS FOR THE INTEGRATED MANAGEMENT OF DRINKING WATER RESERVOIRS CONTAMINATED BY CYANOBACTERIA AND CYANOTOXINS

Maria Sighicelli (ENEA)-Italy

Francesco Fatone (University of Marche)-Italy

Don Pierson (University of Uppsala)- Sweden

Christian Vogelsang (Norwegian Institute for Water Research)

Water Works 2017

Water JPI

Water JPI 2018 Joint Call

Mid-term Evaluation Meeting 19-20 April 2021 (Online)

OBJECTIVES

WP1- to design and develop a monitoring system of bloom based on the integration of remote and proximal sensing technology and in situ data sampling.

WP2- to test two different methods for simulating the occurrence of cyanobacteria blooms: Process based (PB) modeling and Machine learning (ML) based methods.

WP3- to study and validate sustainable and efficient technologies for the treatment of water affected by cyanobacteria toxicity;

to start the laboratory tests to determine the design parameters for the pilot scale polymer-enhanced ultrafiltration (PEUF) demonstration.

WP4- to develop of an integrate DSS-GIS approach for the water cycle management.

SCIENTIFIC AND TECHNOLOGICAL PROGRESS

BlooWater

- to define and plan protocol to collect and compare water sampling data with remote sensing data
- to test drone/sensor system in water sampling winter campaign
- ongoing image processing

- to develop the data sets needed to test either of these approaches;
- to set up PB models on the lakes chosen as test sites by BLOOWATER

- to finalized a practical report on data performances and economical assessment of conventional technologies for cyanobacteria reduction
- Bench Scale Testing of PEUF and reference technology
- Processes design, development and field validation of the promising water treatment technologies

- to define data set concerning the characteristics of the pilot action area
- and mapping of relevant stakeholder.

BLOOWATER
Update on WP1 Monitoring System

Maria Sighicelli

ENEA

Overview on Monitoring Goals WP1

Milestones

M3→M6 Identification and characterization of study areas made
M6→M12 Definition of operational procedures for integrated monitoring campaigns in the pilot area
M12→M24 Integrated bloom data collection

Deliverables ongoing

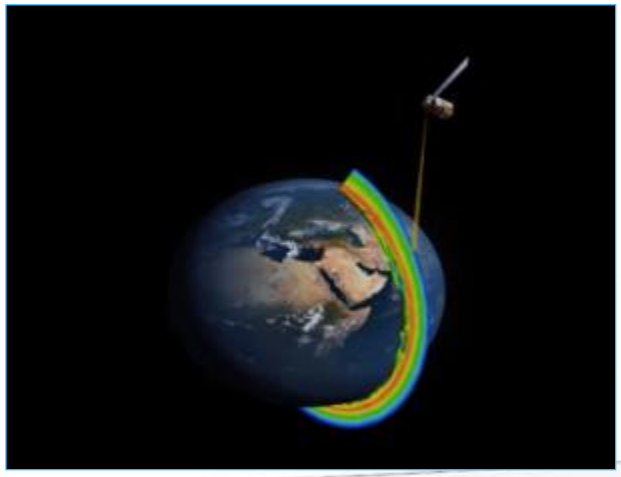
M24→M30 Design of Cyano-HAB Database

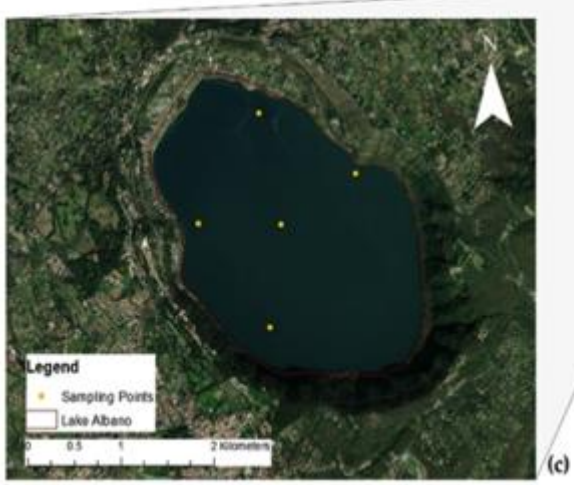
Progress

- Testing sensor for water image acquisition, but not yet complete
- Development of algorithms for image processing , but not yet complete

Priorities

- Finish data analysis for integrates monitoring system
- Continue work on design of database





Albano Lake:
Italian area pilot
WP1

INTEGRATION OF REMOTE SENSING TECHNOLOGY & IN SITU DATA SAMPLING

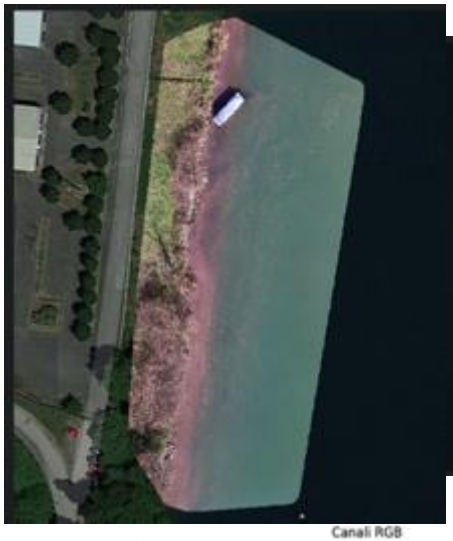
March-October 2019
11 water sampling campaigns

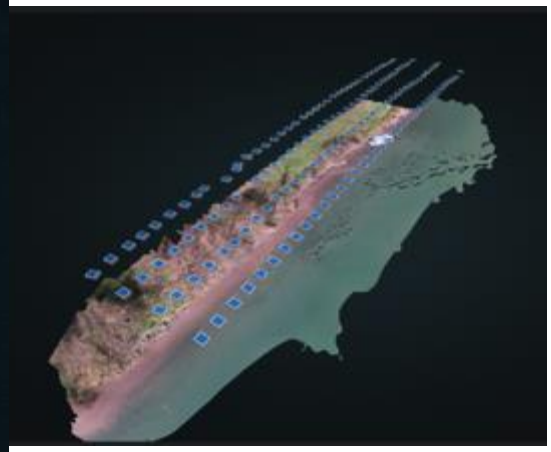
Paper submitted under review:

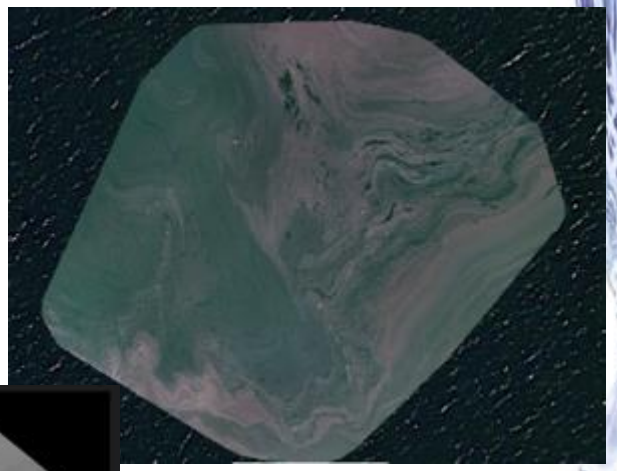
- *An integrated approach to chlorophyll monitoring in surface freshwater: the case-study of Lake Albano (Central Italy).* M. Sighicelli, M. Perrone, F. Lecce, M. Malavasi, M. Scalici. In Water;

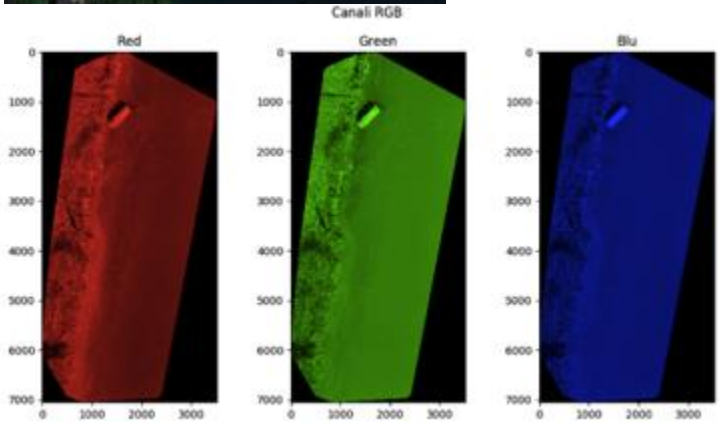
- *Water mixing conditions influence Sentinel-2 monitoring of chlorophyll content in monomictic lakes.* M. Perrone, M. Scalici , L. Conti, D. Moravec, J. Kropáček, M. Sighicelli, F. Lecce, M. Malavasi. In Ecological Remote Sensing

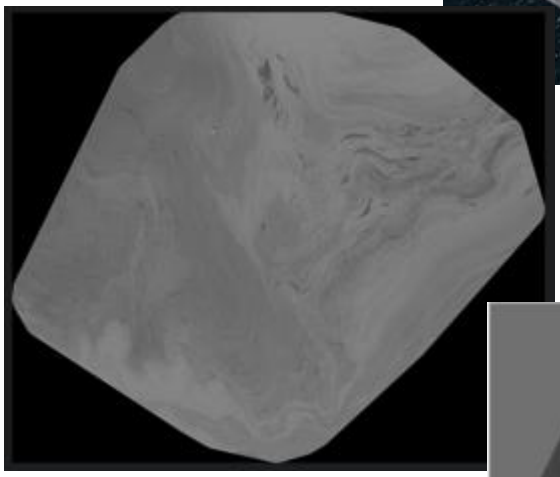
BlooWater

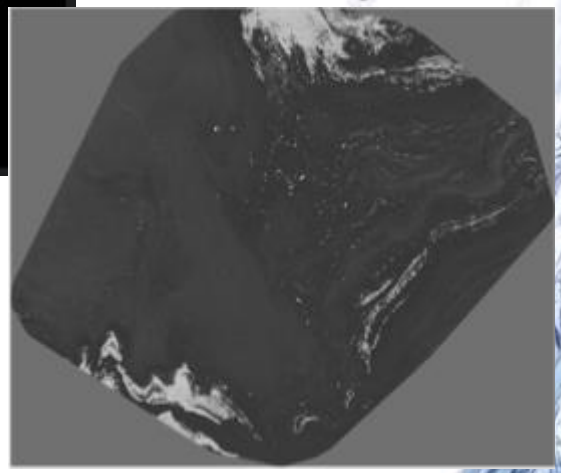












drone/sensor system has been tested and used during the water sampling campaign (11/2020-02/201)

BLOOWATER
Update on WP2 Modelling

Don Pierson

Uppsala University

Overview on Modelling Goals WP2

Milestones

M3 Final decision on case study sites made
M9 GOTM hydrothermal model setup and calibrated for all case study sites.
M18 SELMA water quality model setup and calibrated for all case study sites.
M21 Machine learning algorithms tested on all case study sites

Deliverables

M6 Publicly available data archive of all data used to force and calibrate lake water quality models
M24 Manuscript to be submitted for publication comparing the simulations of cyanoHAB blooms using mechanistic models and machine learning methods.

