DIGIWATER

Co-funded by the Erasmus+ Programme of the European Union

R4.2 Slides from the inter-project coaching sessions

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

PROJECT INFO

Project title	Digitalisation of water industry by innovative graduate water education
Project acronym	DIGIWATER
Project reference number	621764-EPP-1-2020-1-NO-EPPKA2-KA
Action type	Knowledge Alliances in Higher Education
Web address	http://waterharmony.net/projects/digiwater/
Coordination institution	Norwegian University of Life Sciences (NMBU)
Project duration	01 January 2021 – 30 April 2024

DOCUMENT CONTROL SHEET

Work package	WP4 Internal Quality Assurance
Ref. no and title of task	T4.2 Inter-project coaching
Title of deliverable	Slides from the inter-project coaching sessions
Lead institution	NMBU
Author(s)	Rasha Hassan, Harsha Ratnaweera
Document status	Final
Document type	Report
Document version and date	22/10/2023
Dissemination level	Internal

VERSIONING AND CONTRIBUTION HISTORY

Version	Date	Revision description	Partner responsible
v.01	22 September 2023	Document created	NMBU

Contents

1. Event description, goals and outcomes

The inter-project coaching meeting took place in a hybrid format on 15th September 2023 in coincide with the International conference SINARG 2023 that took place at the University of Nis (UNI), Nis, Serbia. The targeted audience of this event was primarily the DigiWater consortium, the beneficiaries of several European projects, participants of the conference and the academic staff.

The broader objective of DigiWater is to strengthen water-related higher education in 6 partner countries to increase the resilience against climate change impacts by developing HEI's competencies and skills with modern technology and teaching resources. Therefore, this event aimed at exchanging of experience, good practices, and lessons in the ongoing and past projects in order to transfer it to DigiWater consortium and promote its related competencies. Additionally, holding this event with the SINARG international conference enabled the organiser to build synergies among the higher education institutions as well as other stakeholders, and to provide the opportunity of networking.

The outcome of this event was a successful coaching on project management through presentations of the different aspects of the projects.

2. Event details

This meeting was moderated by Harsha Ratnaweera (NMBU) and Milan Gocić (UNI). The meeting was composed of two sessions:

First session: Achieved synergy between higher education institutions

Ten presentations were given as related cases under different topics and their levels ranged from international, European and national. In order to achieve the overall objective of the session, the speakers highlighted different items from the projects including:

- Development practices
- Quality assurance
- Project management issues
- Inter-cultural background
- Factors of project environment
- Assets of institutions

The presentations were:

- **CCWATER** (Graduates for Climate Change adapted water management)
- **DIGIWATER** (Digitalization of Water industry by Innovative Graduate Water Education)
- **SMART4ENV** (Enhancing the scientific capacity of Tubitak MRC in the field of smart environmental technologies for climate change challenges)
- **INNOWAT** (EU water policy and innovative solutions in water resources management)
- **ElectroSoil** (A new concept in improvement of geotechnical properties of ground – chemical electrokinetic treatment of soils)
- **Substrate** (Towards sustainable buildings: novel strategies for the design of vibration resistant cross-laminated timber floors)
- **WATERLINE** (Transforming Advanced Water Skilling Through the Creation of a Network of Extended reality Water Emulative Centres)
- **SMARTWB** (Curricula innovation in climate-smart urban development based on green and energy efficiency with the non-academic sector)
- **DGTRANS** (Transport of Dangerous Goods – Modernization of Curricula and Development of Trainings for Professionals in the Western Balkans HEIs)
- **SEACWater** (Soft Sensors Enabling Advanced Control Algorithm for Biological Wastewater Treatment Processes)
- **ARSINOE** (Climate-resilient regions through systemic solutions and innovations).

Second session: Exchanging ideas

The purpose of this session was mainly for networking among the attendees and brainstorm on how to develop projects and overcome the recurring issues they encounter in projects. To achieve this, GroupMap, an online brainstorming platform, was used to collect the input of attendees regarding these issues. The template of Starfish Retrospective was used as a structure to organise the brainstorming process Figure 1.

Figure 1: The template of Starfish Retrospective

Additionally, the brainstorming followed the process shown in Figure 2. The results of the brainstorming are shown in Figure 3. The attendees recommended:

More of:

- Having more inter-project coaching sessions, training and effective communication.
- Collaborating in writing more projects.
- Promoting the role of monitoring and evaluation.
- Establishing effective communications among the partners.
- Carrying out effective training to increase the competencies.

Less of:

- Ineffective workload.
- Unclear version for the projects.
- High number of online meetings and ineffective communications.

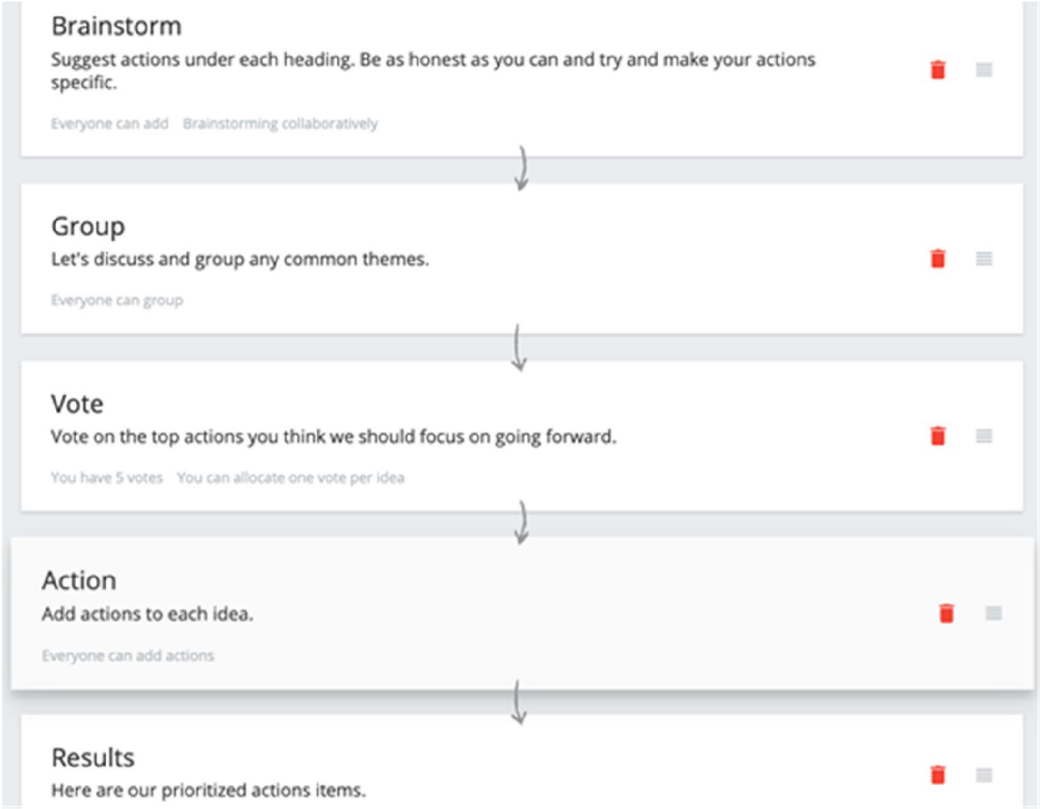

Figure 2 The Brainstorming process.

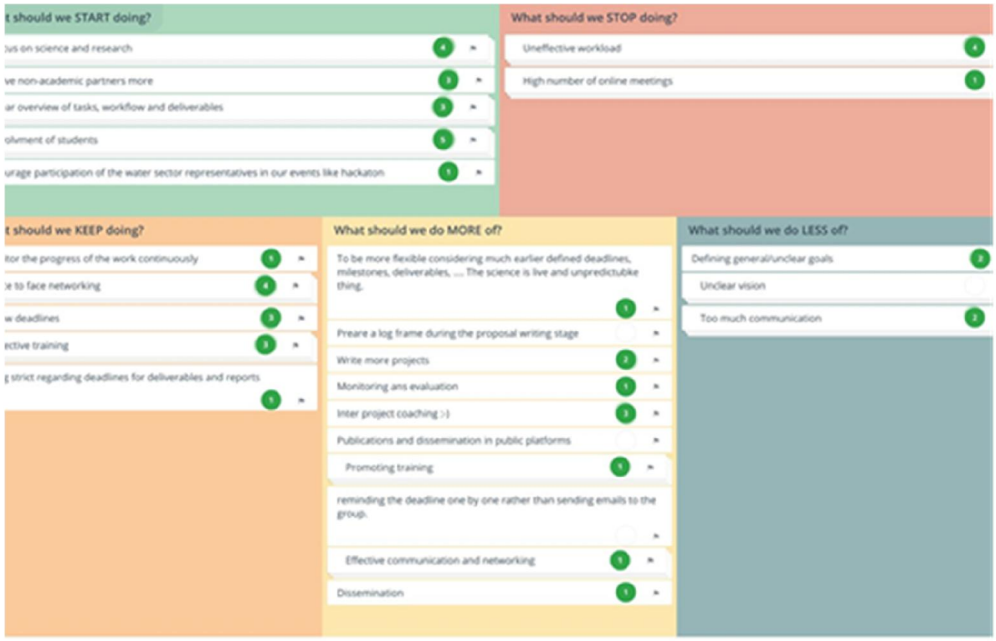

Figure 3 The GroupMap results.

3. The agenda

CC WATER | sinarg 2023 the International Conference Synergy of Architecture & Civil Engineering | DIGIWATER | Co-funded by the Erasmus+ Programme of the European Union

Inter-project coaching meeting

Coincide with the International conference SINARG 2023

Friday, 15th September 2023 (Time in CET)		
Moderator: Milan Gocić (UNI) Venue: Faculty of Civil Engineering and Architecture, Aleksandra Medvedeva 14, Nis		
09:00-09:10	Greetings and Welcome Technical information	Harsha Ratnaweera, Norwegian University of Life Sciences (NMBU) Milan Gocić, University of Nis
First Session – Achieved synergy between higher education institutions		
09:10-09:15	CCWATER (Graduates for Climate Change adapted water management)	Harsha Ratnaweera, Norwegian University of Life Sciences
09:15-09:20	DIGIWATER (Digitalization of Water industry by Innovative Graduate Water Education)	Harsha Ratnaweera, Norwegian University of Life Sciences
09:20-09:25	SMART4ENV (Enhancing the scientific capacity of Tubitak MRC in the field of smart environmental technologies for climate change challenges)	Zakhar Maletskyi, Norwegian University of Life Sciences
09:25-09:30	INNOWAT (EU water policy and innovative solutions in water resources management)	Milan Gocić, University of Nis
09:30-09:35	ElectroSoil (A new concept in improvement of geotechnical properties of ground – chemical electrokinetic treatment of soils)	Elefterija Zlatanović, University of Nis
09:35-09:40	Substrate (Towards sustainable buildings: novel strategies for the design of vibration resistant cross-laminated timber floors)	Radovan Cvetković, University of Nis
09:40-09:45	WATERLINE (Transforming Advanced Water Skilling Through the Creation of a Network of Extended reality Water Emulative Centres)	Vuk Milošević, University of Nis
09:45-09:50	SMARTWB (Curricula innovation in climate-smart urban development based on green and energy efficiency with the non-academic sector)	Marija Jevrić, University of Montenegro
09:50-09:55	DGTRANS (Transport of Dangerous Goods – Modernization of Curricula and Development of Trainings for Professionals in the Western Balkans HEIs)	Milan Protić, University of Nis
09:55-10:00	SEACWater (Soft Sensors Enabling Advanced Control Algorithm for Biological Wastewater Treatment Processes)	Wang Xiaodong, Qingdao University of Technology

10:00-10:05	ARSINOE (Climate-resilient regions through systemic solutions and innovations)	Giannis Adamos, University of Thessaly
Second Session – Exchanging ideas		
10:05-10:30	Networking	Harsha Ratnaweera, Norwegian University of Life Sciences
10:30-10:40	INNOWAT - Certificate award ceremony	Milan Gocić, University of Nis
10:40-10:45	Event evaluation and general conclusions	All participants

4. Participant information

Number of participants at the event	23 in person 16 virtually
Description	
This event brought together participants from different consortiums of European projects and national ones as well as the attendees of the conference. The virtual attendees joined from different locations across the world including Mongolia, Norway, China and Sri Lanka.	

5. Attachment

Agenda (PDF)	Uploaded and added to this document
Attendance list (PDF)	Uploaded and added to this document
Presentations (PDF)	Uploaded
GroupMap report	Added to this document
Other remarks: The ZOOM meeting	

Appendix

Attendance lists:

- **Physical**

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Inter-project coaching meeting

Coincide with the International conference SINARG 2023

Friday, 15th September 2023

o.	Name	Institution	E-mail	Signature	I would like to opt out from being photographed at the event
	ТЕТАР ВЕЛИЋ	МИСАНТ	petarvw@gmail.com		
	Eleftherija Zlatanović	Faculty of Civil Eng. Niš	eleftherija2006@yahoo.com		
	Radovan Veličković	— " —	radovanvetkomo@yahoo.com		
	MARIJA JEVRIĆ	FACULTY OF CIVIL ENG, MONTENEGRO	marijaj@ucg.ac.me		
	Dimitrije Cvetković	Elektronski fakultet u Nišu	dimitrije.cvetkovic@gmail.com		
	Milica Milošević	Elektronski fakultet u Niš	milicamilo@elfak.rs		
	Katarina Antanasijević	Elektronski fakultet u Nišu	katarina.antanasijevic@gmail.com		
	Nikola Benedikt	Elektronski fakultet u Nišu	nikola@elfak.rs		
	Теодора Стојановић	Електронски факултет у Нишу	teodora.stojanovic@elfak.rs		
0	Maja Milić	Електронски факултет у Нишу	majamilic@elfak.rs		
1	VUK MILOŠEVIĆ	FACULTY OF CIVIL ENG. BELGRADE	VUKAMFE@GMAIL.com		
2	Milica Ćirić	Faculty of Civil Engineering and Arch.	milica.cvetic@gaf.ni.ac.rs		

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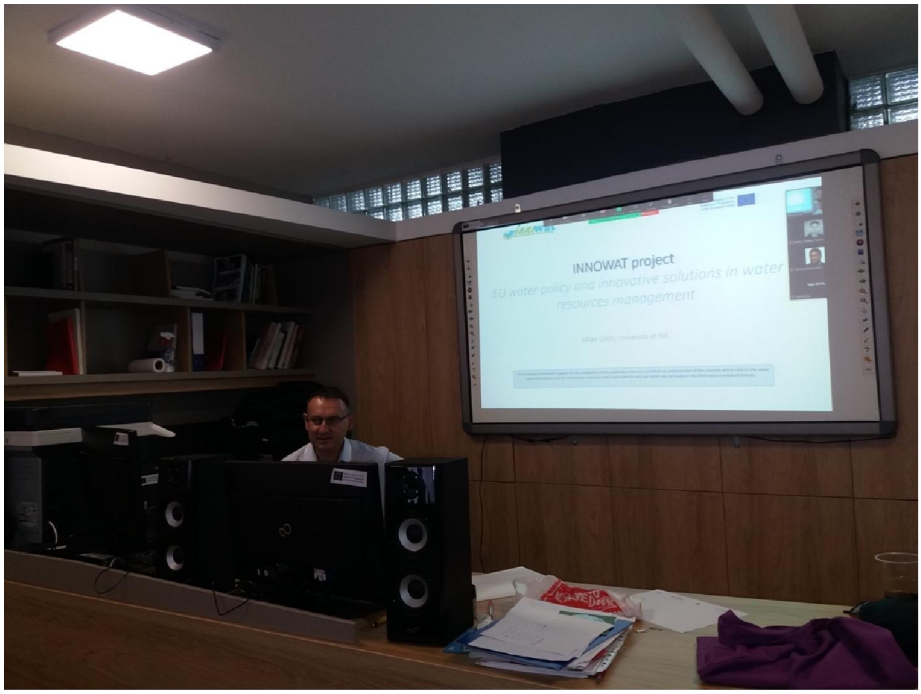
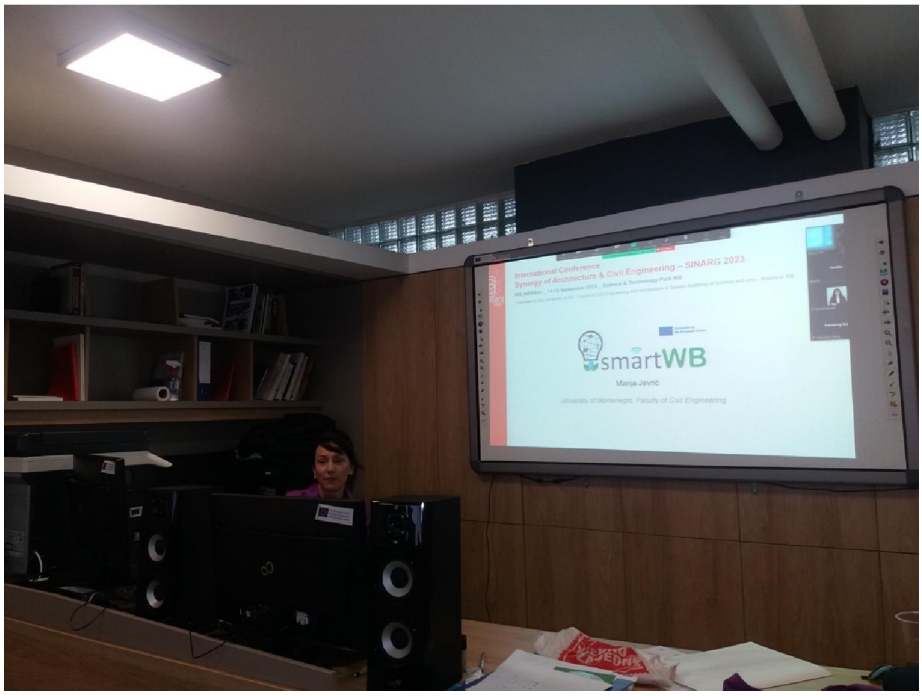
No.	Name	Institution	E-mail	Signature	I would like to opt out from being photographed at the event
13	GIANNIS ADAMOS	UNIVERSITY OF THESSALY	adamos.giannis@gmail.com		
14	TAMARA RADENOVIĆ	FACULTY OF OCCUPATIONAL SAFETY	TAMARA.RADJENOVIC@EUFAX.NI.AC.RS		
15	Вукашин Тодоровић	Академија Технико-васпитних струка	Vukosintodorovic19@gmail.com		
16	JELENA PEJOVIĆ	FACULTY OF CIVIL ENGINEERING	jelenapej@ucg.ac.me		
17	Milan Protić	University of Montenegro University of Niš	milanprotic@gmail.com		
18	TUŠAN TORINA	[illegible]	dturina@uggs.rs		
19	Aleksandar Đorđević	Faculty of Civil Engineering and Architecture University of Niš	aleksandar.djordjevic@gaf.ni.ac.rs		
20	DUŠAN TEODOROVIĆ	SERBIAN ACADEMY OF SCIENCES AND ARTS	DUTEODOR@GMAIL.COM		
21	VLADA VELIKOVIĆ	SERBIAN ACADEMY OF SCIENCES & ARTS	vbvelikovic@yahoo.com		
22	MILAN GOCIĆ	UNIVERSITY OF NIŠ	milan.gocic@gaf.ni.ac.rs		
23	MILI SELIMOTIĆ	University of Mostar	mili.selimotic@untmo.ba		
24					
25					
26					
27					
28					
29					
30					

- **Virtual**

Caption

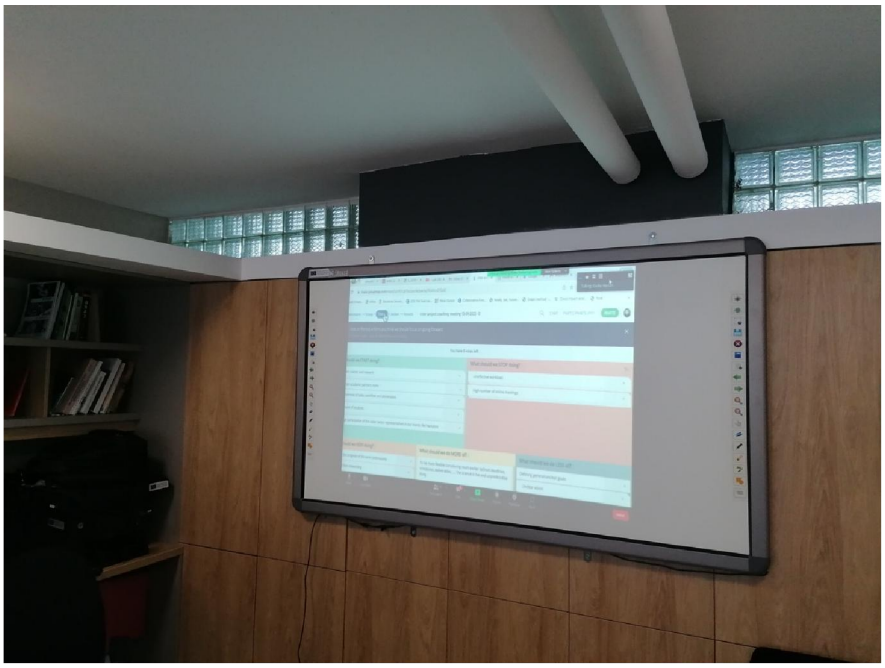
Photos


INNOWAT project
EU water policy and innovative solutions in water resources management

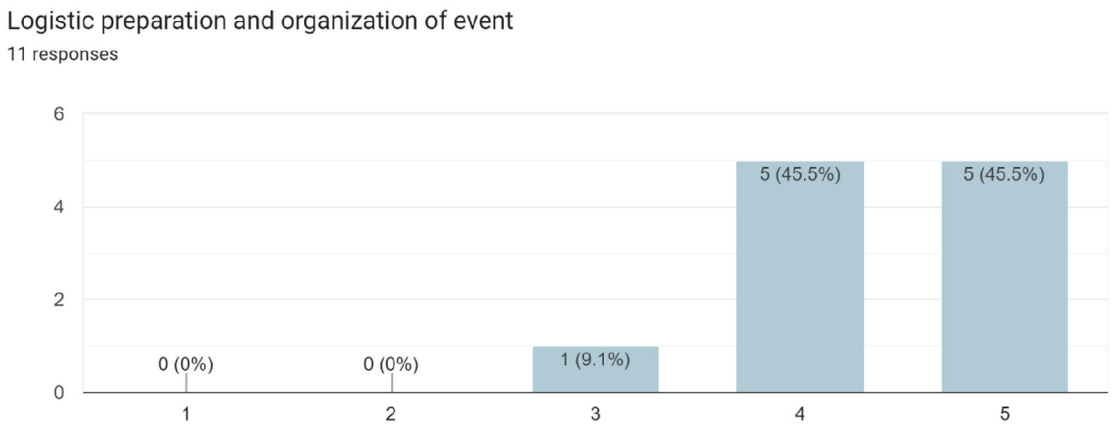

International Conference
Synergy of Architecture & Civil Engineering – SINARG 2023
smartWB
Marija Jevrić
University of Montenegro, Faculty of Civil Engineering


ARSINOE


WATERLINE
The WATERLINE Project

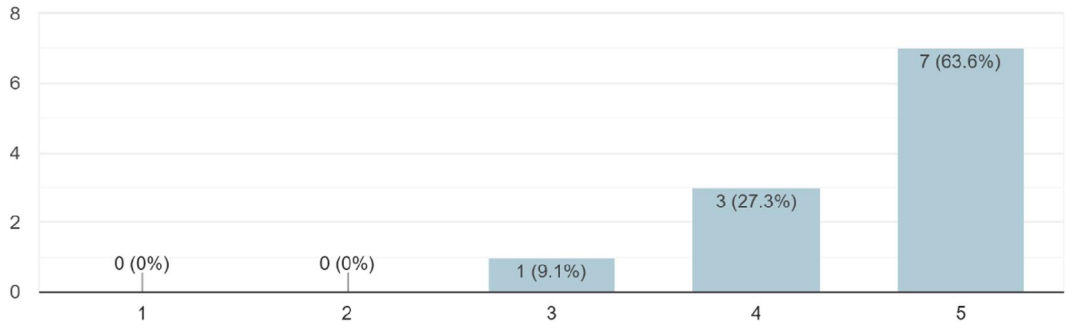


Evaluation:


Logistic preparation and organization of event
11 responses
6
4
2
0
0 (0%)
0 (0%)
1 (9.1%)
5 (45.5%)
5 (45.5%)
1
2
3
4
5

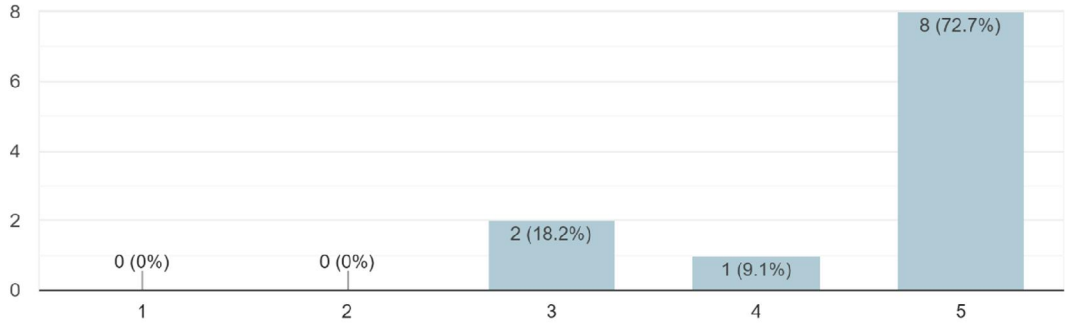
Content of the agenda

11 responses



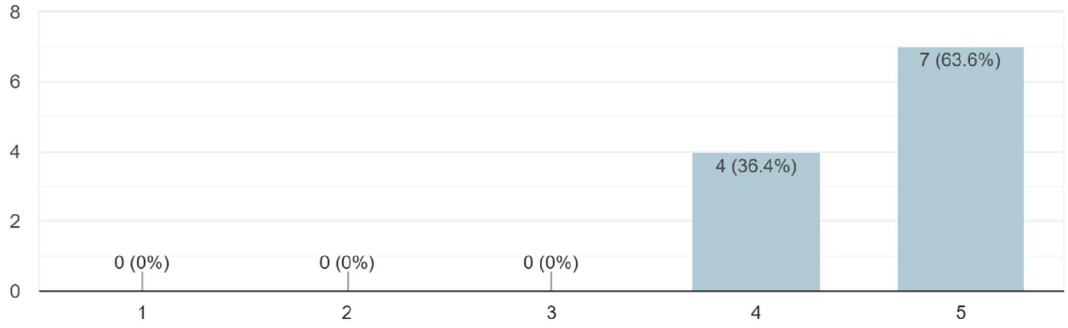
Arrangements of the event (ZOOM, presentations, etc.)

11 responses



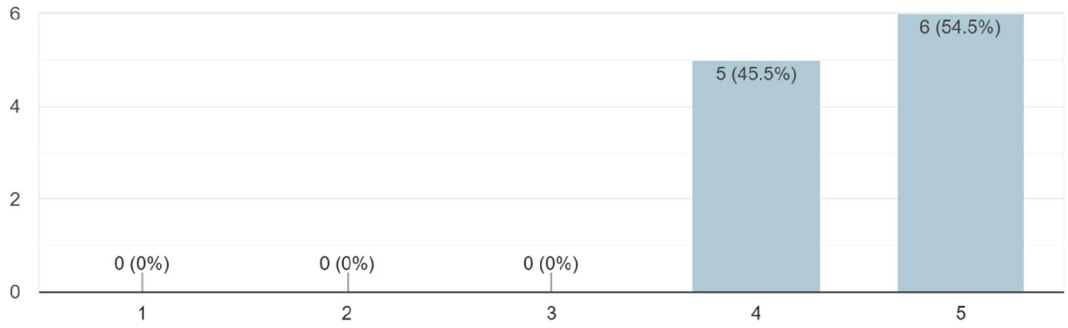
Communication during the event

11 responses



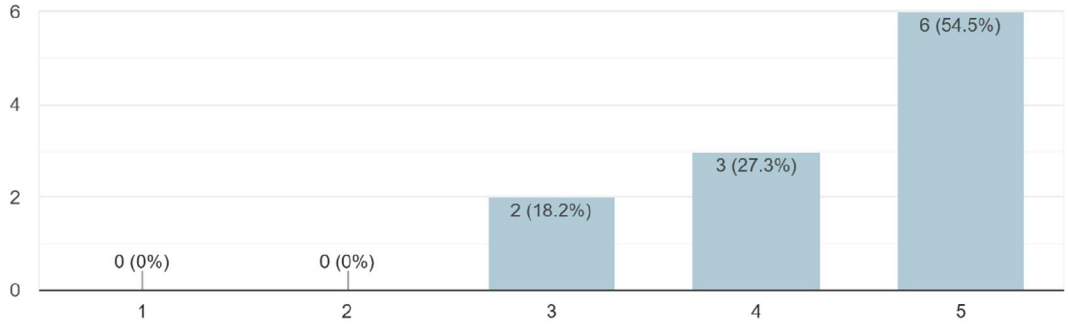
Duration and timetable of the event

11 responses



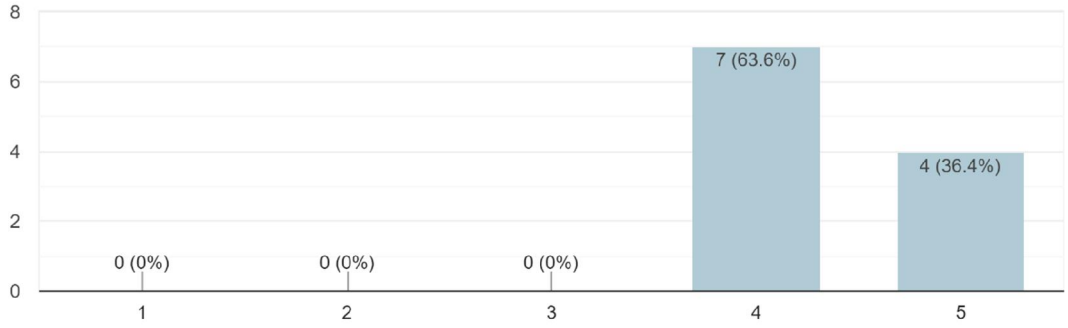
Quality of materials provided during the event