Progress

- Data archive created, but not yet complete
- Hydrothermal model setup Sweden and Norway
- Water quality model setup Sweden and Norway
- Initial work on machine learning underway Postdoc just hired

Priorities

- Final Decision on Study Sites
- Setup GOTM/SELMA on All Sites
- Finish data archive
- Continue work on machine learning

Site	Country	Meterological Forcing Data	Inflows and nutrient inputs Reservoir opperations	Calibration Hydrothermal lake Water Temperature	Calibration lake water quality. Nutrients Chlorophyll Phytoplankton
Erken	Sweden	1961-2018	2004-2018	1989-2018	2004-2018
Mälaren/Ekoln	Sweden	1979-2016	1979-2016	1998-2005	1998-2005
Vansjö	Norway	1980-2018	1984-2018	2005-2018	2005-2018
Albano	Italy			2015-2019	2015-2019
Castereccioni	Italy		2014-2019 (reservoir level)		2013-2019 Phytoplankton counts

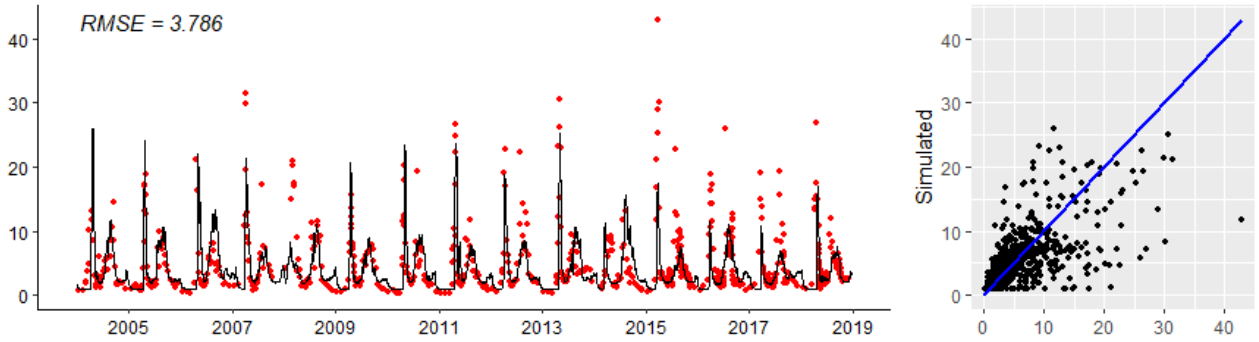
Progress on Process Based Modelling

Good results for simulation of total chlorophyll concentration

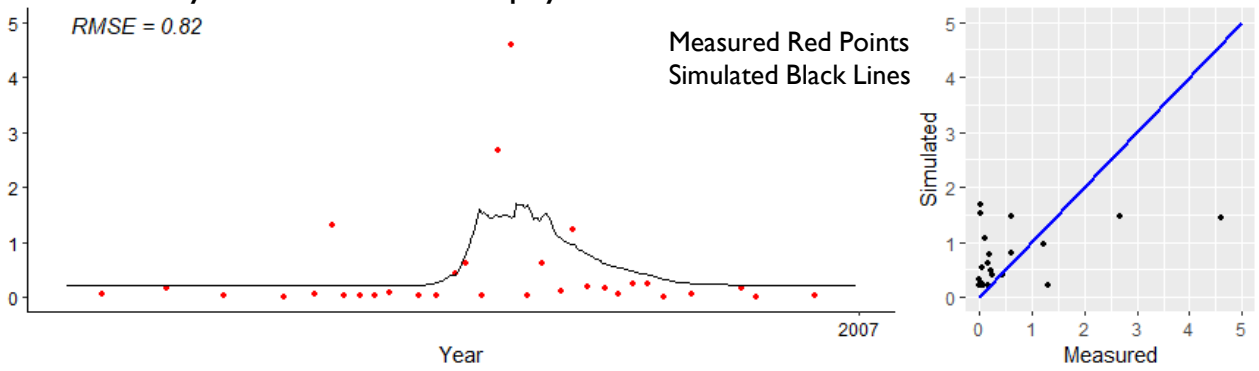
Process based models of cyanobacteria derived chlorophyll concentration are less successful than that for total chlorophyll

Some promise in simulating the correct timing of the blooms. But so far not good enough for management purposes

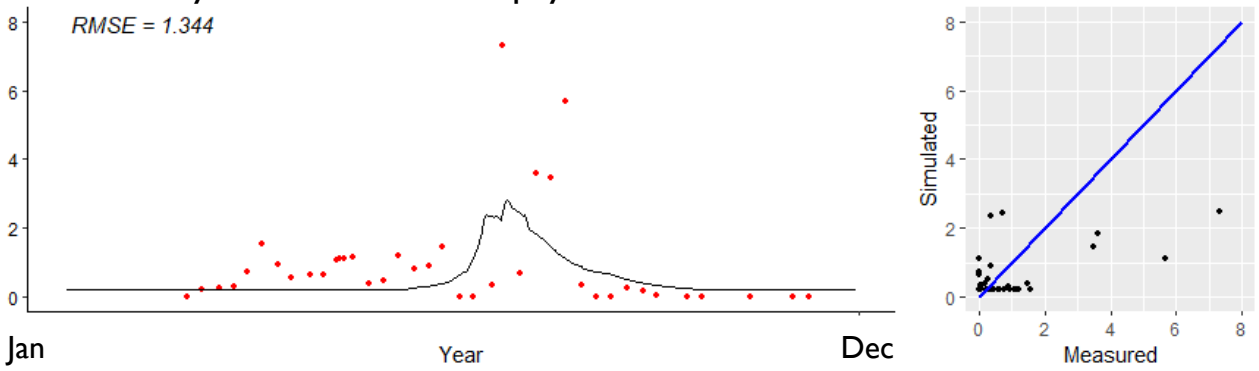
Total Phytoplankton Chlorophyll Lake Erken 3 Meters



2006 Cyanobacterial Chlorophyll Lake Erken 3 Meters



2014 Cyanobacterial Chlorophyll Lake Erken 3 Meters



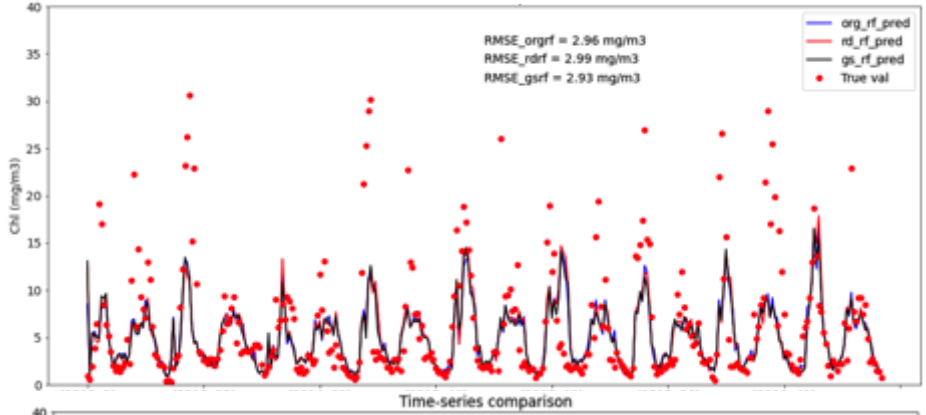
Progress on Machine Learning

- New post hired Shuqi Lin to work on machine learning algorithms. Started 15 March Much Delayed Due to COVID
- Initial testing on using Lake Erken Total Chlorophyll concentration as shown below. Machine learning models can outperform the processed based models

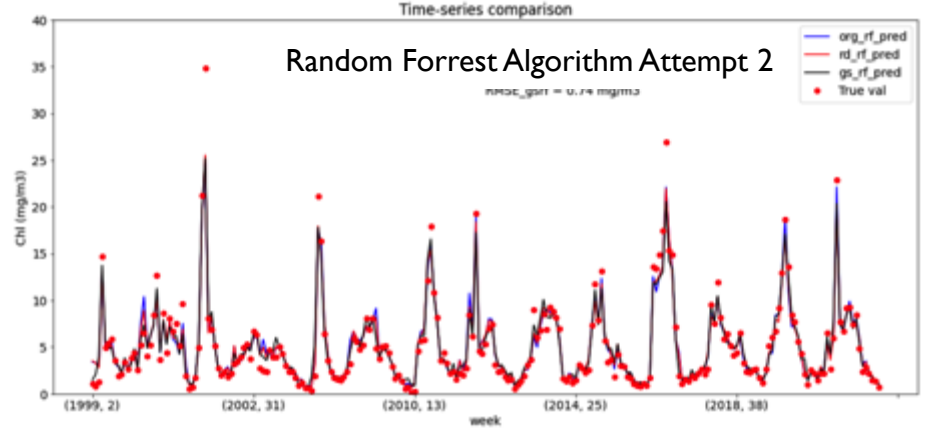
Next Steps

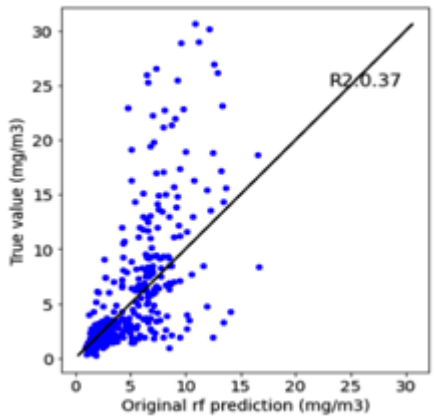
- Test other machine learning algorithms
- Evaluate cyanobacteria in addition to total chlorophyll
- Include information from processed based models into machine learning algorithms

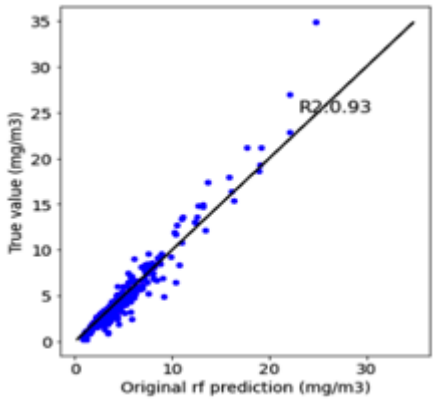
Random Forrest Algorithm Attempt 1



Random Forrest Algorithm Attempt 2







Most important Input Data Attempt 2

	features	FI
4	TotP(mmole/m3)	0.310661
7	PO4(mmole/m3)	0.224303
0	week_num	0.091718
11	in_NH4 (mole/l)	0.062449
6	NOX(mole/m3)	0.062180
2	inflow_temp	0.055247
1	inflow(m3/s)	0.048018
5	NH4(mmole/m3)	0.039010
3	Si(mole/m3)	0.037697
10	in_NOX-N (mole/l)	0.029175
8	in_PO4-P (mmole/l)	0.022111
9	in_TP (mmole/l)	0.017431

BLOOWATER
Update on WP3 Treatment

Pawel Krzeminski, Mohamed Said Lebad, Andreas Ballot, Christian Vogelsang
NIVA

Çağrı Akyol, Anna Laura Eusebi, Stefania Gorbi, Francesco Fatone
(UNIVPM)

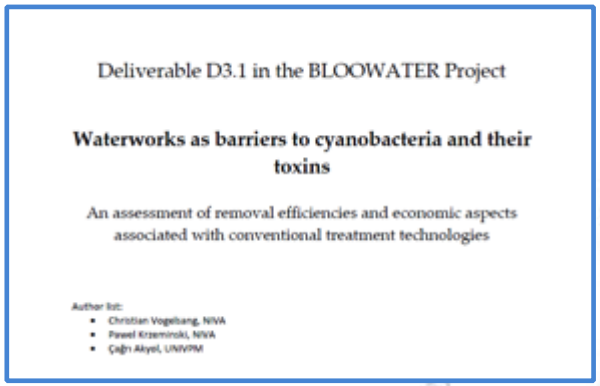
Overview on Treatment Goals WP3

WP3 Tasks:

- WP3.1 Definition of specific technological treatment solutions
- WP3.2 Bench scale testing of polymer enhanced ultrafiltration (PEUF) and reference technology
- WP3.3 Processes design, development and validation

NIVA's tasks:

- **WP3.1 Review** conventional treatment
- technologies targeting cyanotoxins


Deliverable D3.1 in the BLOOWATER Project

Waterworks as barriers to cyanobacteria and their toxins

An assessment of removal efficiencies and economic aspects associated with conventional treatment technologies

Author list:
- Christian Vogelsang, NIVA
- Paweł Krzeminski, NIVA
- Çağrı Akyol, UNIVPM

- **WP3.2 Test** removal efficiencies of nanofiltration (NF)
  - Delayed due to COVID-19 restrictions resulting in limited access to the laboratories and facilities
- **WP3.3 Investigate** UF membrane biofouling to support PEUF system development

BlooWater

Table of contents

Updated guidelines from WHO (2021): Short-term and life-long guideline values for microcystins, cylindrospermopsins, saxitoxins and anatoxins in drinking water

Table 9. *Summary of expected water treatment performance for the removal of selected extracellular cyanotoxins.*

Treatment process	Expected removal based on observed values			Comments
	Microcystins	Anatoxin-a	Cylindrospermopsin	
Slow sand filtration	++/+			
Nanofiltration	+++	(0/++)	++/+++	
Adsorption on activated carbon	++/+++	(+++)	+++	Adsorption varies by carbon type and type of cyanotoxin; competition with NOM
Ozonation (post clarification)	+++	+++	+++	
Free chlorine (post filtration)	+			
Potassium permanganate	++	++	0	Effective on soluble toxin, but only in absence of whole cells

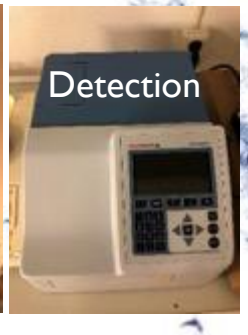
Significant knowledge gaps related to membrane treatment:

- Removal of other cyanotoxins than microcystins
- Effects from shear = release of intracellular cyanotoxins
- Effects of different membrane configurations
- Effects of longer filtration runs; effects from fouling
- Experiments with real raw water

WP 3.2 Test

- Nanofiltration lab testing goals:
  - **effectiveness** of (extracellular) toxins removal,
  - **impact factors** influencing toxin removal,
  - **release** of cyanotoxins during membrane filtration.