11 responses

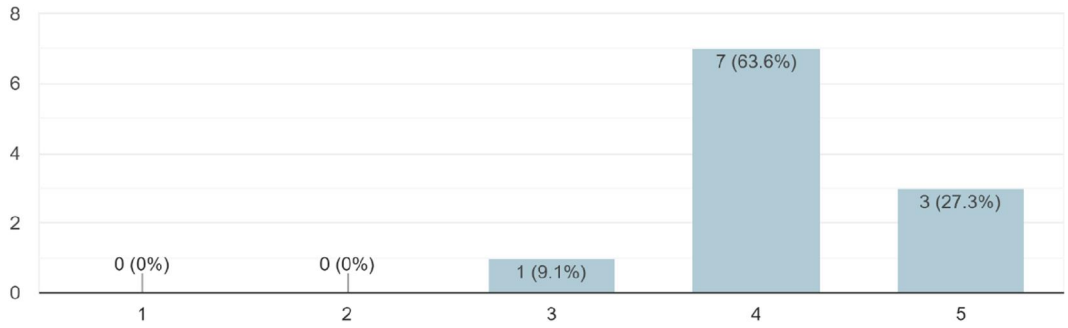


How relevant and applicable was the coaching content to your projects?

11 responses



To what extent did you gain new insights or knowledge from the coaching session?
11 responses



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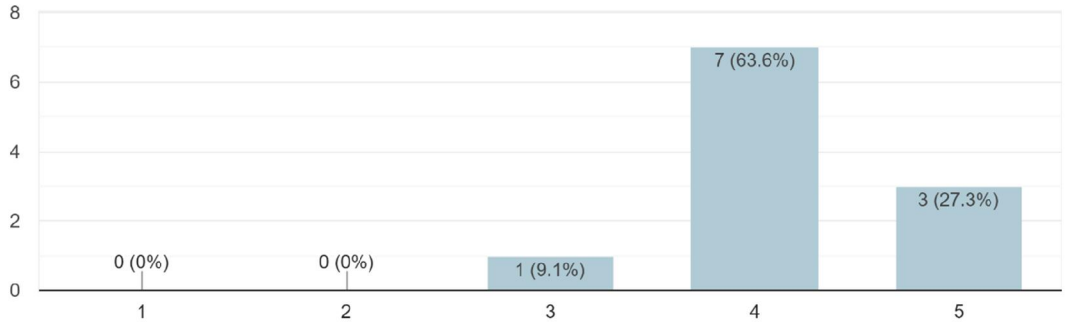
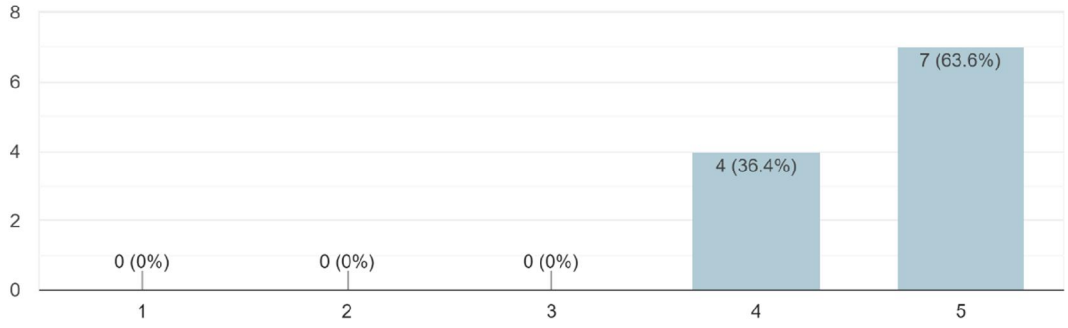
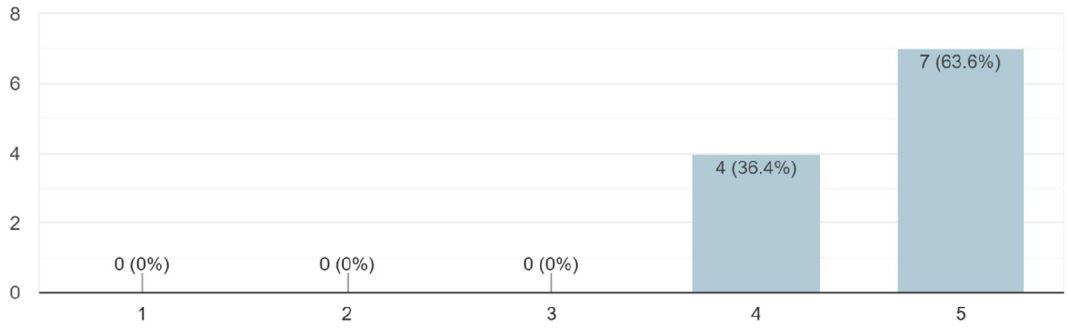


How effective was the facilitator in guiding the session and fostering interaction?
11 responses



Were the facilitation techniques and methods appropriate for the audience?

11 responses



International Conference
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Niš (SERBIA) _ 14-15 September 2023 _ Science & Technology Park Niš

Organised by the University of Niš - Faculty of Civil Engineering and Architecture & Serbian Academy of Science and Arts – Branch in Niš

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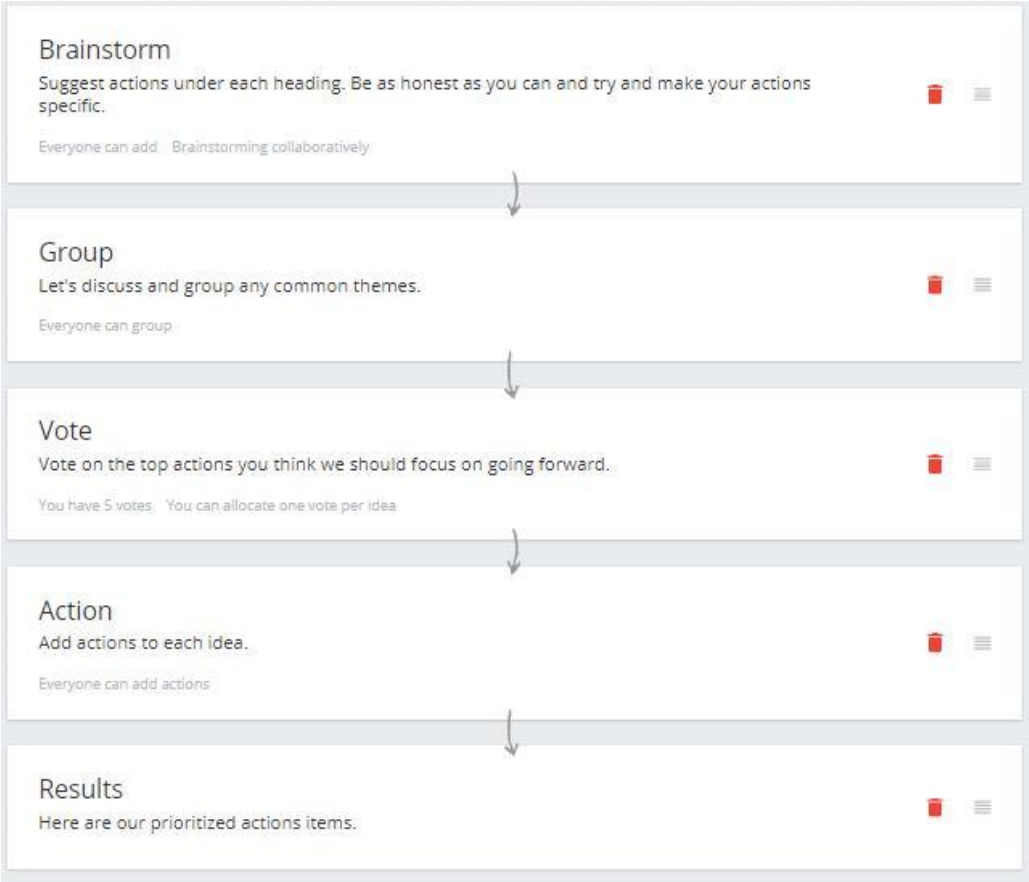
10:40-10:45	Event evaluation and general conclusions	All participants

Sharing experience

- Brief info about the project (title, partners, duration, budget)
- Good practices/lessons learned
  - Application process and evaluations
  - Inception/start-up stage
  - Implementation stage
  - Management (meetings, reporting)
  - Dissemination and communication
- What would we do differently next time?

GroupMap activity

Process


Brainstorm
Suggest actions under each heading. Be as honest as you can and try and make your actions specific.
Everyone can add
Brainstorming collaboratively
Group
Let's discuss and group any common themes.
Everyone can group
Vote
Vote on the top actions you think we should focus on going forward.
You have 5 votes
You can allocate one vote per idea
Action
Add actions to each idea.
Everyone can add actions
Results
Here are our prioritized actions items.

How to contribute?

Browse to **join.groupmap.com**
and enter invite code

488-6AA-AFD

https://join.groupmap.com/488-6AA-AFD

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Synergy of Architecture & Civil Engineering
sinarg 2023

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Inter-project coaching

Inter-project coaching
– learning from best practices

- There is a lot to learn from our own proposals and projects as well as from others. However, often we do not use these opportunities.
- Different project coordinators, organisations and programs have different practices – a lot to learn (for free!)
- How to avoid costly errors and how to make a better application next time
- How to incorporate good practices which will save time, resources and reduce frustrations and even penalties?

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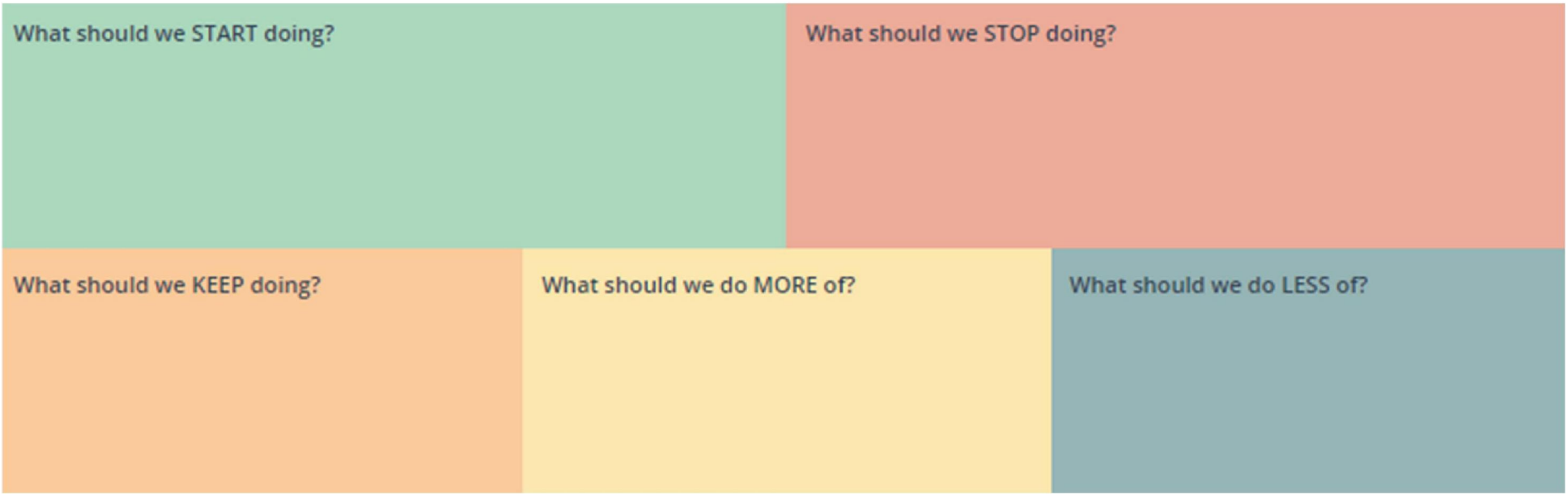
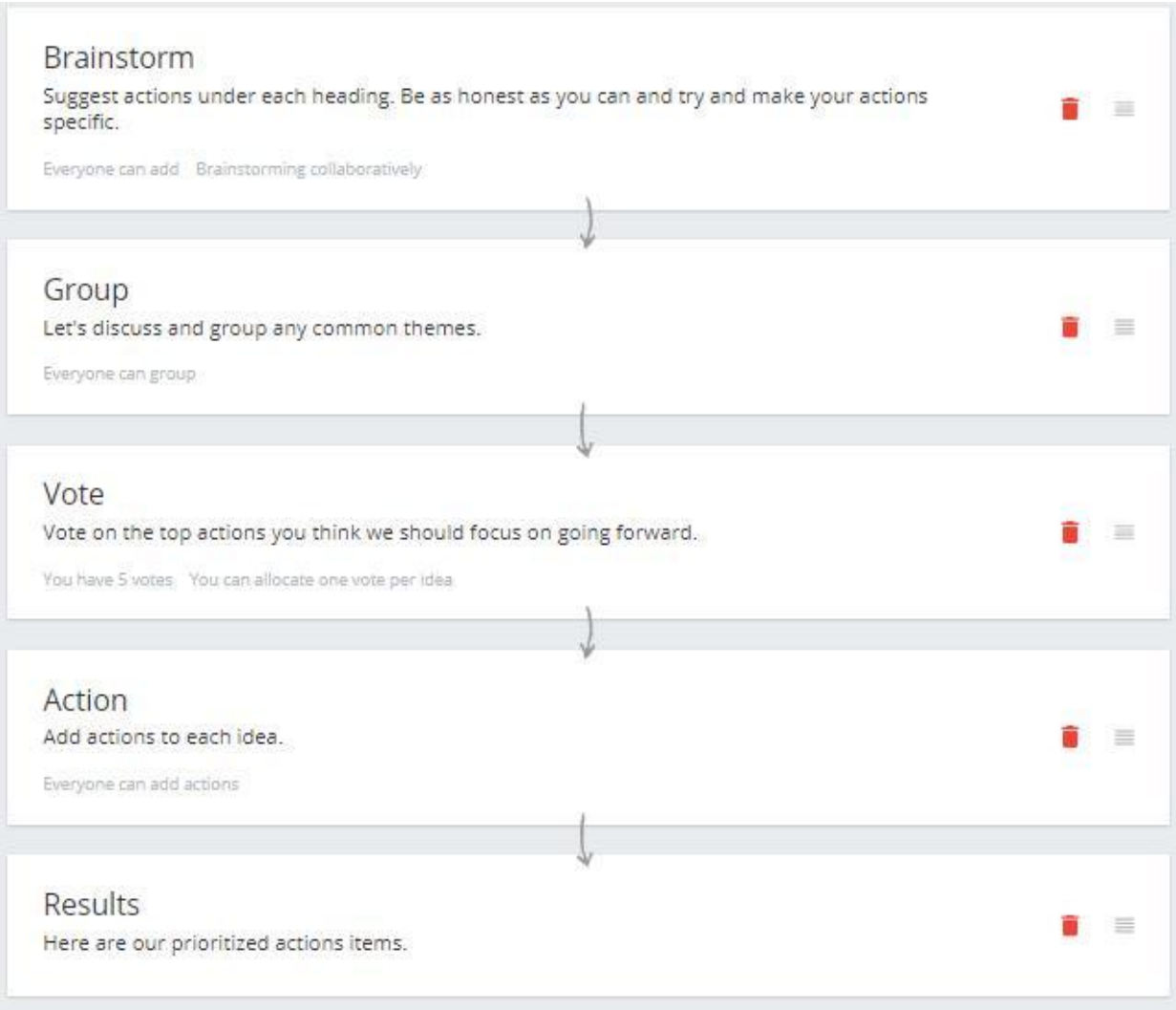
GroupMap


What should we START doing?
What should we STOP doing?
What should we KEEP doing?
What should we do MORE of?
What should we do LESS of?

Process


Brainstorm
Suggest actions under each heading. Be as honest as you can and try and make your actions specific.
Everyone can add
Brainstorming collaboratively
Group
Let's discuss and group any common themes.
Everyone can group
Vote
Vote on the top actions you think we should focus on going forward.
You have 5 votes
You can allocate one vote per idea
Action
Add actions to each idea.
Everyone can add actions
Results
Here are our prioritized actions items.

How to contribute?

Browse to **join.groupmap.com**
and enter invite code

488-6AA-AFD

https://join.groupmap.com/488-6AA-AFD

DIGIWATER

Digitalisation of water industry by innovative graduate water education

Co-funded by the Erasmus+ Programme of the European Union

Erasmus+ Knowledge Alliance Call
Among the 30 best applications among 217
2021-2023
1mill €

Erasmus+
Cooperation for innovation and the exchange of good practices
Knowledge Alliances in Higher Education

Disclaimer:
This project has been funded with support from the European Commission.
This presentation reflecta the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

12 partners from 6 countries + EU

	University	SME
Norway	Norwegian University of Life Sciences, Ås	DOSCON, Oslo
Germany	University of Applied Sciences Ostwestfalen-Lippe	Stadtentwaesserungsbetrieb Paderborn
Belgium	Katholieke Universiteit Leuven	Sumaqua, Leuven
Romania	University of Galati "Dunarea de Jos"	Smartech Automation SRL, Galati
Cyprus	University of Cyprus, Nicosia	I.A.CO Environmental And Water Consultants Ltd, Strovolos
Turkey	Istanbul Technical University	Memsis Environmental Technology R & D Co.Lt, Istanbul
EU	European Water Association EWA, Hennef, Germany	

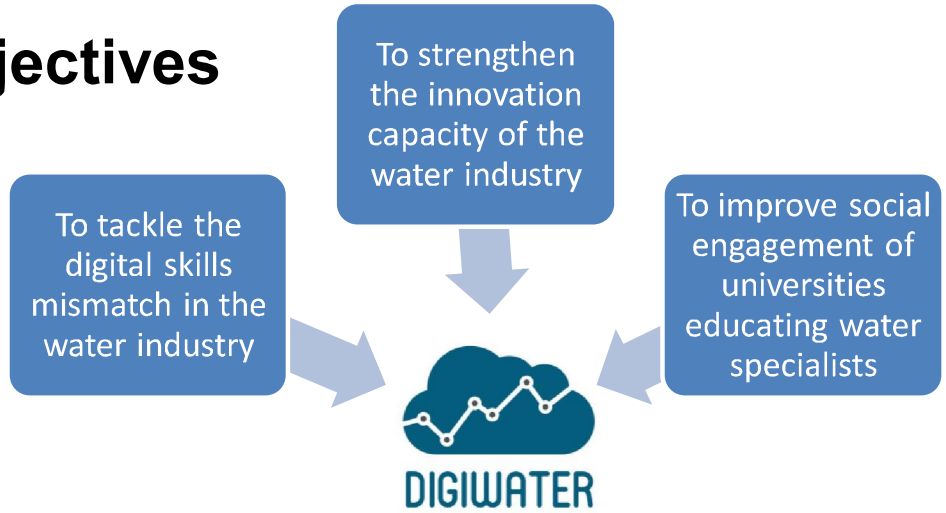
Good practices & and lessons learned
Application process

What are we trying to accomplish?

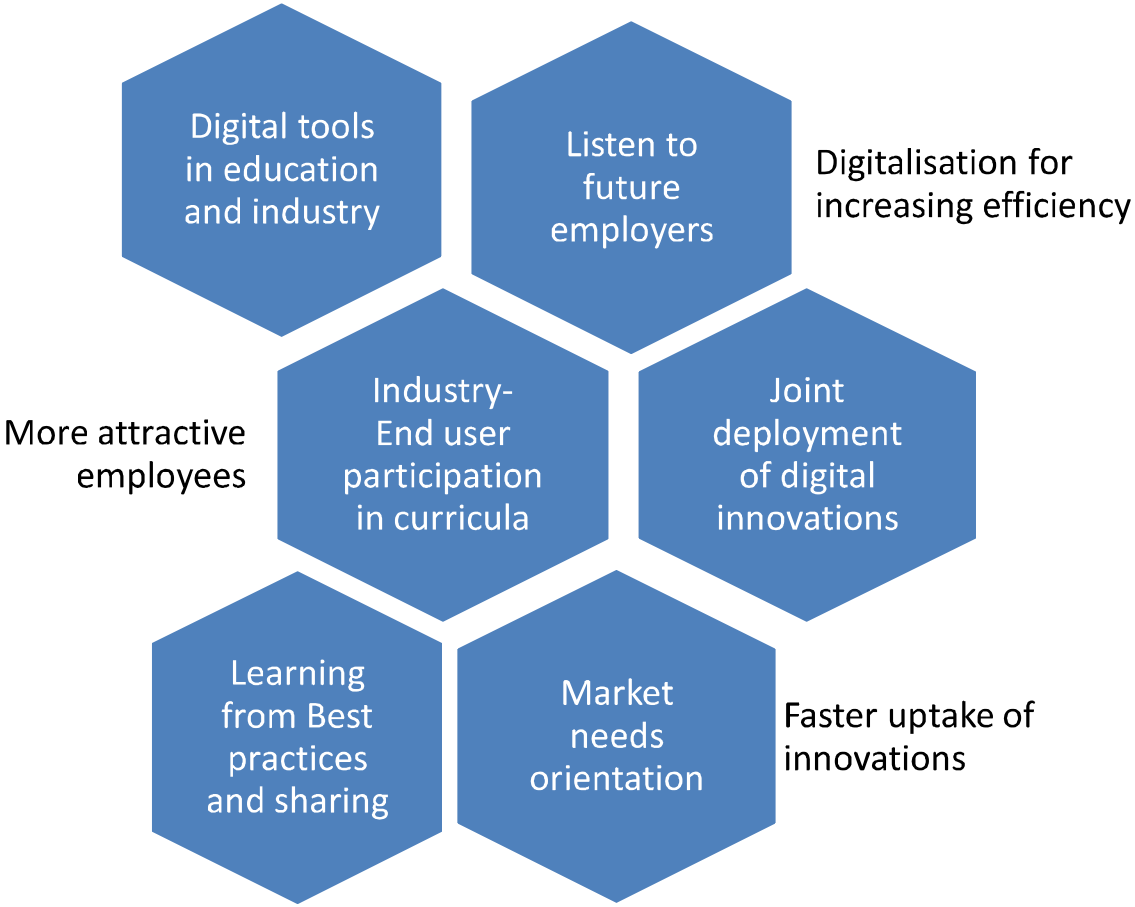
A water-smart, sustainable and encouraging growth Europe, improving its competitiveness and productivity via digitalisation and promoting entrepreneurship.

Water-smart society: none is wasted, avoid water scarcity and damage due to climate change (flooding) and secure the right quality of the water where it is needed.

Objectives



WHY IS OUR APPROACH INNOVATIVE AND WHY DO WE THINK IT WILL BE SUCCESSFUL?



IF (WHEN) WE SUCCEED, WHAT DIFFERENCE WILL IT MAKE IN THE SHORT AND IN THE LONG TERM?

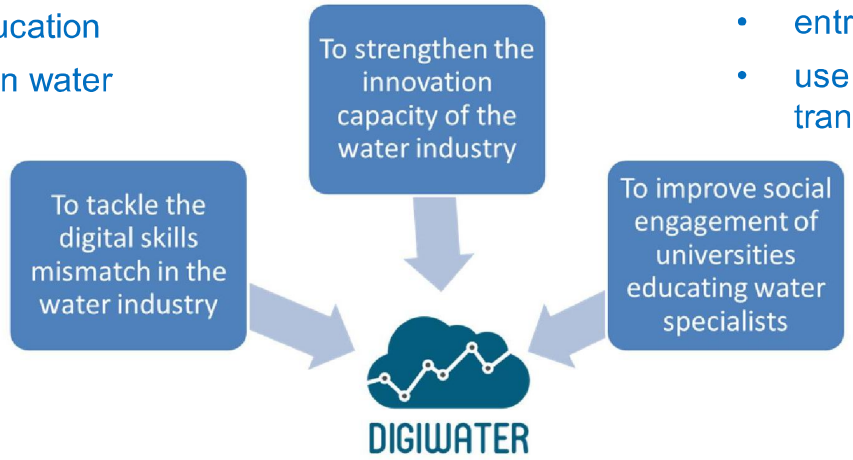
	Impacts	
	Short-term	Long-term
TG1: Future water professionals	Development of skills and competences necessary to support digitalization of water industry	Growing generation of water professionals leading digital transformation of water industry
TG2: Water professionals	Update of knowledge and competences towards 'smartening of the water system'	Support of digital transformation in the industry, rather than resistance
TG3: Water educators,	Upgraded curricula, improvement of teaching styles by modern tools and resources	Enhancing smart specialisation for water in higher education
TG4: Technology entrepreneurs	Reduction of research costs and quicker implementation of innovations in the market	Sustainable of Open Innovation in the industry
TG5: Local communities	Growing specific opportunities that can be realised in practice	Growing positive changes based on regional innovation ecosystems
TG6: Water industry	Transfer of positive impacts of digitalization from other industries	Skills match between water engineers and process control specialists
TG7: European community at large	Digitalization of water enterprises	Highly competitive European water sector and attractive water-related higher education

How it is done?

- Promoting innovation coordinating: companies-academia-government (Digital Water Living Lab)
- enhancing digital innovations in curricula during education for future employment
- joint academia-industry deployment of digital innovations (Digital Water Innovation Camps)
- facilitating the knowledge exchange between academia and industry (Digital Experiential Education)

- smart specialisation for digital water (curricula with industry participation)
- intelligent use of digital tools in education
- use digital tools for the presentation water industry to nonprofessionals

- improving the orientation of academia towards societal and market needs
- entrepreneurial education components
- use of digital tools to reinforce transdisciplinary approaches



Good practices & and lessons learned
Start-up / Inception & implmentation

- Several physical meetings were planned because social networking is one of the key features for sustainability
- COVID-19 disturbed the process
- Digital start-up meeting - not really the same. Shorter meetings, difficult keep the concentration

- Less successful follow-up: not stringent in requiring deliverables on time +++

Good practices & and lessons learned
Management

- Variable engagement among partners
- Not disciplined to follow Erasmus+ guidelines on report formats, minutes, publishing in web pages
- No frequent communication with the Project Officer

- Involve more experienced and disciplined project managers in the project

ENSUARING VISBILITY AND DISSEMINATION

- A Dissemination and Exploitation Plan
- Project webpage, social media networking (for experts and end users)
- Templates for results
- Brochures and newsletters
- Student participants as goodwill ambassadors

The Dream:

- Future employers & industry: more satisfied with the improvement of graduate quality
- More innovations initiated from the universities together with industry and End users
- Faster uptake of innovations due to better match, trust and quality

Good practices & and lessons learned
Managing delays

- Requested a no-cost extension of 4 months
- Approved after 2 months
- Give us time to comply with the Erasmus+ formalities

Co-funded by the
Erasmus+ Programme
of the European Union

Graduates for Climate Change adapted water management - **CCWater**

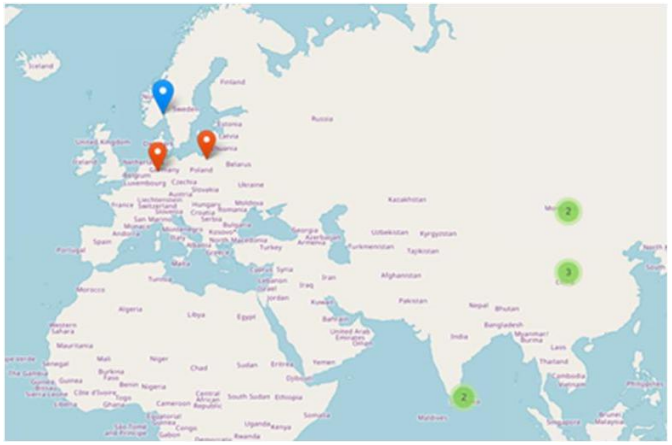
CC WATER

Coordinated by the Norwegian University of Life Sciences and implemented by 11 universities from 6 countries

Erasmus+ Cooperation for innovation and the exchange of good practices
Capacity building in the field of higher education
Grant. no. 619456-EPP-1-2020-1-NO-EPPKA2-CBHE-JP

Project facts

- Among the 164 projects awarded from 1005 applications
- Project period: 15.01.2021-14.01.2024 (3 years)
- Grant 1 million €, co-funding 61 000 €
- 11 partners from 6 countries



1. Norwegian University of Life Sciences
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3. University of Applied Sciences, Høxter, Germany
4. University of Peradeniya, Sri Lanka
5. Raja Rata University of Sri Lanka
6. South Eastern University of Sri Lanka
7. Mongolian University of Science and Technology
8. National University of Mongolia
9. Qingdao Technological University, China
10. Shenzhen Institutes of Advanced Technology – CAS, China
11. Inner Mongolia University of Finance and Economics, China

The need & justification for CC Water

- The universities, as the key stakeholders preparing tomorrow's leaders, engineers, and scientists, have a key role to play when educating the graduates in the water sector.
- Participating universities have teaching responsibilities related to water resources, water supply and wastewater management
- Water-related challenges becoming more complex due to the impact of Climate Change.
  - Some of the challenges and needs of the three countries are similar,
  - Some are different among countries (China vs Mongolia)
  - Some are different within three countries (Sri Lanka: Kandy vs Ampare, China: Guangdong vs Inner Mongolia).
  - Some universities (P5: SEUSL, P11: IMUFE) have a significant percentage of minorities reflecting the socio-economic and cultural differences.