- But before NF ⇒ some **preparatory** works:
  - **Production** of toxin-producing cyanobacteria
  - Optimization of **cell lysis** to release toxins
  - Setting up ELISA method for toxins **quantification**



WP 3.2 Test

Optimization of cell lysis to release extracellular toxins:

	Microcystins (MC)		Anatoxin (ATX)		Saxitoxins (STX)		Cylindrospermopsin (CYN)	
	Conc. [µg/L]	% change	Conc. [µg/L]	% change	Conc. [µg/L]	% change	Conc. [µg/L]	% change
Freeze/thawing	117	-	28	-	57	-	163	-
Freeze/thawing + sonication*	175	50%	38	33%	70	24%	249	52%
Freeze/thawing + centrifugation	96	-17.7%	32	12.2%	59	3.4%	173	5.8%
Freeze/thawing + filtration 0.7 µm	122	4.5%	28	0.4%	38	-33%	154	-5.5%

* - for different toxins different sonication power was optimal ranging from 0.6-18.5 W/mL

Filtration can remove algae cells (before NF tests) without significantly reducing toxins concentrations

WP 3.2 Test

- **Production:** toxin concentrations are low **(30-160 µg/L)**
- **Cell lysis method:** freeze/thawing followed by sonication
  - toxins concentrations increase by +20-50% **(40-250 µg/L)**
- **Next steps:**
  - Waiting for pipette tips (since January) and starting NF tests

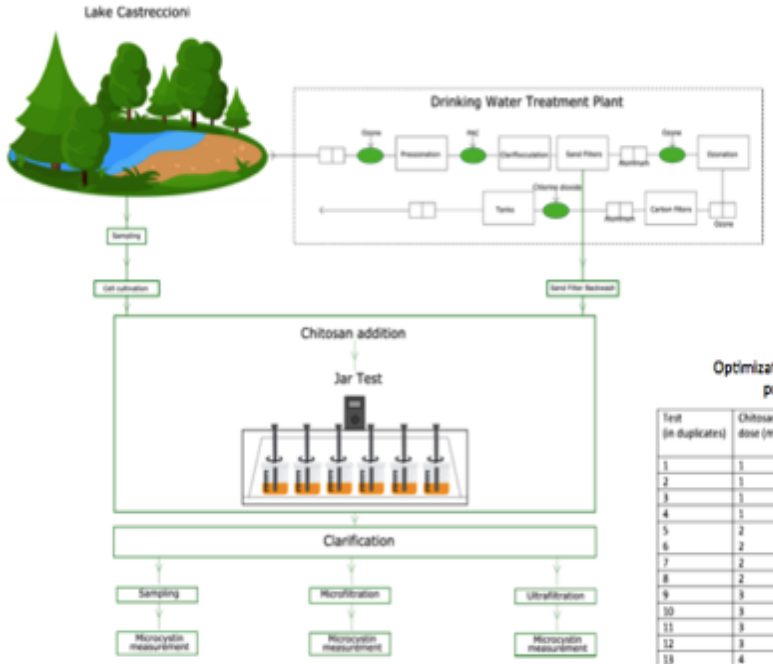
The Best in Test www.edn.com

Long channel membrane test cell (LCMTC)

Removal effectiveness & impact factors

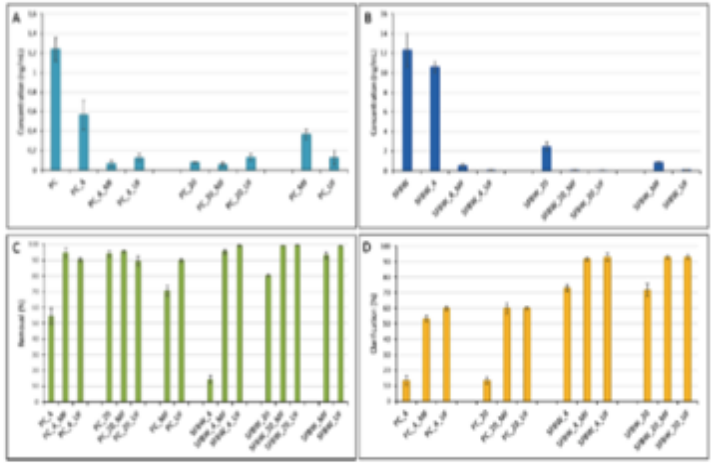
WP3.2 Bench Scale Testing of PEUF and reference technology

- ✓ Bench-scale PEUF tests are finalized by UNIVPM.
- ✓ Optimal operating conditions (i.e. mixing speed, coagulant dose, contact time) are defined for the pilot unit.



Optimization of chitosan dosage and contact time in preliminary coagulation/flocculation.

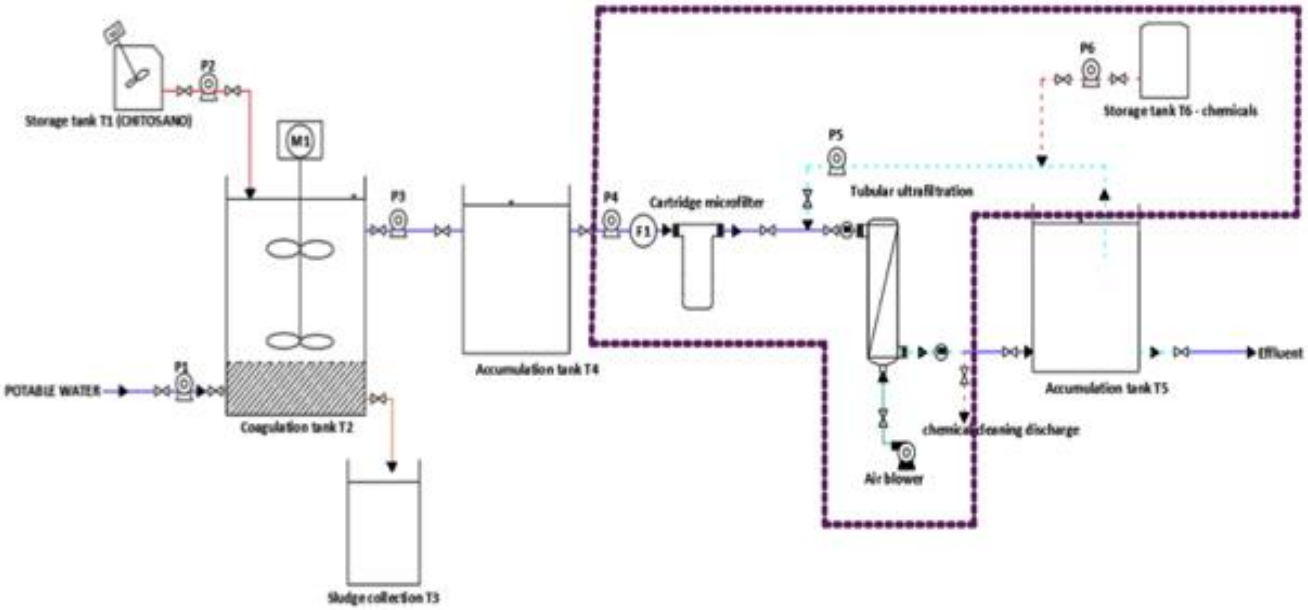
Test (in duplicates)	Chitosan dose (mg/L)	Rapid mixing		Slow mixing		Sedimentation
		Velocity (rpm)	Time (min)	Velocity (rpm)	Time (min)	Time (min)
1	1	100	3	40	30	30
2	1	150	2	40	30	30
3	1	200	1.5	40	30	30
4	1	250	1.2	40	30	30
5	2	100	3	40	30	30
6	2	150	2	40	30	30
7	2	200	1.5	40	30	30
8	2	250	1.2	40	30	30
9	3	100	3	40	30	30
10	3	150	2	40	30	30
11	3	200	1.5	40	30	30
12	3	250	1.2	40	30	30
13	4	100	3	40	30	30
14	4	150	2	40	30	30
15	4	200	1.5	40	30	30
16	4	250	1.2	40	30	30
17	5	100	3	40	30	30
18	5	150	2	40	30	30
19	5	200	1.5	40	30	30
20	5	250	1.2	40	30	30
21	10	100	3	40	30	30
22	10	150	2	40	30	30
23	10	200	1.5	40	30	30
24	10	250	1.2	40	30	30
25	20	100	3	40	30	30
26	20	150	2	40	30	30
27	20	200	1.5	40	30	30
28	20	250	1.2	40	30	30



Microcystin removal and clarification efficiencies after each process in PEMF and PEUF tests

WP 3.3 Processes design, development and field validation of the promising water treatment technologies

- ✓ From the results of the bench activities, the optimal flow scheme is designed and developed by UNIVPM to treat 0.2-0.5 m^3/d of surface water.
- ✓ The pilot system in Lake Castreccioni (Cingoli, Italy) is finalized, ordered and expected to be delivered by the end of April 2021.



BlooWater

Water and Waste Enviromental Engineering LAB

Water JPI

BLOOWATER
Update on WP 4 DSS

ENEA-UNIVPM

Overview on DSS Goals WP 4

Deliverables

M3 A guidelines on data collection and management
M8 A social mapping of the relevant stakeholders and the role
M8 Database set up

The delay accumulated in the first phase of WP1 has also strongly slowed down the activities related to this WP. The Covid emergency has increased the delay especially in the direct exchange with partners.

Priorities

Complete data collection
Database design and development

COLLABORATION, COORDINATION, MOBILITY, SYNERGIES

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The emergency situation due to the COVID-19 and the consequent lock-down did not allow the mobility foreseen in this phase of the project not only for the coordination activity but also for the exchange activities between the different laboratories on the joint monitoring and treatment activities.