Main objectives

- to strengthen the water-related higher education in 3 partner countries to increase the resilience against climate change impacts.
- This is achieved by developing HEI's competences and skills with modern technology and teaching resources.
- The international collaboration, which is a unified strategic priority of all participating HEIs, will be strengthened together with improved gender and ethnic diversity and inclusion.

CC Water Activities

A1.1 Prioritisation of needs
A1.2 Analysis of partners' assets
A1.3 Best practices review
A1.4 Scoping review of policy and actions
A1.5 Gaps analysis, specification of needs and actions

A2.1 Curriculum design
A2.2 Content development
A2.3 Curriculum implementation

A6.1 Dissemination & Exploitation Plan
A6.2 Project website
A6.3 Promotion materials
A6.4 Promo-video
A6.5 Social media marketing plan
A6.6 Educational publications
A6.7 Exploitation roundtables and/or board meetings

A3.1 Staff training «Curiosity-driven education»
A3.2 Collaborative mentoring /joint supervision online platform
A3.3 Interactive tools for teaching
A3.4 Virtual mobility course

A4.1 Training "Socially engaged universities and community-connected pedagogies"
A4.2 University-enterprise forums
A4.3 Social entrepreneurship hackathons "Water & climate change"

A5.1 Quality assurance in the project
A5.2 Sharing quality assurance practices
A5.3 Inter-project coaching and cross-evaluation

A7.1 Overall project coordination
A7.2 Project Steering Committee (PSC) and the Project Guide
A7.3 Day-to-day coordination of the project
A7.4 Project communications
A7.5 Project progress meetings and staff travels
A7.6 Student travels
A7.7 External financial audit

Good practices & and lessons learned
Application process

NMBU led the proposal drafting with contributions from partners

Good practices & and lessons learned
Start-up / Inception & implementation

- Several physical meetings were planned because social networking is one of the key features for sustainability
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- Less successful follow-up: not stringent in requiring deliverables on time +++

Meetings and mobilities:

- 7 Project meetings (NMBU, SIAT, THOWL, RUSL, UMW, NUM/MUST, QUT)
- 2 Student courses (NMBU (3w)+UoP (2w))
- 2 staff trainings (IMUEF+NUM/MUST)

	NMBU	UWM	THOWL	UOP	RUSL	SESL	NUM	MIUST	QUT	SIAT	IMUEF	
Staff	22	19	17	16	16	20	14	14	16	16	16	186
Student	4	6	6	4	6	6	6	6	6	6	6	62
												248

- 186 staff travels
- 62 student travels

Good practices & and lessons learned
Management

- Variable engagement among partners
- Not disciplined to follow Erasmus+ guidelines on report formats, minutes, publishing in web pages
- No frequent communication with the Project Officer

- Involve more experienced and disciplined project managers in the project
- Coordinator (NMBU) retained travel and accommodation funds and arranged flights and hotels for all: more coordinated but lot of additional work for NMBU

Results

- Activities led to a learning process both among program and partner countries
- Joint development and training of curricula
- Use of developed curricula for mobility students

- Procurement- takes time but the 1-year rule made it happen on time
- Partially distributed responsibilities – still behind the schedule

Good practices & and lessons learned
Managing delays

- Requested a no-cost extension of 6 months
- Approved after 1 month
- Give us time to comply with the Erasmus+ formalities

This Project has received funding from European Union's Horizon Europe research and innovation programme under grant agreement no 101079251

SMART4ENV

Enhancing the Scientific Capacity of TUBITAK MAM in the Field of Smart Environmental Technologies for Climate Change Challenges

TÜBİTAK MAM

UNIVERSITÀ POLITECNICA DELLE MARCHE

Beta UVIC

NMBU Noregs miljø- og biovitskaplege universitet

SiTeS

GENERAL INFORMATION

Project number: 101079251

Project acronym: SMART4ENV

Call: HORIZON-WIDERA-2021-ACCESS-03

Topic: HORIZON-WIDERA-2021-ACCESS-03-01

Type of action: HORIZON Coordination and Support Actions

Project starting date: 1 November 2022

Project end date: 31 October 2025

Project duration: 36 months

Total eligible cost	Funding rate (%)	Maximum grant amount
1 499 417.50 €	100	1 499 417.50 €

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Nº	Role	Organisation name	Country
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2	BEN	Università Politecnica delle Marche (UNIVPM)	ITALY
3	BEN	Fundación Universitaria Balmes (UVIC-UCC)	SPAIN
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WHY?

climate change related natural disasters

Water resources agricultural sectors and food security are expected to become more vulnerable soon

Floods, droughts, storms, heatwaves, and forest fires

Mediterranean region; water scarcity, irregular rainfall, unbalanced population distribution

Alarming summer precipitation threatening water availability and agricultural productivity

Need;

- effective/efficient strategies
- connected, and responsive systems/services
- robust,
- flexible,
- resilient infrastructure
- sustainable use of resources

Digital solutions have the power to deliver substantial environmental gains through increased efficiencies and improving environmental sustainability.

SMART4ENV

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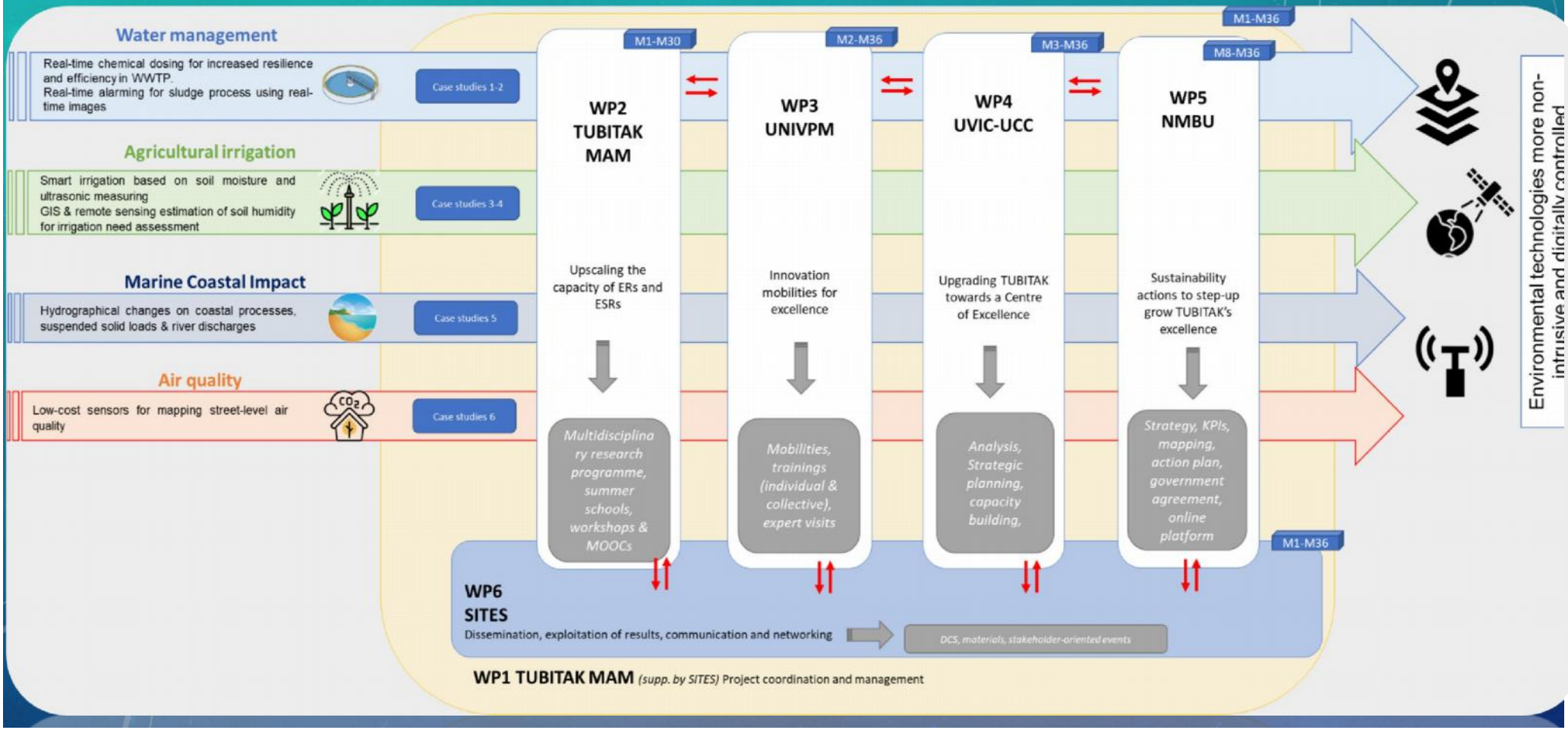
TÜBİTAK MAM · Università Politecnica delle Marche · Beta UVIC · NMBU Norges miljø- og biovitskaplege universitet · SiTeS

AIMS

Increasing scientific and technical capacity of TUBITAK MAM related to smart environmental solutions (SES) through collaboration	• *implementing a multidisciplinary and specialized capacity building activities to foster human capital development and research excellence.*
Supporting TUBITAK MAM's institutional networking and international reputation by strengthening collaboration	• *through a series of activities to facilitate the access to international networks, promoting awareness-raising campaigns and stakeholders engagement processes.*
Developing a knowledge transference framework of TUBITAK MAM and linked stakeholders to jointly develop excellent R&I in SES	• *through new research avenues, skills, and competences to foster results exploitation.*
Increasing the knowledge of national stakeholders on available SES	• *promoting their use, enabling application of innovative approaches and solutions, sharing knowledge and best practices, disseminating research results and technology to address climate change challenges, focused on project target groups at vertical/horizontal levels.*

HOW?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DCS, materials, stakeholder-oriented events
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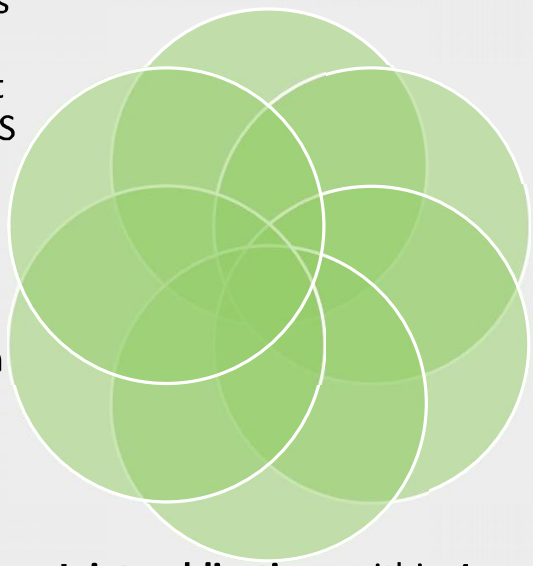
Environmental technologies more non-intrusive and digitally controlled

Around case studies, SMART4ENV will organize:

HOW?

Workshops, summer schools, and training aiming to transfer best practices

Networking and **knowledge exchange** to create the basis for international competitiveness to relevant research infrastructure in SES



Staff mobility by supporting internationalization through exchange of researchers

Outreach and **clustering** for a wider visibility of project outcomes to favor outputs capitalization.

Participation in research activities in sustainable environmental management through SES and **strengthening visibility in the research community and involvement in R&I projects.**

Joint publications within 4 identified research avenues applied to 6 targeted case studies.

EXPECTED OUTCOMES

Increased science and innovation capacities, new interdisciplinary streams, more exchange of knowledge and mobilities	• *+20% researchers publishing papers* • *+15% publications in peer-reviewed journals* • *+20% documents for research proposals and* • *+5% participation in competitive funding*
Enhanced strategic collaboration, alliances, stronger linkages with linked stakeholders value chains, meetings with national relevant projects and better outreach for longer connections	• *3 Collaboration agreements with international R&I networks,* • *3 information exchange meetings and* • *participation in 3 relevant international events and 6 info days.*
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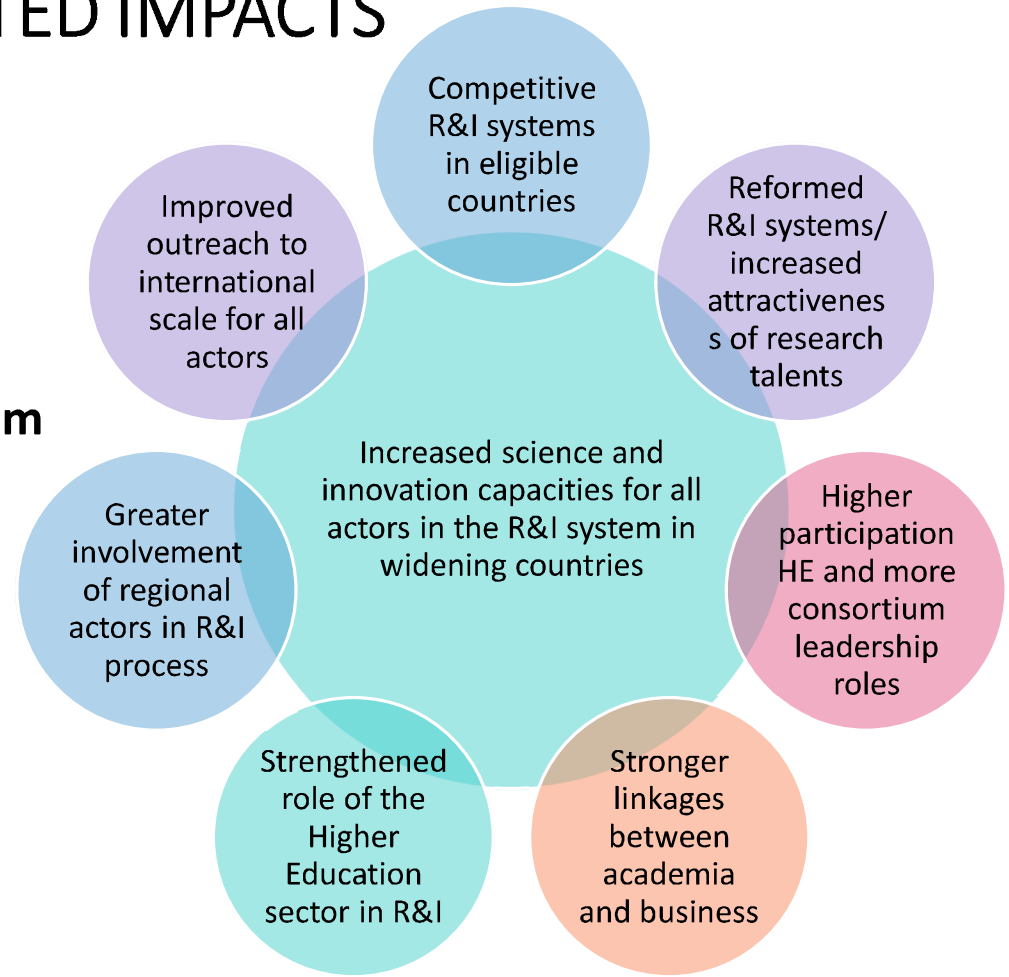
EXPECTED IMPACTS