COLLABORATION and SYNERGIES

- Department of Sciences of University Roma 3 and Department of Applied Geo-informatics and Spatial Planning of Czech University of Life Sciences Prague → remote sensing

- Department of Robotics of Enea→ drone

- Department of Environmental Biology of University La Sapienza of Rome → photogrammetry and image processing applied to bloom

STAKEHOLDER ENGAGEMENT

Regional Agency for Environmental Protection - ARPA Lazio and ARPA Marche- showed interest in the project outputs and collaborated by providing historical data series on the new pilot areas of the project, Lake Albano in Lazio and Lake Castreccioni in Marche;

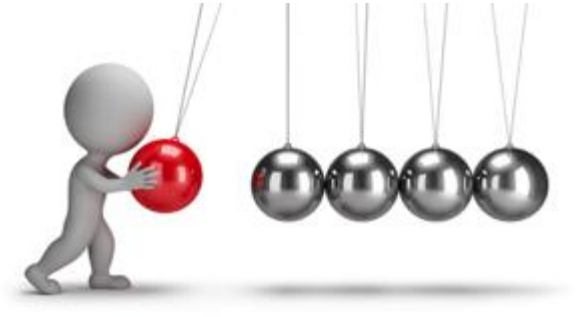
Regional Park of "Castelli Romani" is strongly interested in monitoring the quality of the lake water; is providing great logistical and administrative support for the necessary authorizations to navigate and fly within protected areas; and above all to extend the activity also in other lakes of the Park interested in the phenomenon of cyanotoxic blooms

Acquambiente, a company totally owned by Local Authorities with a strong vocation in the management of water resources, both in terms of research, water supply, supply and distribution of drinking water and in the collection, treatment and purification of wastewater and wastewater until their return to the natural water bodies; the drinking water treatment plant located in the district of Castreccioni is managed by Acquambiente Marche S.r.l., which is therefore particularly interested in the treatment of waters subject to blooms

The Manifesto of Intent has been signed for a "**Lake Water Contract for Albano, Nemi and for the River Incastro**" **(18-03-2021)**

District Basin Authority of the Central Apennines

IMPACT AND KNOWLEDGE OUTPUT



COORDINATION: COMMUNICATION ACTIVITES

BLOOWATER COORDINATION: COMMUNICATION ACTIVITES

Claudia Trotta, Federica Colucci

ENEA

COMMUNICATION AND DISSEMINATION

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International	
Peer-reviewed journals.	**2**
Books or chapters in books	
Communications (presentations, posters)	

National	
Peer-reviewed journals	
Books or chapters in books	
Communications (presentations, posters).	**1**

Dissemination initiatives		
Popular articles	**2**	
Popular conferences	**2**	
Others	***20+***	*(web news, broadcasting tvs, virtual events, social media, etc….)*

COMMUNICATION AND DISSEMINATION

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Peer-reviewed journals

- Çağrı Akyol, et al.. (UNIVPM, Italy)
  Monitoring of microcystin production associated with Planktothrix rubescens in an oligo-mesotrophic lake in Central Italy: polymer-enhanced membrane treatment as an alternative mitigation approach for cyanotoxin severity (under review in Science of the Total Environment)

Communications (presentations, posters)

- Sighicelli M. (ENEA, Italy)
  Il Progetto Bloowater e l'area di studio del lago Albano […]
  (Sos Laghi Albano e di Nemi Webinar - **oral presentation**, December 10th, 2020)

COMMUNICATION AND DISSEMINATION

Popular articles

2 online local news

- *"Università Politecnica: ingegneria ambientale, finanziati 4 programmi di ricerca europei"* (6 March, 2019 Ancona, Marche, Italy) https://www.vivereancona.it/2019/03/07/universit-politecnica-ingegneria-ambientale-finanziati-4-programmi-di-ricerca-europei/720398?fbclid=IwAR1P66e042pb2dOpx2MhFTj8q95A0AuahaT38-TyIn5cFDo4IOF2bLPd1k4
- *«Castel Gandolfo: il progetto di ENEA per il contrasto ai cianobatteri nel lago»* (16 July 2020, Castel Gandolfo, Rome, Italy) https://www.ilmamilio.it/c/comuni/28353-castel-gandolfo-il-progetto-di-enea-per-il-contrasto-ai-cianobatteri-nel-lago.html

Popular conferences

Virtual events

- "Time4child" *(digital edition* 9-22 Nov 2020)
  Time4child is an exhibition dedicated to children and young people whose aim is to raise awareness on Sustainable Development.
- "Veliero Parlante" a webinar dedicated to school teacher
- training about Bloowater project themes (4 Mar2021)

COMMUNICATION AND DISSEMINATION

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Others

- Service on newscast RAI NEWS 24 - Futuro24 (Italy) – (22 Aug 2020)
- Report on ITALIA UNO - E PLANET (20 Sept 2020)
- Interview with Maria Sighicelli (ENEA, Italy) on newscast by Tg1-Italian National tv RAI (22 July 2020). https://www.enea.it/it/Stampa/eneainonda/22-07-2020-rai-1-tg1-20-00-durata-00-01.36
- Interview with Maria Sighicelli (ENEA, Italy) by RaiNews24 Futura Ambiente (2 April 2021) https://www.bloowater.eu/news-events/bloowater-on-rai-news-24.html

- 2 articles on EneaInforma newsletter (Italian and English version)*
- 1 articles on ARPATnewsletter (Tuscan environmental protection regional agency, Italy)
- 2 WJPI Newsletters (Sept and Dec)
- 5 news and a webpage dedicated to the project on web site of ENEA

**ENEAInform@ is the periodic newsletter from the ENEA community, dedicated to all stakeholders on energy, new technologies, the environment and sustainable economic development. ENEAInform@ will be emailed to all ENEA personnel and to about 3000 addressees working in national and international media, companies, public administrations, local bodies, associations and institutions. It boasts 960 foreign users mainly from scientific community.*

COMMUNICATION AND DISSEMINATION

Others

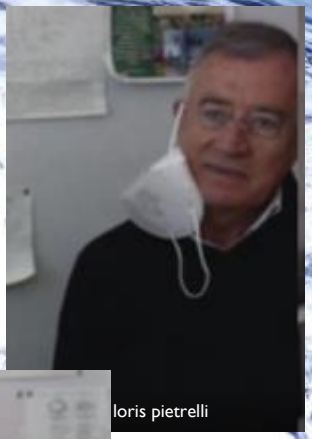
- regular posts on Bloowater social media:
  - Twitter (30 from may 2020 to April 2021),
  - Youtube channel (12 VIDEOs)
  - Facebook

Twitter account is used not only to spread information about the project but to build a network among people involved in halgal bloom research like Cyanotrans, Cyanoworld, Cyanomonitoring. CyanoAlert, CyanoCoast, Cyanotracker.

- Project website www.bloowater.eu
  (Project and partners description, news and events, data sharing, Join Us, video e photo gallery) - on line since July 2020

CONTINUATION OF THE WORK IN THE FUTURE

	BLOOWATER									
N.	Work Package Name	Status of products	%	% time	Starting	Current	Activity	Delay	Extension	Notes
WP 1	MONITORING SYSTEM DEVELOPMENT				01/05/19	31/12/21			31/03/23	
1.1	Implementation of Cyanobacteria monitoring system	Tests being conducted	50	100	01/05/19	31/12/19	M	8		Delay in the retrieval and delivery of drone sensors
1.2	Data Collection of Cyano-HABs	Ongoing	40	75	01/05/19	31/12/21	H	12		Monitoring campaigns canceled due to Covid emergency, limited access to the laboratories
1.3	Design of Digital Database	Ongoing	25	90	01/05/19	31/07/21	H	10		Delay affected by deleyd in W.P.1 e W.P2
WP 2	DEVELOPMENT OF BLOOM FORECASTS				01/05/19	31/01/22			31/03/23	
2.1	Testing of mechanistic water quality models for predicting cyanobacterial blooms		75	100	01/05/19	01/03/21	L	6		Good progress in Sweden and Norway Still need to work with Italian lakes
2.2	Testing of alternative methods of predicting cyanobacterial blooms based on machine learning algorithms		5	80	01/10/20	01/09/21	H	15		Greatly delayed due to difficulties hireing a post doc during COVID 19 pandemic
2.3	Developing model workflows		0	18	02/09/19	01/03/22	H	12		Delays here are not so extreme now, but will to some extent be affected by delays in WP2.2
WP 3	TREATMENT PROCESS COMPARISON				01/04/19	31/03/22			31/03/23	
3.1	Definition of specific technological treatment solutions functional to the different scenarios	D3.1 finalised	100	100	01/04/19	31/12/19	L			Peer-reviewed publication planned
3.2	Bench Scale Testing of Polymer Enhanced Utra Filtration (PEUF)	D3.2 PEUF in lab scale finalised PEUF	100	100	01/10/19	31/12/20				
	Reference technology	Tests being conducted	25	50	01/10/19	31/12/20	H	12	31/12/21	Extention until 31.12.2021 already accepted by the Norwegian Research Council
3.3	Processes design	Design completed	20	10	01/10/20	31/03/22				Pilot system will be set up in May 2021
	Fouling study		0	10	01/10/20	31/03/22	H	12	31/03/23	
WP 4	DECISION SUPPORT SYSTEM DEVELOPMENT				01/05/19	28/02/22			31/03/23	
4.1	Country data acquisition	Ongoing	75	60	01/05/19	31/01/22	L	2		Delay affected by deleyd in others WP
4.2	Realization of a database on the drinking water management	Ongoing	20	60	01/05/19	31/01/22	H	6		Delay affected by deleyd in others WP
4.3	Realization of a GIS and data normalization	Ongoing	10	60	01/05/19	31/01/22	H	8		Delay affected by deleyd in others WP
4.4	Decision Support System Development	Ongoing	10	55	01/05/19	28/02/22	H	12		Delay affected by deleydin others WP



Water JPI

BlooWater

https://www.bloowater.eu

An integrative information aqueduct to close the gaps between global satellite observation of water cycle and local sustainable management of water resources

iAqueduct

Water 2017 Works

Water JPI

Coordinator: Prof. Bob Su, University of Twente

Project Manager: Dr. Yijian Zeng, University of Twente

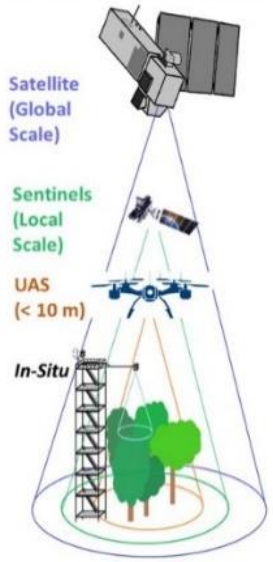
Water JPI 2018 Joint Call

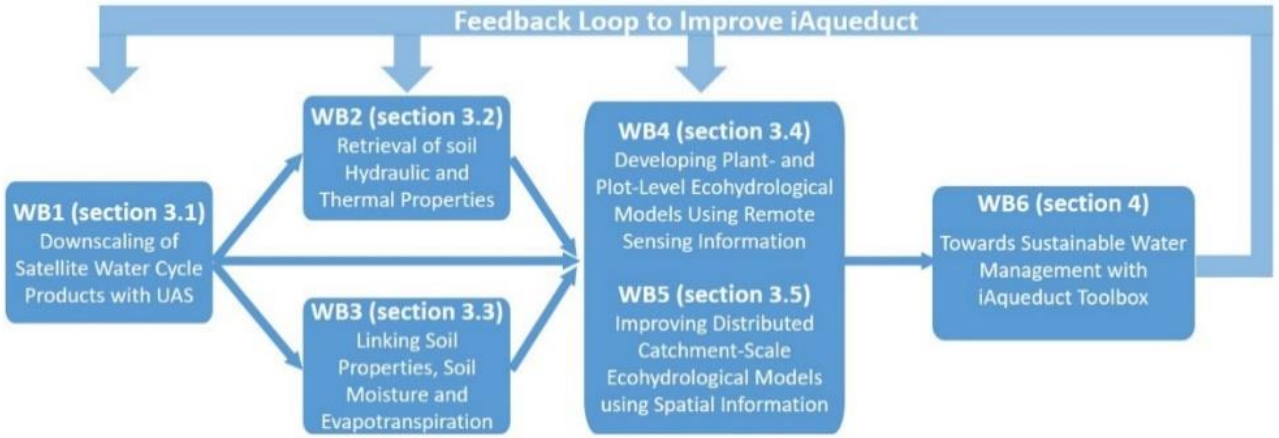
Mid-term evaluation meeting

19-20 April 2021 Online

iAqueduct Conceptual Framework

Site1. Twente. NL
Temperate, Hot Summer
Site2. Zala, HU
Cold, Humid, Warm Summer
Site3. Alento, IT
Temperate, Dry Hot Summer
Site4. Corleto, IT
Temperate, Dry Warm Summer
Site5. Barranco del Carraixet, ES
Arid, Steppe, Cold
Site6. K.S. Yoav & Afeka, IL
Arid, Dry Hot Summer





water

MDPI

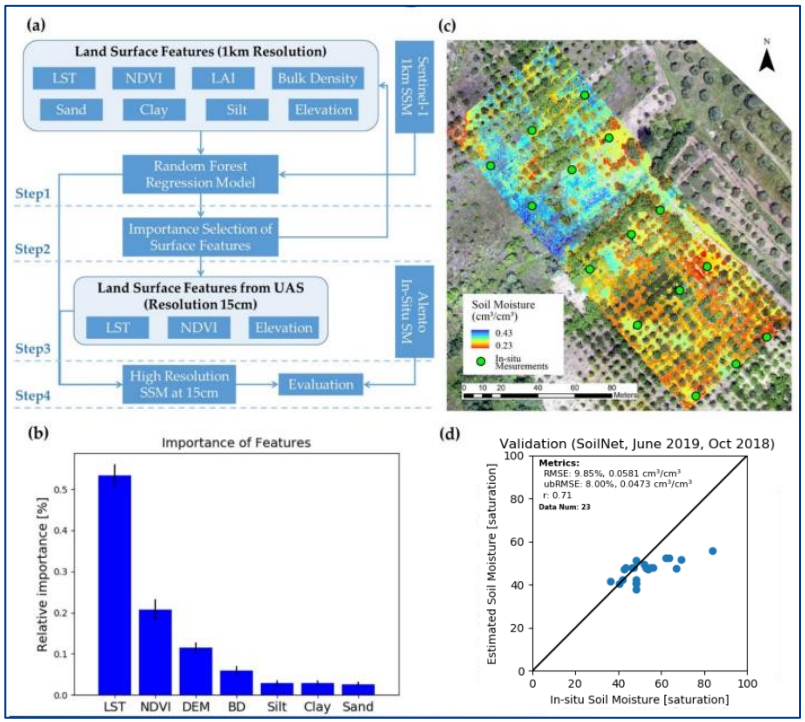
Water **2020**, *12*, 1495; doi:10.3390/w12051495

An Integrative Information Aqueduct to Close the Gaps between Satellite Observation of Water Cycle and Local Sustainable Management of Water Resources

Zhongbo Su [1,*], Yijian Zeng [1,*], Nunzio Romano [2,3], Salvatore Manfreda [4], Félix Francés [5], Eyal Ben Dor [6], Brigitta Szabó [7], Giulia Vico [8], Paolo Nasta [2], Ruodan Zhuang [9], Nicolas Francos [6], János Mészáros [7], Silvano Fortunato Dal Sasso [9], Maoya Bassiouni [8], Lijie Zhang [1], Donald Tendayi Rwasoka [1], Bas Retsios [1], Lianyu Yu [1], Megan Leigh Blatchford [1] and Chris Mannaerts [1]

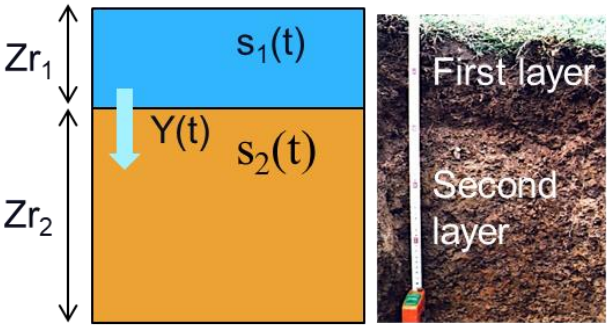
Scientific and technological results

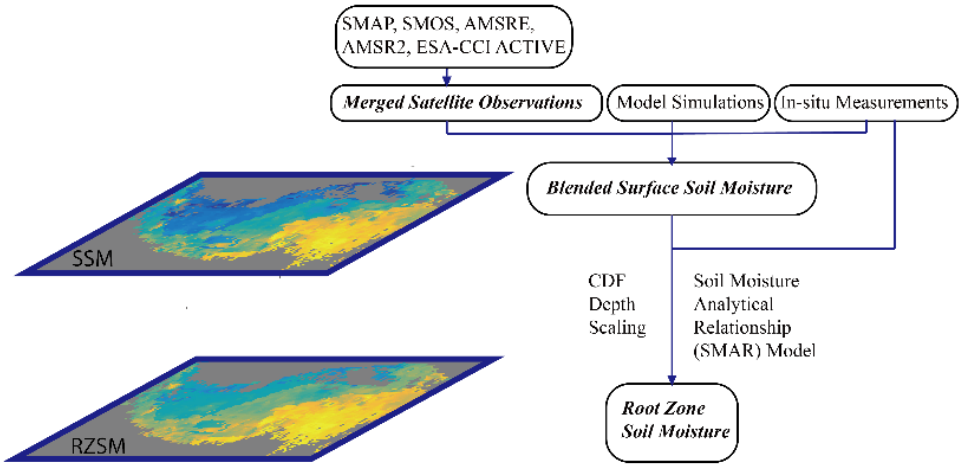
WP1. From global satellite water cycle products to field scale water states



- Su et al. 2020, Water
- Zhuang et al. 2020, Remote Sensing
- Paruta et al. 2020, TGRS
- Zhuang et al. 2021, Chapter 8, HARMONIOUS Book, Elsevier

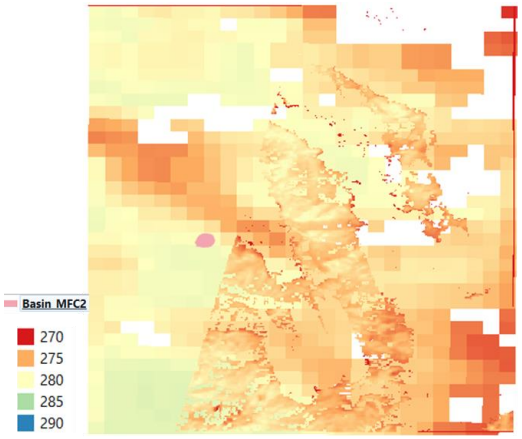
Surface & Root Zone Soil Moisture



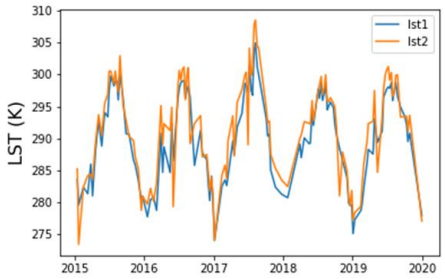


Scientific and technological results

WP1. From global satellite water cycle products to field scale water states



Presence of clouds may limit the extents of the higher resolution LST maps



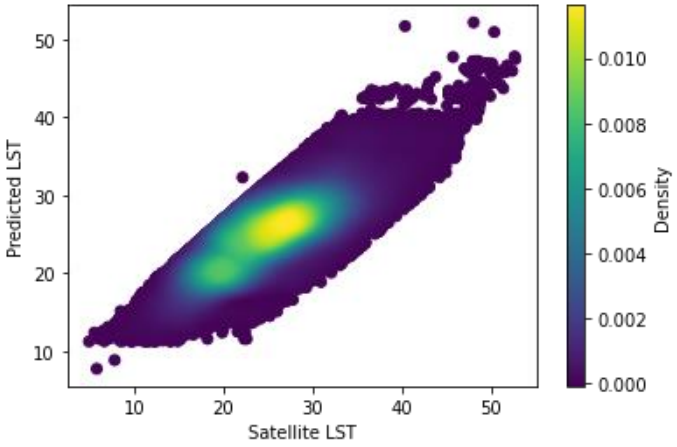
lst1: 1km MODIS LST (averaged of 13:30 and 01:30)
lst2: 30m LANDSAT LST (daytime)

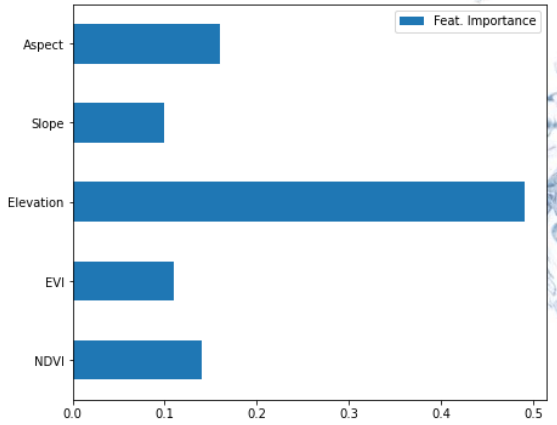
Land Surface Temperature

Njuki, S.M.; Mannaerts, C.M.; Su, Z. An Improved Approach for Downscaling Coarse-Resolution Thermal Data by Minimizing the Spatial Averaging Biases in Random Forest. Remote Sens. 2020, 12, 3507. https://doi.org/10.3390/rs12213507

Rwasoka, D.T.; Su, Z.; Zeng, Y, Machine Learning for Spatiotemporal High Resolution Land Surface Temperature Product, under preparation.

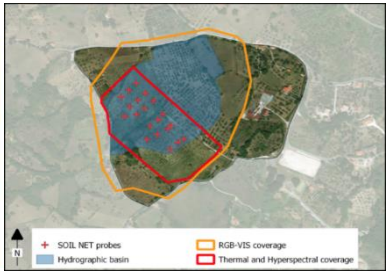
- Currently: the downscaling approach being pursued is a Random Forest (RF) approach
- Also have a feed-forward ANN and Deep NN prepared
- Incremental model development
  - Add data in batches whilst assessing what is happening with the model





Scientific and technological results

WP2. Retrieval of soil properties



Acquired spectral data	State of soil sample*				Extension of survey	Equipment used for the survey	Date of survey
	1	2	3	4			
soil reflectance in the 450-1000 and 450-2400 nm range		x	x		20 points, close to the SoilNET probes	ASD Spectrometer with SoilPRO	13 June 2019
soil reflectance in the 450-1000 and 450-2400 nm range	x		x		20 points, close to the SoilNET probes	ASD Spectrometer, Laboratory	3-4 October 2018 13 June 2019
soil reflectance in the 450-950 nm range, 125 channels		x	x		7.5 ha of study site	Cubert UHD-185 hyperspectral snapshot camera on UAS platform with a spatial resolution of 5cm	15 June 2019
soil reflectance in the 450-2400 nm spectral range	x			x	20 points, close to the SoilNET probes	SoilPRO in situ measurement & spectral analysis in laboratory	4 October 2018, 13 June 2019
soil reflectance in the 7.5-13.5 µm range		x	x		7.5 ha of study site	FLIR Tau 336 thermal camera on UAS platform with a spatial resolution of 15cm	3-4 October 2018, 13-14 June 2019
RGB in VIS range		x	x		18 ha of sub-catchment	Fuji X-T20 snapshot camera on UAS platform	13 June 2019