R&I system



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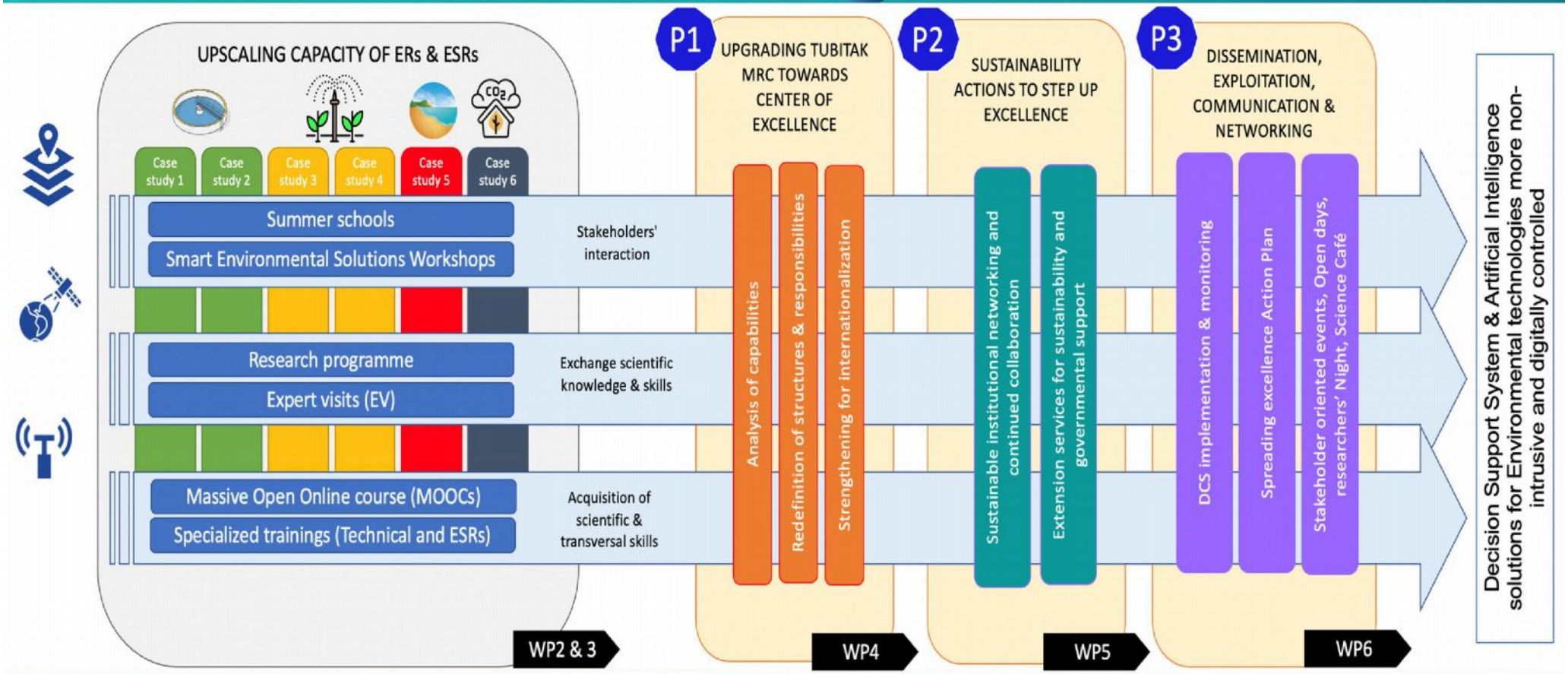
The **environmental benefits** of improved environmental resources management in view of climate change are not only a potential extra value, but one of the main ways to sustain nature **and synergies with EU Policies and HE Missions, the European Green Deal and the Climate neutrality**.

OVERALL STRATEGY OF SMART4ENV



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SiTeS

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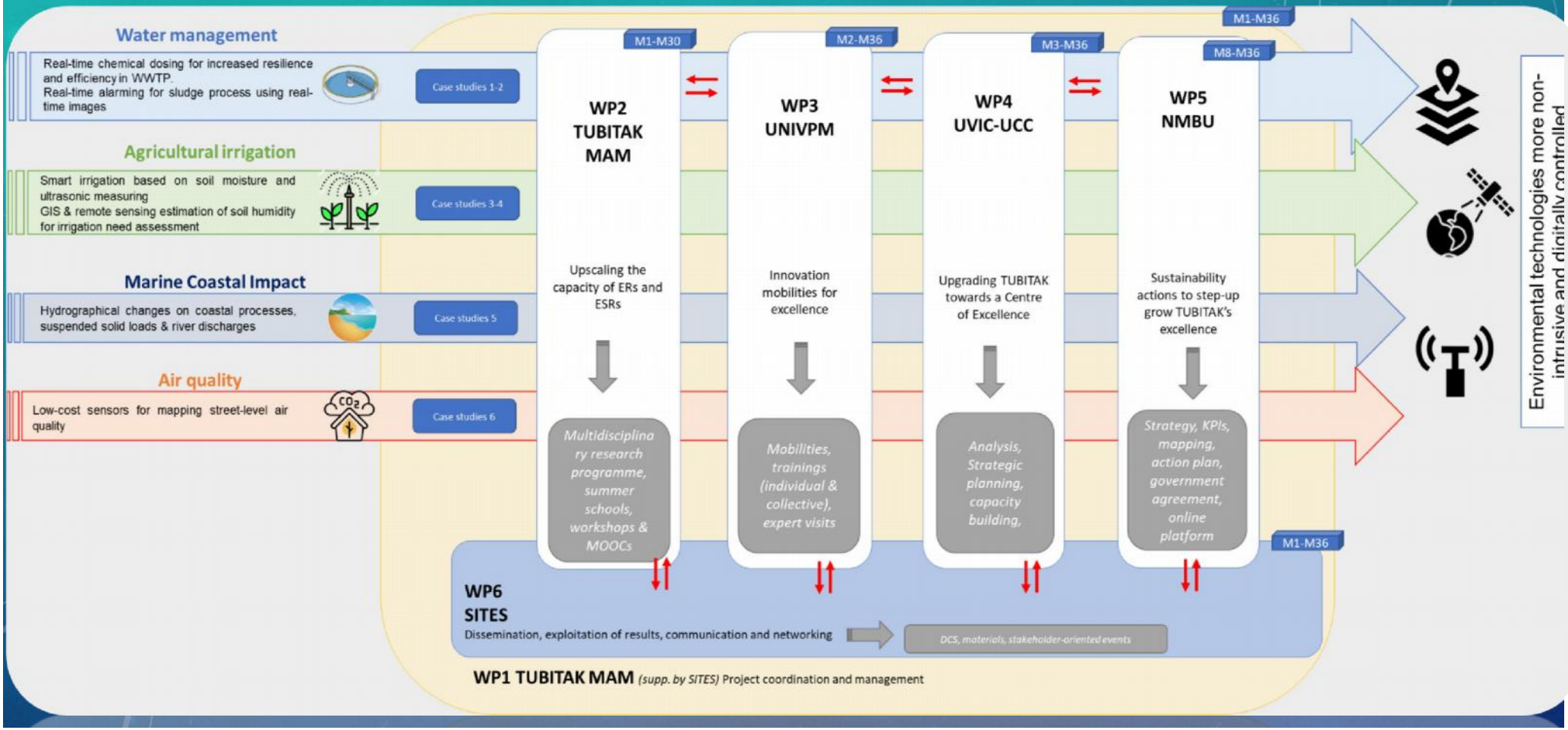
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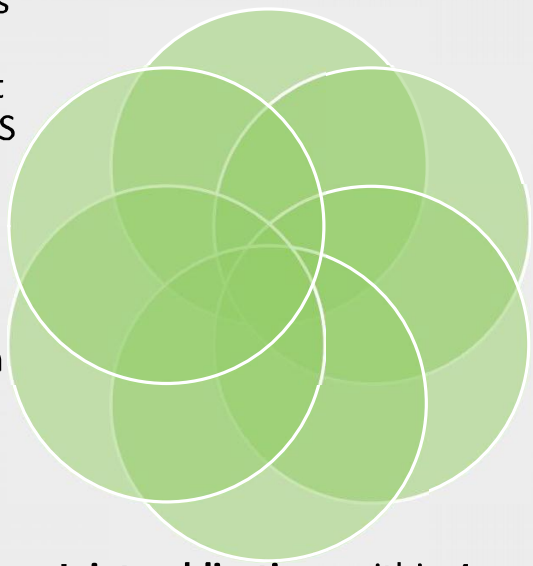

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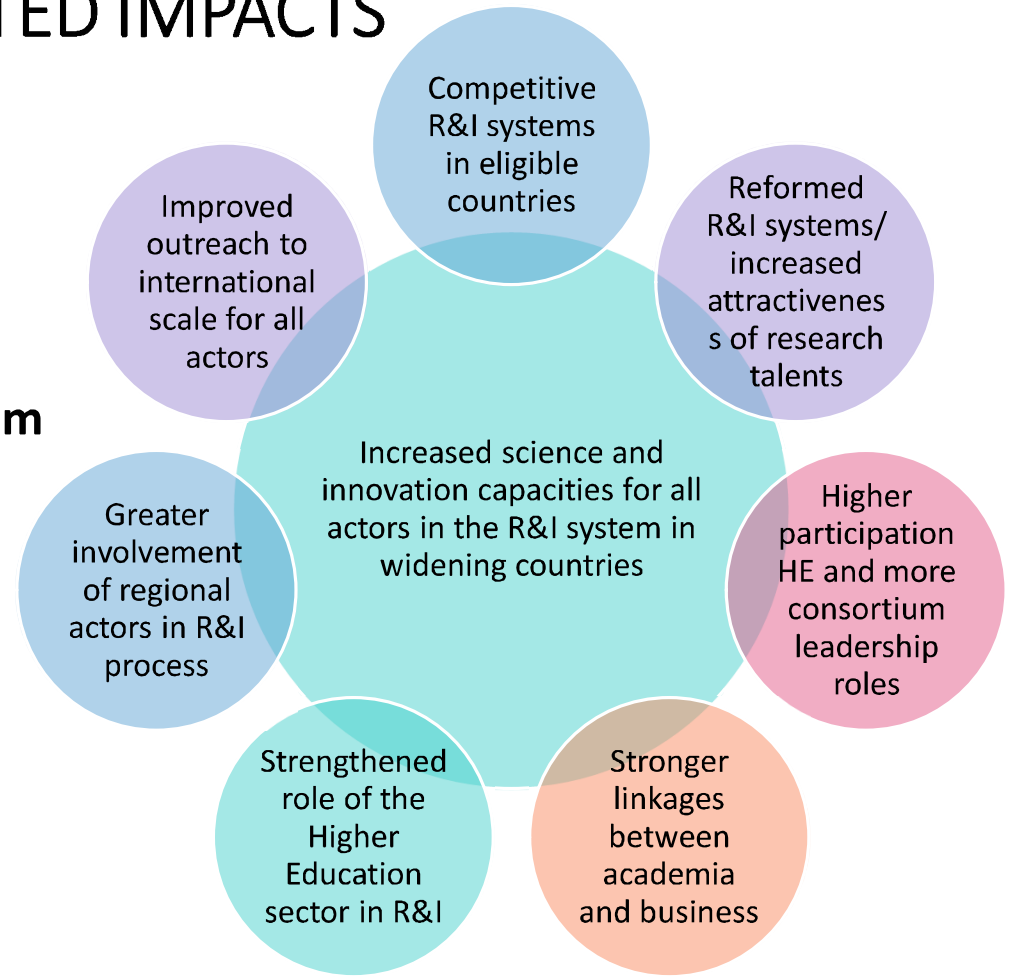

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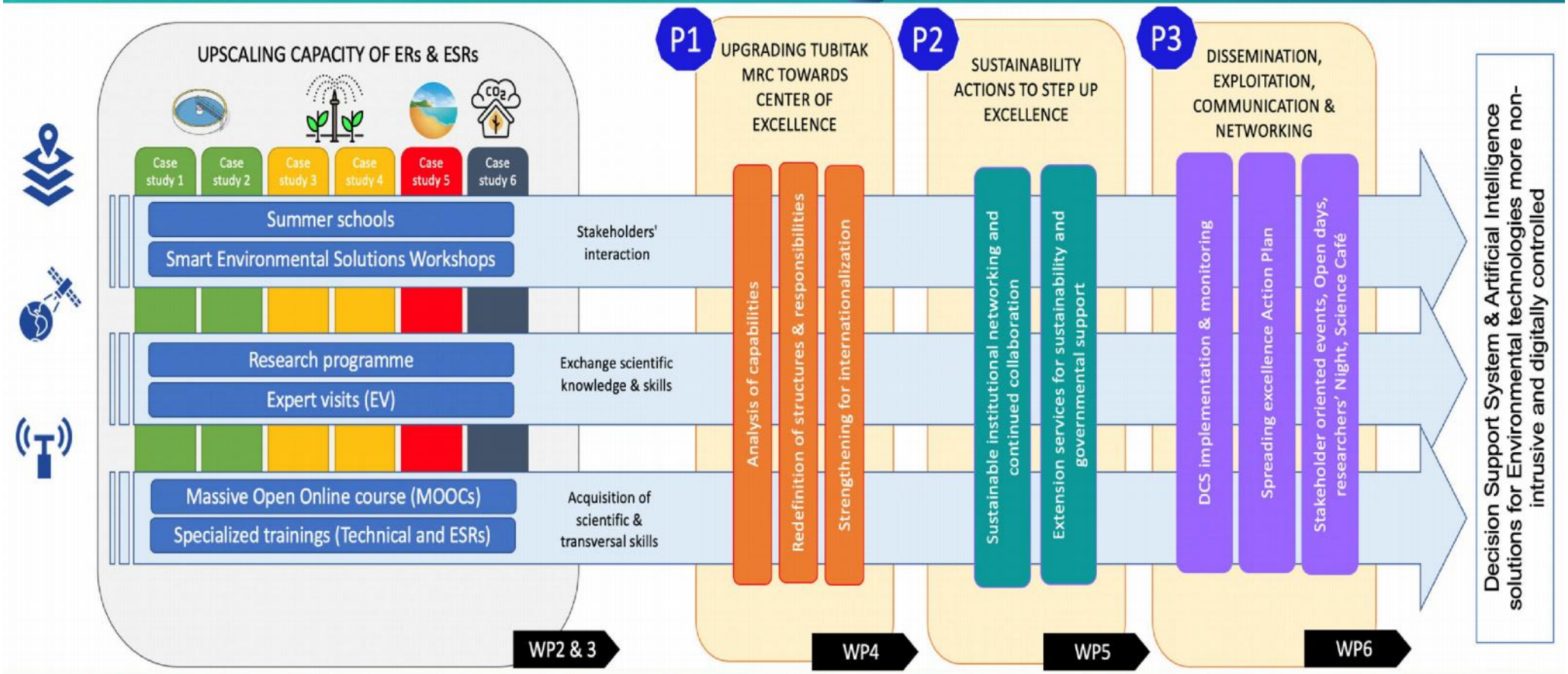