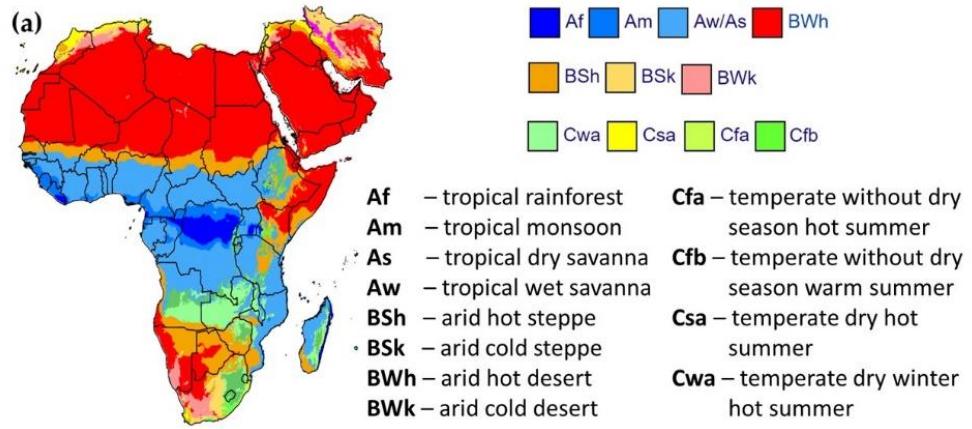
- Paolo Nasta, Brigitta Szabó, Nunzio Romano Evaluation of Pedotransfer Functions for predicting soil hydraulic properties from regional to field scales in Europe
  - Submitted to Journal of Hydrology: Regional Studies in February 2021
- Nicolas Francos, Nunzio Romano, Paolo Nasta, Yijiang Zeng, Brigitta Szabó, Salvatore Manfreda, Giuseppe Ciarolo, János Mészáros, Ruodan Zhuang, Bob Su, Eyal Ben-Dor Estimation of water infiltration rate of soil using reflectance data from ground and UAV platforms
  - Resubmission to Remote Sensing
- N. Romano, B. Szabó, A. Castrignanò, E. Ben-Dor, P. Nasta Chapter 7. Mapping soil properties for UAS-based environmental monitoring
  - Remote Sensing of the Environment using Unmanned Aerial Systems (UAS) book

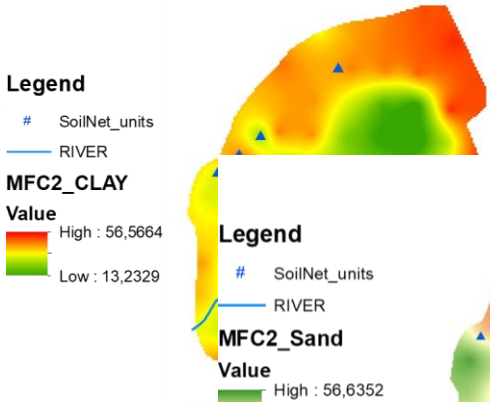
- Testing eleven PTFs to estimate **water retention parameters** (6122 soil samples) and ten PTFs to estimate **saturated hydraulic conductivity** (2126 soil samples), respectively, in Europe
- The impact of spatial variability on PTF accuracy was quantified in terms of semi-variograms and ordinary kriging **maps** in two experimental areas in southern Italy
- Functional evaluation to determine the impact of PTF accuracy on water balance components simulated in **Hydrus-1D**

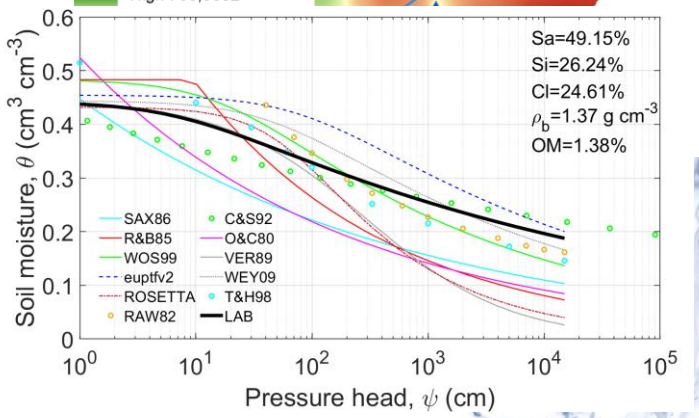
➢ Szabó, B., Weynants, M., and Weber, T. K. D.: Updated European hydraulic pedotransfer functions with communicated uncertainties in the predicted variables (euptfv2), Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2020-36

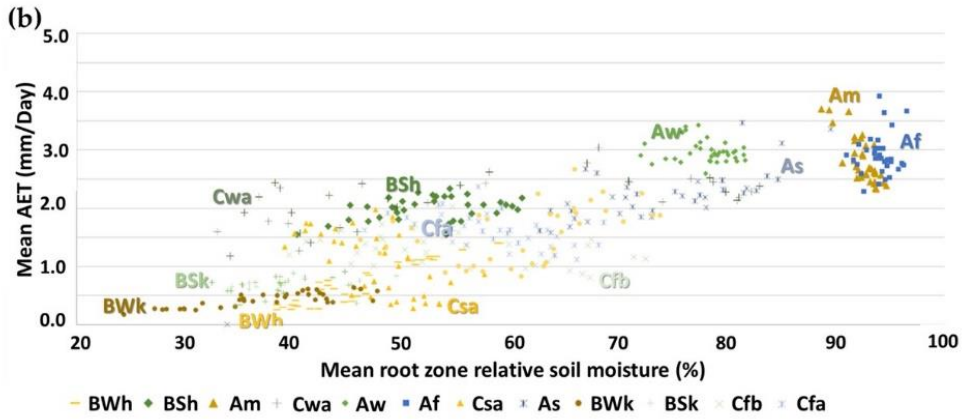
Scientific and technological results

WP3. Linking soil properties, soil moisture, and









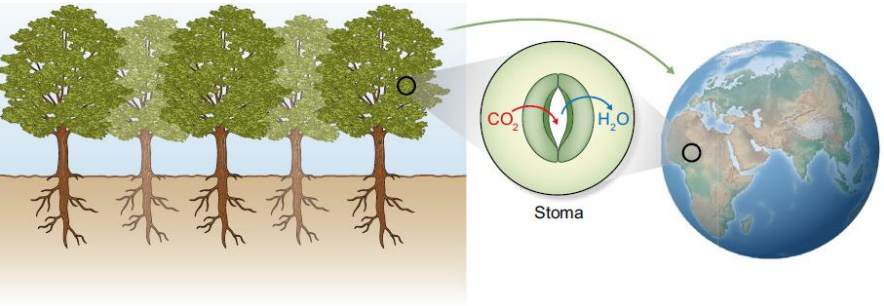
HYDRUS-1D

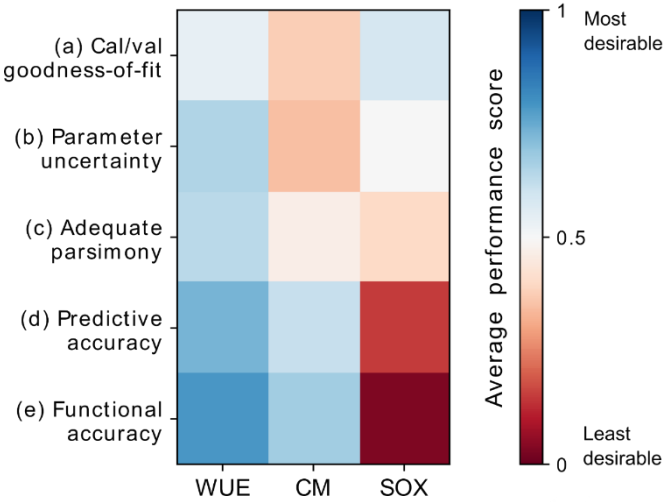
STEMMUS

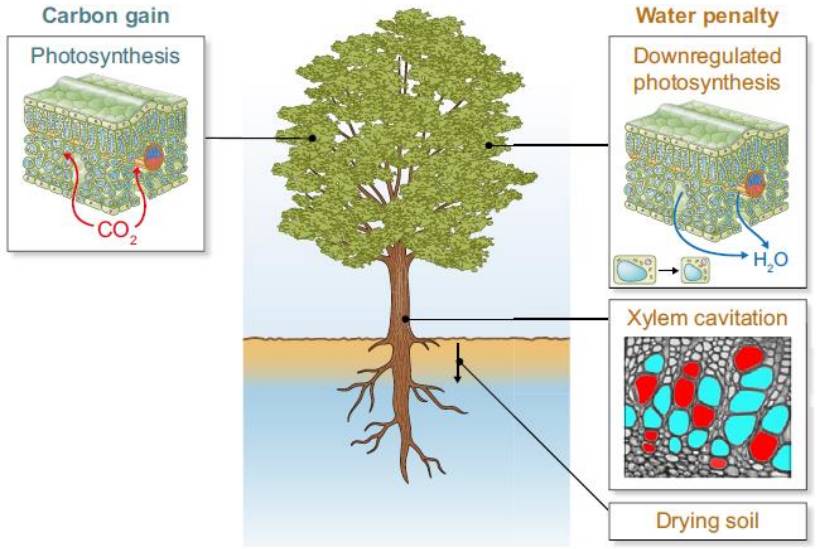
- Romano, N., N. Ursino, 2020. Forest fire regime in a Mediterranean ecosystem: unraveling the mutual interrelations between rainfall seasonality, soil moisture, drought persistence, and biomass dynamics. Fire 3, 49:1-19.
- Nasta P, Bogena HR, Sica B, Weuthen A, Vereecken H and Romano N (2020) Integrating Invasive and Non-invasive Monitoring Sensors to Detect Field-Scale Soil Hydrological Behavior. Front. Water 2:26. doi: 10.3389/frwa.2020.00026
- Romano, N. Intertwining Observations and Predictions in Vadose Zone Hydrology: A Review of Selected Studies. Water 2020, 12, 1107

Scientific and technological results

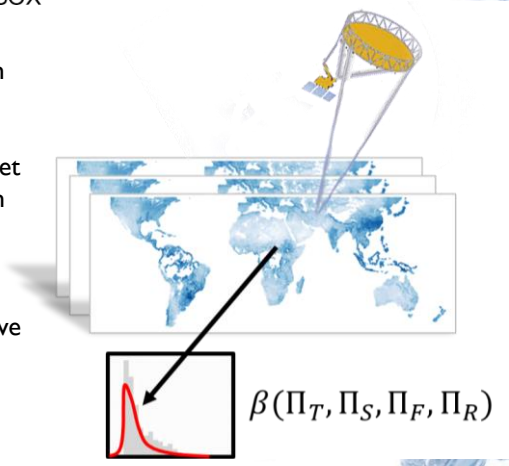
WP4 Developing Ecohydrological Models Using Remote Sensing Information





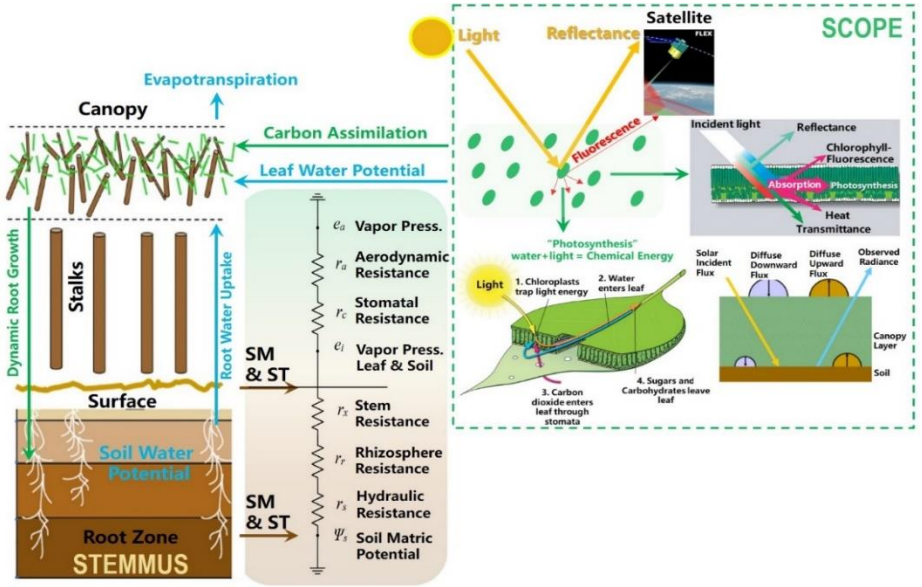


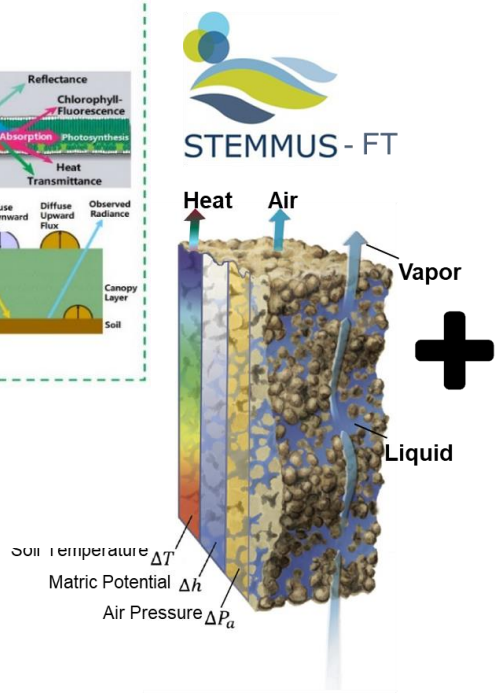
- Ruiz-Pérez G, Vico G (2020) Effects of temperature and water availability on Northern European boreal Forests, Frontiers in Forests and Global Change, 3, 34
- Wu M, Vico G, Manzoni S, Cai Z, Bassiouni M, et al, Early growing season anomalies in vegetation activity determine the large-scale climate-vegetation coupling in Europe, Journal of Geophysical Research – Biogeosciences, 2021
- Bassiouni M, Vico G, Parsimony versus predictive and functional performance of three stomatal optimization principles in a big-leaf framework, New Phytologist, in press
- Bassiouni M, Manzoni S, Vico G, Parsimonious optimality-based inference of global ecosystem water use strategies, in prep.

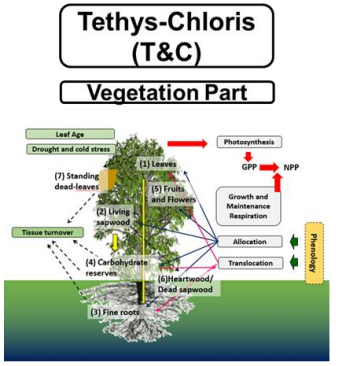


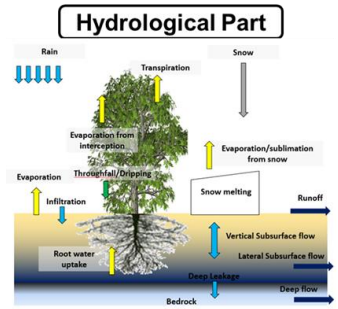
Scientific and technological results

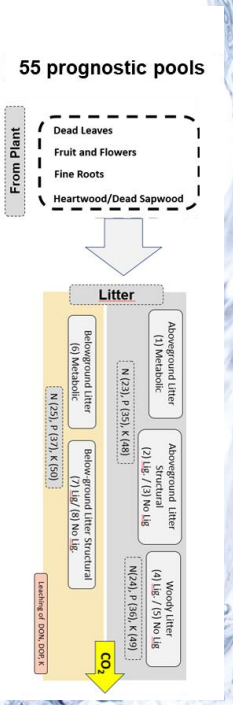
WP4 Developing Ecohydrological Models Using Remote Sensing Information









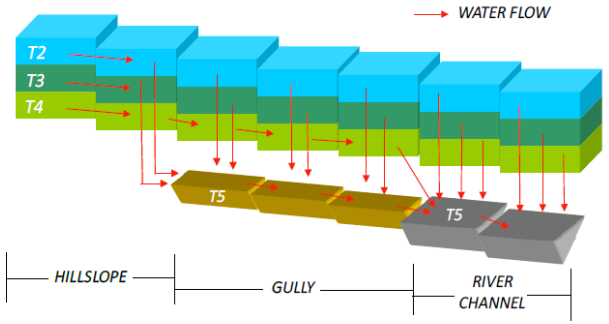


- Wang, Y., Zeng, Y., Yu, L., Yang, P., Van der Tol, C., Yu, Q., Lü, X., Cai, H., and Su, Z.: Integrated modeling of canopy photosynthesis, fluorescence, and the transfer of energy, mass, and momentum in the soil–plant–atmosphere continuum (STEMMUS–SCOPE v1.0.0), Geosci. Model Dev., 14, 1379–1407, https://doi.org/10.5194/gmd-14-1379-2021, 2021
- Yu, L., Fatichi, S., Zeng, Y., and Su, Z.: The role of vadose zone physics in the ecohydrological response of a Tibetan meadow to freeze–thaw cycles, The Cryosphere, 14, 4653–4673, https://doi.org/10.5194/tc-14-4653-2020, 2020
- Yu, L., Zeng, Y., and Su, Z.: Understanding the Mass, Momentum and Energy Transfer in the Frozen Soil with Three Levels of Model Complexities, Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2020-253

Scientific and technological results

WP5 Improving Distributed Catchment-Scale Ecohydrological Models Using Spatial Information

TETIS eco-hydrological model

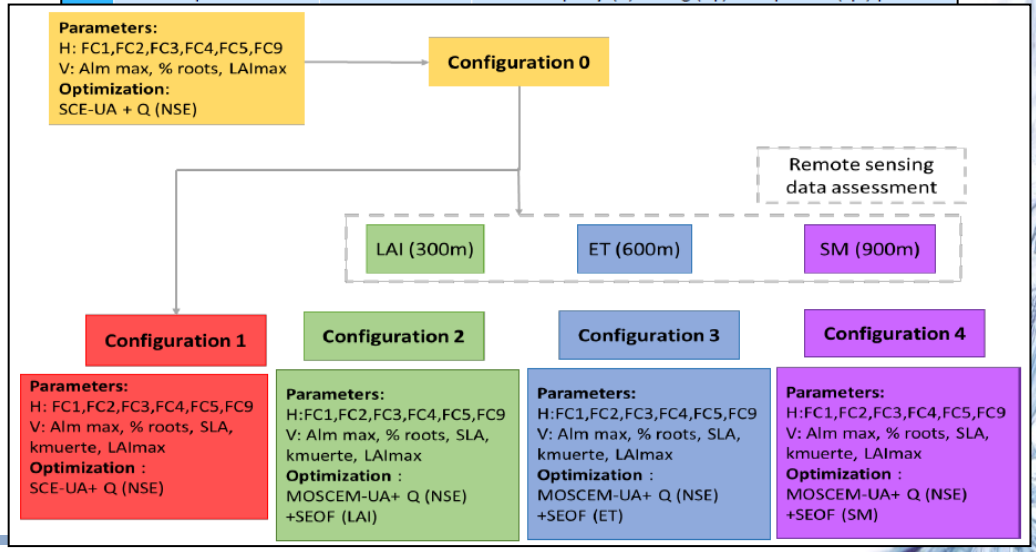


- Inclusion of spatial information during the calibration process is possible through a STE as objective function (mono or multiobjective)
- It results in an improvement of model performance
  - Reproduction of spatial patterns
  - Robustness in validation
- Some products deficient performance over the region (SM Copernicus)
  - Disagreement with precipitation spatial pattern

TETIS PARAMETERS — TETIS parameters for calibration: selection based on sensitivity analysis and expertise

Spatially distributed data

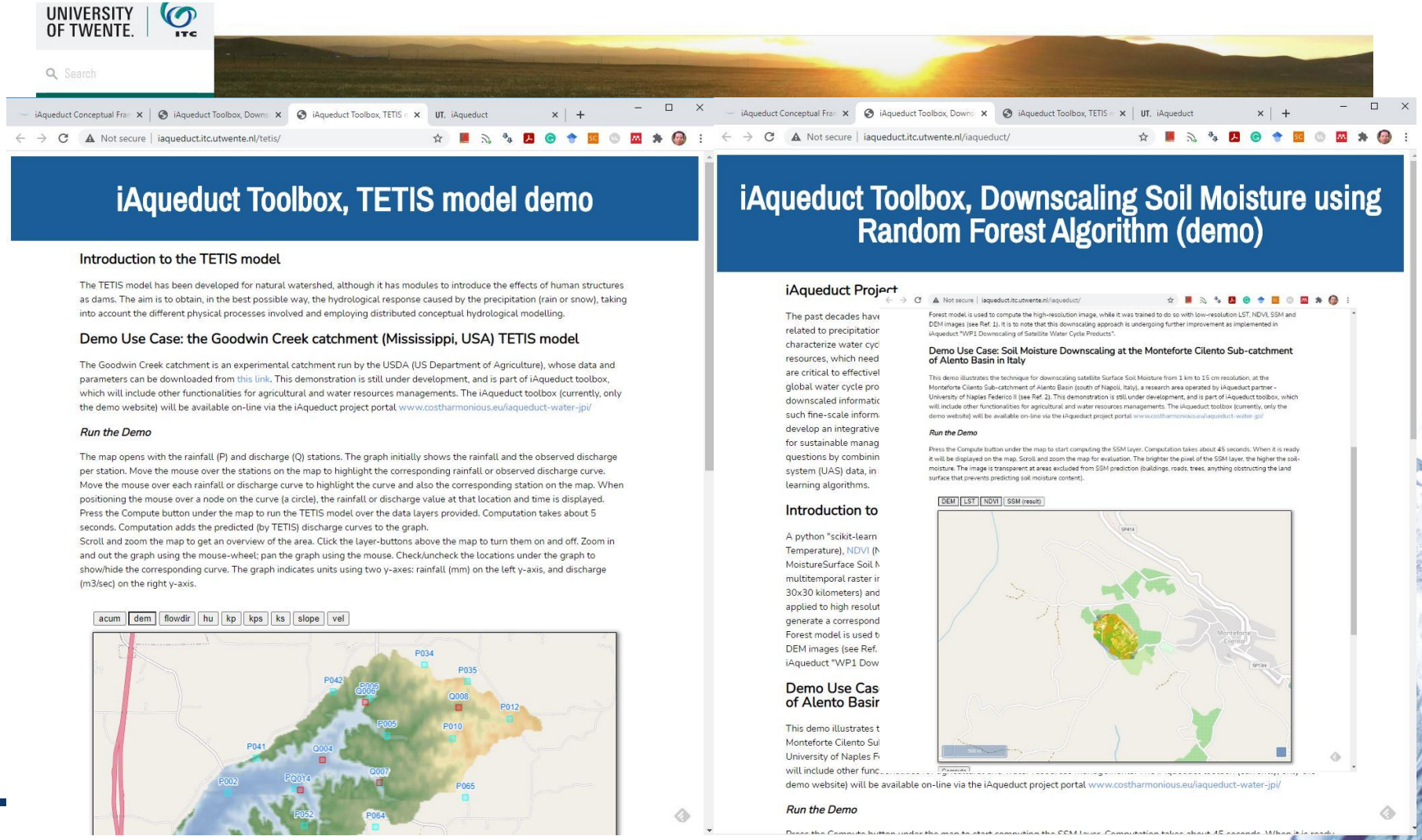
		Database	Spatial resolution	Derived parameters
Hydrological sub-model	Elevation	ICV DEM	100m	Slope, drainage directions, accumulated drainage cells, hillslope velocity
	Land Cover	Corine Land Cover 2018	100m	Land use, field capacity (fc), wilting (wp) and Optimum (opt) point
		Spanish forest map	1:50.000	Corine land use map correction
		Copernicus land cover	100m	Corine land use map correction
	Soil properties	3D-SoilsHydroGrids	250	Sat. infiltration capacity (Ks),interflow velocity (Kss), field capacity (fc), wilting point (wp) and optimum point (opt)
		Spanish Aquifer Permeability Map	1:200.000	Percolation capacity (Kp), saturated hydraulic conductivity (Ksa) and deep aquifer flow velocity (Kps)
		ISRIC Depth to bedrock	250m	field capacity (fc), wilting (wp) and optimum (opt) point



- Paper about D5.1: Advantages of exploiting additional remote sensing LAI, SSM and ET in the calibration of TETIS (in preparation).
- Harmonious book chapter: A. Maltese, F. Francés, M. García and K. Johansen. Monitoring Agricultural Ecosystems (in preparation)