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SiTeS

With the support of the Erasmus+ Programme of the European Union

INNOWAT project

EU water policy and innovative solutions in water resources management

Milan Gocić, University of Niš

Key objective

The key and strategic objective of INNOWAT Module is to **strengthen teaching in European integration studies at the University of Nis** by

(i) **applying novel methodology of teaching and learning** tailored to the needs of advanced-level undergraduate students and students enrolled at the master studies at the Faculty of Civil Engineering and Architecture, as well as students from different study programs, young professionals from water sector, policy-makers and general public with sufficient level of knowledge in water resources management (WRM)

(ii) **promoting research in the WRM field of EU studies** conducive to the development of new innovative and interdisciplinary solutions in the water sector and encouraging young researchers to involve in research.

Specific objectives

- **to contribute to better academic and media coverage of EU water policy**, regulations, standards and best practices in interdisciplinary studies of EU water governance
- **to strengthen the quality of research** by providing opportunity to young scholars to expose topics on new EU WRM issues by promoting their research at national and international level and create academic network for further research and publishing papers in national/international peer reviewed journals
- **to support students in their career prospects** by providing innovative knowledge and EU best and sustainable practices in WRM through new and unique teaching courses supported by the foreign expert who will deal with specific EU subject more in-depth in innovative manner
- **to enable young teachers to acquire necessary experience** to incorporate proposed course, teaching materials and methodology in current study programmes or to create new ones.

With the support of the Erasmus+ Programme of the European Union

INNOWAT team

- **Ksenija Denčić Mihajlov**, Faculty of Economy
- **Evica Petrović**, Faculty of Economy
- **Jelena Stanković**, Faculty of Economy
- **Michael Tritthart**, University of Natural Resources and Life Sciences, Vienna
- **Slaviša Trajković**, Faculty of Civil Engineering and Architecture
- **Milica Ćirić**, Faculty of Civil Engineering and Architecture
- **Mladen Milanović**, Faculty of Civil Engineering and Architecture
- **Milan Gocić**, Faculty of Civil Engineering and Architecture

With the support of the Erasmus+ Programme of the European Union

Tailor-made thematic courses

L1. Basics of European integration (5 hours)
L2. Sustainability, project evaluation and financing (5 hours)
L3. EU water policy under the Water Framework Directive (10 hours)
L4. Water management and climate change adaptation (10 hours)
L5. Flood and Drought risk management (6 hours)
L6. Sustainable insurance – Principles, Practices and Challenges (6 hours)
L7. Innovation in the European water sector (10 hours)
L8. Implications of the Water Framework Directive in sustainable river engineering and hydropower development (10 hours)
L9. Processing and exploitation of water-related data (10 hours)

Student research seminar (18 hours)

With the support of the Erasmus+ Programme of the European Union

Handbook on water resources management based on innovative solutions

Managers in the field of water resources need to be able to get hold of reliable, up-to-date and relevant information for their activities related to regulation, planning, adaptation to climate change, risk management and public information.

The handbook aims to provide decision-makers with strategy pointers for efficient water data management, and to guide any organization that would like to develop its capacities for producing, accessing, processing and making good use of the water-related data and information necessary for implementing an Integrated Water Resources Management policy.

With the support of the Erasmus+ Programme of the European Union

Handbook on water resources management based on innovative solutions

Water resources research - from basic research to innovation

All proposed INNOWAT Module activities will be accompanied by academic research work of key staff members. The investigation will be based on technological innovations in the field of water resources management. The primary goal of this research is to accept the possibilities of technological innovations in cities and communities of the Southeast region of Serbia, based on know-how and experience of implemented EU best practices.

Publishing **two articles in international/national peer-reviewed journals** referenced in the following scientific databases DoiSerb, ScienceDirect, SpringerLink, Wiley, SciIndeks, as well as presenting **minimum 4 scientific articles at national and international conferences**.

With the support of the Erasmus+ Programme of the European Union

Published papers – International journals

Pure Appl. Geophys.
© 2021 The Author(s), under exclusive licence to Springer Nature Switzerland AG
https://doi.org/10.1007/s00024-021-02688-0

Pure and Applied Geophysics

Author Proof

Regional Precipitation-Frequency Analysis in Serbia Based on Methods of L-Moment

Milan Gocic,[1] Lazar Velimirovic,[2] Miomir Stankovic,[2] and Slavisa Trajkovic[1]

Abstract—Precipitation is the main water resource for agronomy. The frequency is one of the most significant characteristics of precipitation. The objectives of this study are (1) to identify the homogeneous regions, (2) to determine the probability distribution that fits precipitation the best for each region, (3) to perform regional precipitation-frequency analysis by using L-moment methods, and (4) to derive the return levels for precipitation. In this study, the precipitation data collected from 24 meteorological stations for the period 1965–2013 over Serbia were analyzed. Three distributions [generalized extreme value (GEV), generalized Pareto (GPD), and generalized logistic (GLO)] based on three parameters (scale, shape, and location) are investigated. The L-moment method is applied to determine the parameters. Three independent precipitation regions (R1, R2, and R3) were studied. The homogeneity test indicates that the identified regions are homogeneous. To confirm the goodness-of-fit for the selected three probability distributions, the Z-statistics was applied. Based on the obtained results, the GEV distribution best fits the precipitation data in the regions R1 and R2, while the GPD was selected for the region R3.

Keywords: L-moment, homogeneous region, precipitation, regional frequency analysis, Serbia.

1. Introduction

Precipitation is the main resource of water for agriculture. The amount, intensity and frequency are the three most important characteristics of precipitation. Knowledge related to a probability distribution of precipitation data plays the main role in a broad variety of decisions in agronomy such as cropping patterns, soil conservation, irrigation and drainage (Li et al. 2019; Perondi et al. 2019). Various methods for regionalization have been developed and applied such as index-flood (Dalrymple 1960; Kjeldsen et al. 2002; Saf 2010; Nobert et al. 2014; Formeta et al. 2018), principal component and factor analysis (Gocic and Trajkovic 2014b; Raziei et al. 2008; Singh 1999; Varitas et al. 2018), hierarchical and non-hierarchical cluster analysis (Bunkers et al. 1996; Ramos 2001; Sahin and Cigizoglu 2011; Sun et al. 2019), L-moment (Chowdhury et al. 1991; Hosking et al. 1985; Ibrahim 2019; Kumar and Chatterjee 2008; Simkova 2018). According to Malekinezhad et al. (2011), regionalization includes the identification of homogeneous regions and the regional frequency analysis. The regional frequency analysis (RFA) can be applied to assume an equal form of the probability distribution in a region (Gonzales and Valdes 2008).

The RFA based on L-moments has been applied to describe low flow (Chen et al. 2006; Dodangeh et al. 2014; Modarres 2008), flood (Atiem and Harmancioglu 2006; Aydoğan et al. 2014; Kumar and Chatterjee 2008; Lee and Kim 2019; Meshgi and Khalili 2009; Parida et al. 1998; Shabri and Jemain 2013; Yang et al. 2010), drought (Lana et al. 2008; Abolverdi and Khalili 2010; Eslamian et al. 2012; Sarhadi and Heydarizadeh 2014; Ulah et al. 2020), and wave heights (Ma et al. 2006). To analyse the precipitation data the method of L-moments has been considered worldwide. In Malaysia, the daily annual maximum rainfall data were analyzed showing that the L-moments and TL-moments approaches provide equivalent results (Shabri et al. 2011). Zakaria and Shabri (2013) applied an approach based on the RFA of extreme rainfalls considering the partial L-moments (PL) method and compared with L-moments and LH-moments. Three probability distributions were conducted: generalized extreme value (GEV), generalized logistic (GLO), and generalized Pareto distribution (GPD). Wallis et al. (2007) estimated

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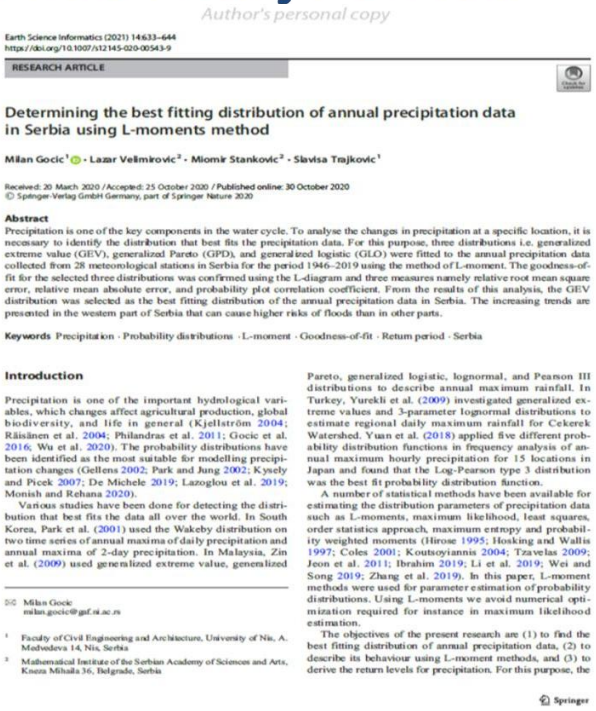
Birkhäuser

Gocic, M., Velimirovic, L., Stankovic, M., Trajkovic, S., 2021. Regional precipitation-frequency analysis in Serbia based on methods of L-moment. Pure and Applied Geophysics 178(4), 1499-1511. DOI: 10.1007/s00024-021-02688-0



Author's personal copy

Earth Science Informatics (2021) 14:633–644
https://doi.org/10.1007/s12145-020-00543-9

RESEARCH ARTICLE

Determining the best fitting distribution of annual precipitation data in Serbia using L-moments method

Milan Gocic[1] · Lazar Velimirovic[2] · Miomir Stankovic[2] · Slavisa Trajkovic[1]

Received: 20 March 2020 / Accepted: 25 October 2020 / Published online: 30 October 2020
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Abstract
Precipitation is one of the key components in the water cycle. To analyse the changes in precipitation at a specific location, it is necessary to identify the distribution that best fits the precipitation data. For this purpose, three distributions i.e. generalized extreme value (GEV), generalized Pareto (GPD), and generalized logistic (GLO) were fitted to the annual precipitation data collected from 28 meteorological stations in Serbia for the period 1946–2019 using the method of L-moment. The goodness-of-fit for the selected three distributions was confirmed using the L-diagram and three measures namely relative root mean square error, relative mean absolute error, and probability plot correlation coefficient. From the results of this analysis, the GEV distribution was selected as the best fitting distribution of the annual precipitation data in Serbia. The increasing trends are presented in the western part of Serbia that can cause higher risks of floods than in other parts.

Keywords Precipitation · Probability distributions · L-moment · Goodness-of-fit · Return period · Serbia

Introduction

Precipitation is one of the important hydrological variables, which changes affect agricultural production, global biodiversity, and life in general (Kjellström 2004; Räisänen et al. 2004; Philandras et al. 2011; Gocic et al. 2016; Wu et al. 2020). The probability distributions have been identified as the most suitable for modelling precipitation changes (Giellens 2002; Park and Jung 2002; Kysely and Picek 2007; De Michele 2019; Lazoglou et al. 2019; Monish and Rehana 2020).

Various studies have been done for detecting the distribution that best fits the data all over the world. In South Korea, Park et al. (2001) used the Wakeby distribution on two time series of annual maxima of daily precipitation and annual maxima of 2-day precipitation. In Malaysia, Zin et al. (2009) used generalized extreme value, generalized Pareto, generalized logistic, lognormal, and Pearson III distributions to describe annual maximum rainfall. In Turkey, Yurekli et al. (2009) investigated generalized extreme values and 3-parameter lognormal distributions to estimate regional daily maximum rainfall for Cekerek Watershed. Yuan et al. (2018) applied five different probability distribution functions in frequency analysis of annual maximum hourly precipitation for 15 locations in Japan and found that the Log-Pearson type 3 distribution was the best fit probability distribution function.

A number of statistical methods have been available for estimating the distribution parameters of precipitation data such as L-moments, maximum likelihood, least squares, order statistics approach, maximum entropy and probability weighted moments (Hirose 1995; Hosking and Wallis 1997; Coles 2001; Koutsoyiannis 2004; Tzavelas 2009; Jeon et al. 2011; Ibrahim 2019; Li et al. 2019; Wei and Song 2019; Zhang et al. 2019). In this paper, L-moment methods were used for parameter estimation of probability distributions. Using L-moments we avoid numerical optimization required for instance in maximum likelihood estimation.

The objectives of the present research are (1) to find the best fitting distribution of annual precipitation data, (2) to describe its behaviour using L-moment methods, and (3) to derive the return levels for precipitation. For this purpose, the

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Springer

Gocic, M., Velimirovic, L., Stankovic, M., Trajkovic, S., 2021. Determining the best fitting distribution of annual precipitation data in Serbia using L-moments method. Earth Science Informatics 14(2), 633-644. DOI: 10.1007/s12145-020-00543-9

Published papers – International conferences

Gocić, M., 2020. Water resources management education in the Western Balkan region, Proceedings of the International conference on water, society and climate change – Part II, WASO 2020, Concluding event of the 7-year Norad-Norhed project, 15th-16th December 2020, pp. 378-383.