Scientific and technological results

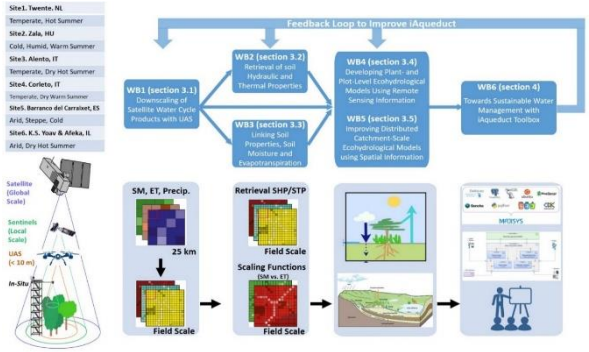
WP6 Towards Sustainable Water Management with iAqueduct Toolbox



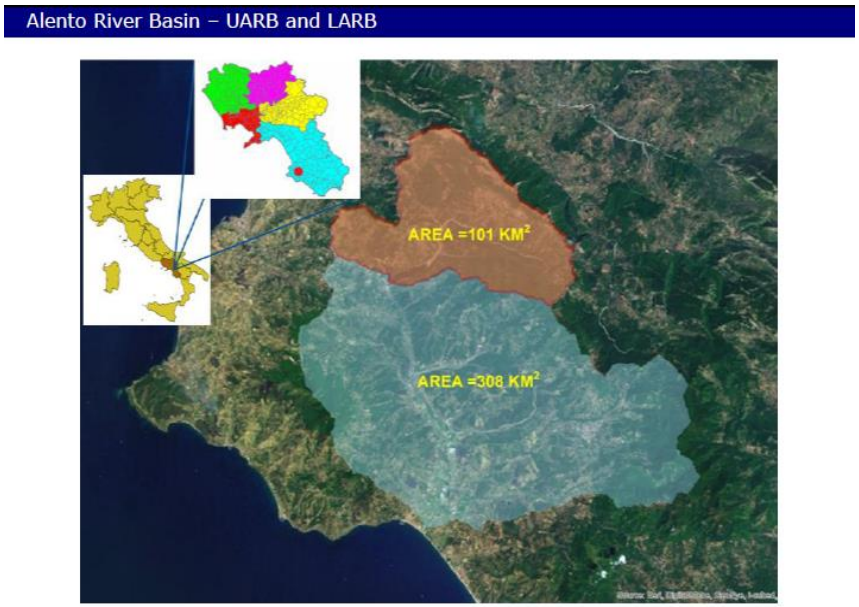
Collaboration, coordination, mobility, synergies

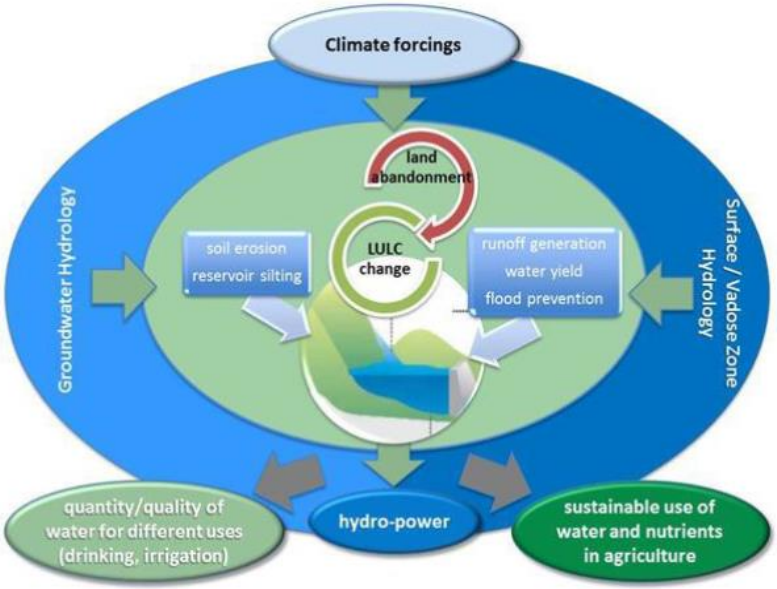
HARMONIOUS
UAS for environmental monitoring

Interaction

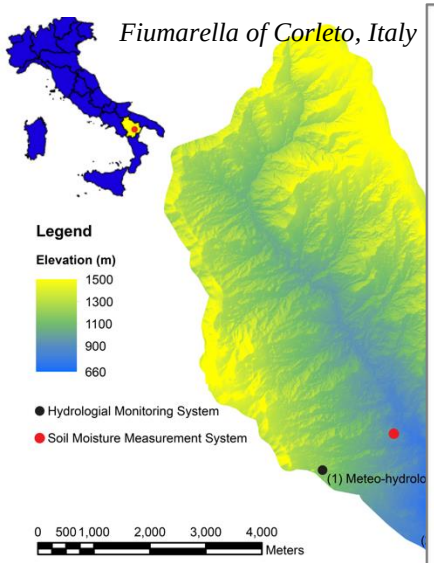


Stakeholder engagement



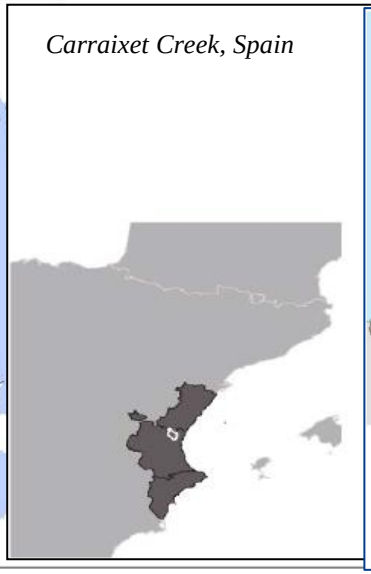


Fiumarella of Corleto, Italy

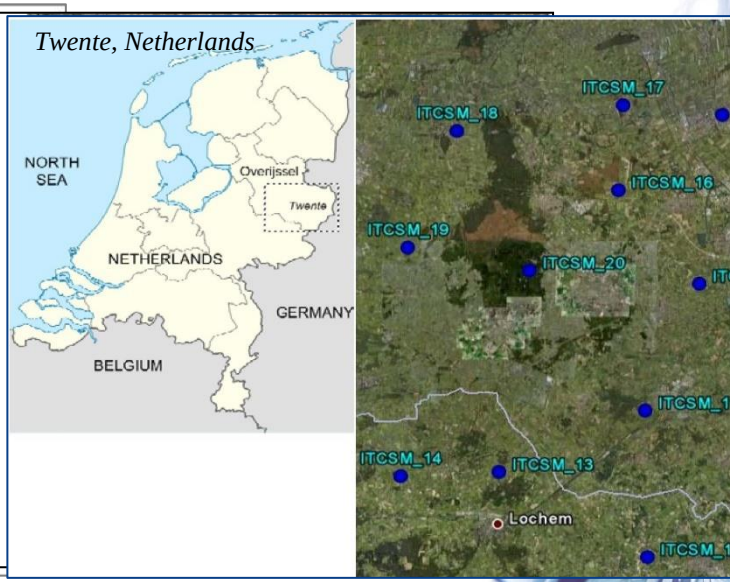


Zala catchment study site, Hungary

Carraixet Creek, Spain

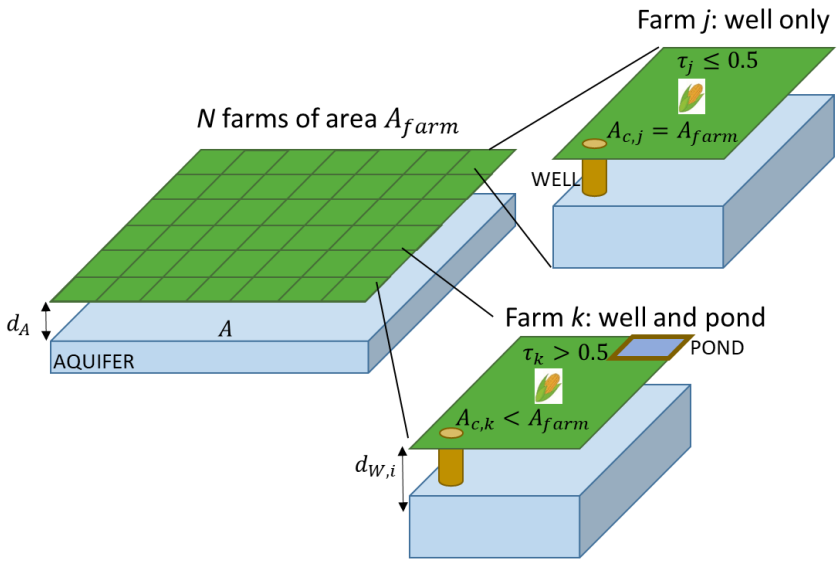


Twente, Netherlands



Impact and knowledge output

Socio-eco-hydrological models for water resource management in agriculture



We advance socio-hydrology by developing a model for a smallholder farming system under conditions of water scarcity and rainfall unpredictability.

The model deals with the investment decision making between developing on farm-ponds vs. further groundwater exploitation under a falling water table.

The model identifies the most beneficial water source for economic gain and its stability, and how it can change across communities and under future climate scenarios.

Such a model, in iAqueduct, is important for stakeholder engagement and improving water management

- Tamburino L, Di Baldassarre G, Vico G, 2020, Water management for irrigation, crop yield and social attitudes: a socio-agricultural agent-based model to explore a collective action problem, Hydrological Sciences Journal, 65(11), 1815–1829

So far …

- 15 international peer-reviewed journal papers
- 6 manuscripts under revision/submission
- 3 book chapters ready to be submitted

Continuation of the work in the future

WP1: UAV campaigns covering dry and wet seasons for generating consistent Surface/RootZone Soil Moisture at 1km, 30m, and 16cm resolutions; Incorporating the surface SM downscaling and Root Zone SM model (SMAR) into iAqueduct Toolbox;

WP2: Apply what have been achieved in Alento MFC2 catchment to other study sites, and catalogue their data availability; Proceed with the development of Spectral-Transfer functions, and the 'Pedotransfer Function' for soil thermal properties;

WP3: Apply the soil hydraulic (thermal) properties (as obtained from PTF) in models (e.g., HYDRUS, STEMMUS, STEMMUS-SCOPE) to determine the impact of PTF accuracy on water, energy and carbon balance; Proceed the development of a scaling function of ET, based on predictor variables (soil moisture, soil texture, etc.) with machine learning approach;

WP4: Further inter-comparisons of models, soil and vegetation parameterizations leveraging the information-theoretical predictive and functional performance metrics and the developed parsimonious ecohydrological models;

WP5: Validation/confirmation of TETIS, DREAMS, and STEMMUS-T&C model at catchment scales and implement simulations over a common study area (Upper Alento), using downscaled Remote Sensing Data from WP1/WP2.

WP6: Drought analysis and risk assessment over all iAqueduct study sites; engage stakeholders for a sustainable water resource management with iAqueduct knowledge/data/models (toolbox)

Any comments?

Water JPI

URBANWAT

Agenda 20 April

Projects presentations on Topic 2- Strengthening Socio-economic Approaches to Water Management *FG members: Budds, Becker, Covaliova, Schirmer, Suzenet*	
10:00 – 10:20	*NATWIP*
10:20 – 10:40	*NEWTS*
10:40 – 11:00	*RECOWATDIG*
11:00 – 11:20	*Sense and Purify*
11:20 – 11:40	*SIMTWIST*
11:40 – 11:55	*Group Discussion with the Follow-up Group and Coordinators*
11:55 – 12:30	Coffee / Snack Break
Projects presentations on Topic 1- Enabling Sustainable Management of Water Resources *FG members: Budds, Becker, Covaliova, Schirmer, Vehanen*	
12:30 – 12:50	*MARadentro*
12:50 – 13:10	*WaterHarmony*
13:10 – 13:30	*RainSolutions*
13:30 – 13:50	*EviBAN*
13:50 – 14:05	*Group Discussion with the Follow-up Group and Coordinators*
14:05 – 14:30	Q&A with the funding agencies Reflections and summary. Wrap-up. *Water JPI Vice Chair, Miguel Ángel GILARRANZ REDONDO (AEI, Spain)*