Jeremic, M., Gocic, M., 2021. Visualization of average annual precipitation in Serbia for the period from 1946 to 2019, Proceedings of the International Symposium „Water Resources Management: New Perspectives and Innovation Practices“, Novi Sad, Serbia, 23-24 September 2021, pp. 81-87, ISBN 978-86-6022-367-0.

Markovic, M., Milanovic, M., Trajkovic, S., 2021. Water quality evaluation in Bovan reservoir for irrigation purpose, Proceedings of the International Symposium „Water Resources Management: New Perspectives and Innovation Practices“, Novi Sad, Serbia, 23-24 September 2021, pp. 25-30, ISBN 978-86-6022-367-0.

Djordjevic, D., Rajakovic-Ognjanovic, V., Milicevic, D., Milanovic, M., 2021. Online monitoring kvaliteta vode za piće u vodovodnoj mreži. INDIS 2021, Novi Sad.

Stankovic, J., Tomic, Z., Gocic, M., 2021. Flood risk vulnerability visualization for sustainable risk management – the case of Serbia. Facta Universitatis

With the support of the Erasmus+ Programme of the European Union

Basics of EU Water Policy

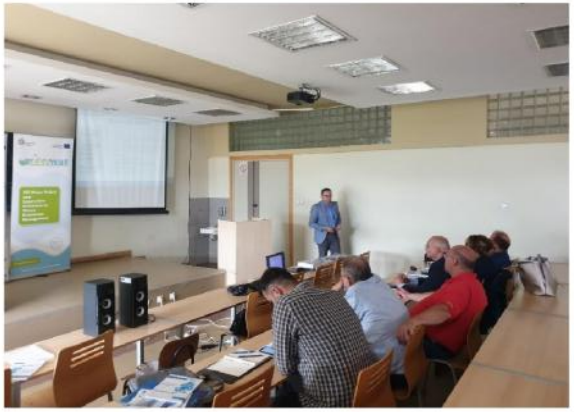
The **roundtable debate** will host scholars and experts in the field of water resources management and aim to contribute to an **exposure to new ideas and methodologies concerning the promotion of EU standards and principles in Serbia**. It is intended for **employers in local authorities, NGOs, students, professionals in the water sector**, and the **general public**. The event will be open to the participation of policy makers as speakers.

The roundtable is fully open to the general public. That is why information about the roundtable debate will be extensively advertised.

The roundtable debate will include **thematic presentations related to the implementation of EU Water Policy** and **introducing EU best practices in the water sector**.

With the support of the Erasmus+ Programme of the European Union

Basics of EU Water Policy



EU water policy and innovative solutions in water resources management

Wednesday, 19th May 2021		
On-line (Teams platform), Face-to-face (University of Nis, Faculty of Civil Engineering and Architecture, classroom 205)		
12:00-12:20	Presentation of INNOWAT project	Milan Gocić, University of Nis
12:20-12:50	Innovations in the water sector in Austria	Michael Tritthart, University of Natural Resources and Life Sciences, Vienna
12:50-13:20	EU Water Policy – Water Framework Directive	Slaviša Trajković, University of Nis
13:20-13:50	Introducing EU best practices in the water sector	Milan Gocić, University of Nis
13:50-14:40	General discussion: Implementation of EU Water Framework Directive in the water sector in Serbia	
14:40-15:00	Final remarks and closing the event	Milan Gocić, University of Nis

With the support of the Erasmus+ Programme of the European Union

First generation of INNOWAT participants (2020/2021)

With the support of the Erasmus+ Programme of the European Union

Water resources management in practice

Study visit will complement teaching activities and will be organized for the students – participants of the courses. The aim of the study visit is to **provide insight in practical implementation of innovative solutions in water resources management** in the Republic of Serbia. Therefore, students will visit a **water supply company in Nis**.

Presentation on current achievements in practice will be provided by the representatives of the company in the premises of the visiting company. Students will be introduced to the main processes of water management (water availability, ground water access, wastewater treatment and water quality) in the company and will be able to ask questions and discuss various issues on the sustainability of water management and applied practices.

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Water resources management in practice

PWC “NAISSUS”, 20 May 2022

With the support of the Erasmus+ Programme of the European Union

Second generation of INNOWAT participants (2021/2022)

With the support of the Erasmus+ Programme of the European Union

Practical exercises in water management

The **workshop** will include thematic presentations of researchers and practical exercises. It will be held at the **University of Niš Faculty of Civil Engineering and Archietecture in the Laboratory for Hydrotechnics**. It is intended for students and professionals in the water sector. The participants will have an opportunity to use the following **high quality laboratory equipment**: Base module for experiments in fluid mechanics, Bernoulli's principle, Methods of flow measurement and Groundwater flow.

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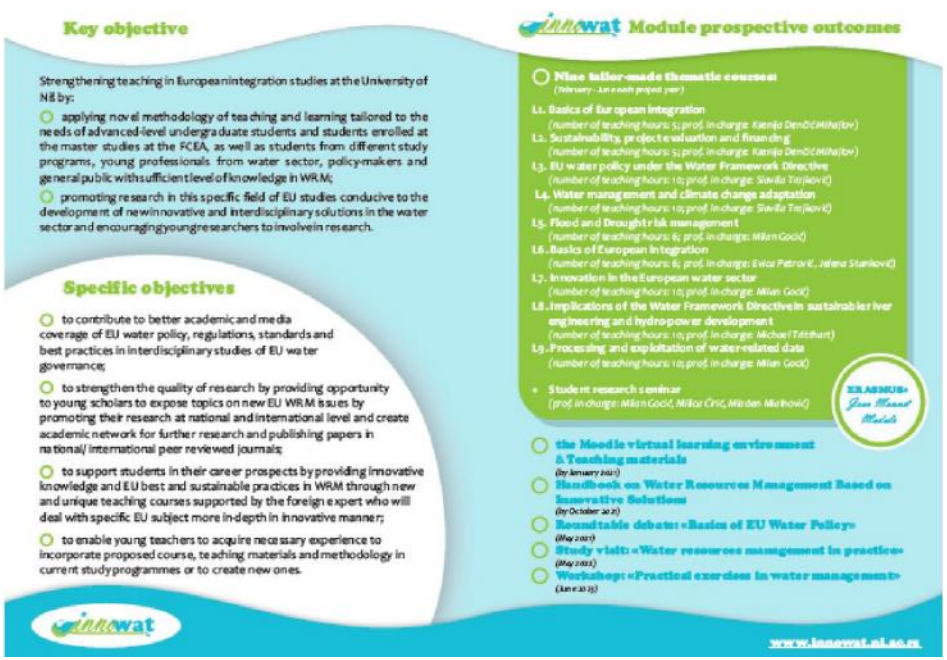
Visual identity and promotional material



Key objective

Strengthening teaching in European integration studies at the University of Niš by:

- applying novel methodology of teaching and learning tailored to the needs of advanced-level undergraduate students and students enrolled at the master studies at the FCEA, as well as students from different study programs, young professionals from water sector, policy-makers and general public with sufficient level of knowledge in WRM;
- promoting research in this specific field of EU studies conducive to the development of new innovative and interdisciplinary solutions in the water sector and encouraging young researchers to involve in research.

Specific objectives

- to contribute to better academic and media coverage of EU water policy, regulations, standards and best practices in interdisciplinary studies of EU water governance;
- to strengthen the quality of research by providing opportunity to young scholars to expose topics on new EU WRM issues by promoting their research at national and international level and create academic network for further research and publishing papers in national/ international peer reviewed journals;
- to support students in their career prospects by providing innovative knowledge and EU best and sustainable practices in WRM through new and unique teaching courses supported by the foreign expert who will deal with specific EU subject more in-depth in innovative manner;
- to enable young teachers to acquire necessary experience to incorporate proposed course, teaching materials and methodology in current study programmes or to create new ones.

innowat Module prospective outcomes

- **Nine tailor-made thematic courses**
  (February - June each project year)

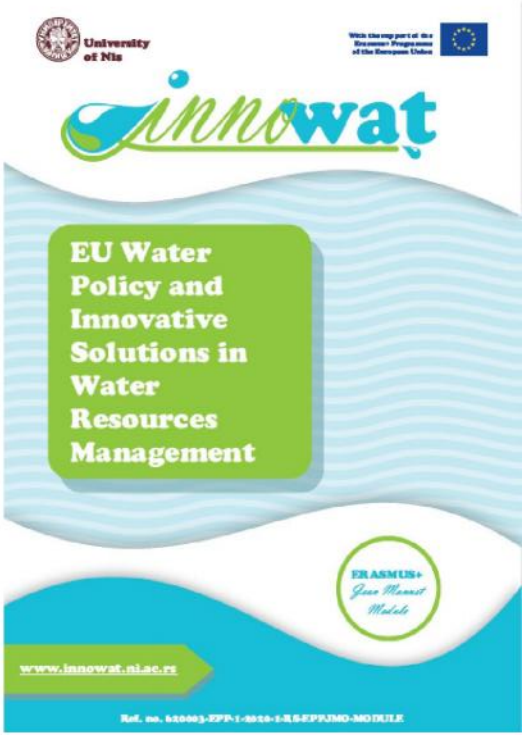
L1. Basics of European integration
(number of teaching hours: 5; prof. in-charge: Ksenija Denić Mihajlov)
L2. Sustainability, project evaluation and financing
(number of teaching hours: 5; prof. in-charge: Ksenija Denić Mihajlov)
L3. EU water policy under the Water Framework Directive
(number of teaching hours: 10; prof. in-charge: Slavša Trifković)
L4. Water management and climate change adaptation
(number of teaching hours: 10; prof. in-charge: Slavša Trifković)
L5. Flood and Drought risk management
(number of teaching hours: 6; prof. in-charge: Milan Gocić)
L6. Basics of European Integration
(number of teaching hours: 6; prof. in-charge: Evica Petrović, Jelena Stanković)
L7. Innovation in the European water sector
(number of teaching hours: 10; prof. in-charge: Milan Gocić)
L8. Implications of the Water Framework Directive in sustainable river engineering and hydropower development
(number of teaching hours: 10; prof. in-charge: Michael Tütthart)
L9. Processing and exploitation of water-related data
(number of teaching hours: 10; prof. in-charge: Milan Gocić)

- Student research seminar
  (prof. in-charge: Milan Gocić, Miloš Ćirić, Miloš Milošević)

ERASMUS+ Jean Monnet Module

- **the Moodle virtual learning environment & Teaching materials**
  (by January 2021)
- **Handbook on Water Resources Management Based on Innovative Solutions**
  (by October 2021)
- **Roundtable debate: «Basics of EU Water Policy»**
  (May 2021)
- **Study visit: «Water resources management in practice»**
  (May 2021)
- **Workshop: «Practical exercises in water management»**
  (June 2021)

www.innowat.ni.ac.rs



University of Niš

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innowat

EU Water Policy and Innovative Solutions in Water Resources Management

ERASMUS+ Jean Monnet Module

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Ref. no. 620003-EPP-1-2020-1-RS-EPPJMO-MODULE

With the support of the Erasmus+ Programme of the European Union

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Science Fund of the Republic of Serbia

Programme IDEAS

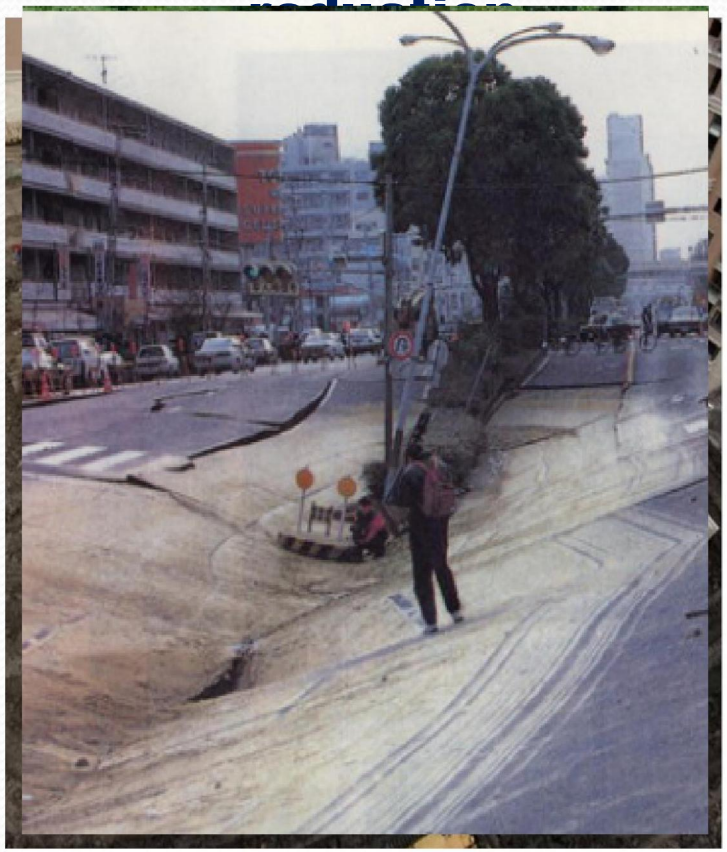
A New Concept in Improvement of Geotechnical Properties of Ground – Chemical Electrokinetic Treatment of Soils

ElectroSoil

January, 2022 – January, 2025

1. *Problem Statement*

Soil water content → **Soil strength reduction** → **Soil instability !**



Landslides

Foundation soil instability

Ground settlement

→ **SOIL STABILISATION TECHNIQUES** √

2. *Project Goals*

1) A NEW APPROACH IN SOIL STABILISATION

Combined electrokinetic and chemical soil treatment.

2) PERMANENT STABILISATION EFFECTS

Permanent improvement of physico–mechanical (geotechnical) soil properties.

3) A VIABLE *IN SITU* SOIL STABILISATION METHOD

- **Prevention**
- **Remediation**

3. *Project Novelty*

1) APPLICATION:

- **IN DEEPER SOIL LAYERS**
- **BENEATH EXISTING STRUCTURES**

Owing to electric field.

2) APPLICATION OF NEW MATERIALS

- **$MgCO_3$;**
- **Na_2SiO_3.**

3) RESEARCH UNDER DYNAMIC CONDITIONS

Has not been considered so far.

3. *Project Novelty*

GDS
www.gdsinstruments.com

Enterprise Level Dynamic Triaxial Testing System (ELDYN).

GAF NCS

4. Project Impact

1) SCIENCE

- **SUSTAINABILITY (Verification by scientific methods);**
- **New ideas, techniques, and directions of development.**

2) ECONOMY AND INDUSTRY

Stakeholders – Construction companies:

- **PUT INŽENJERING (Serbia);**
- **INTEGRAL (Serbia).**

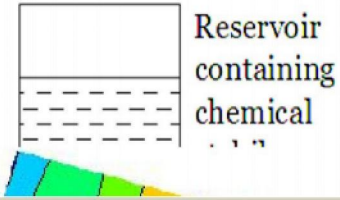
} **industrial commercialisation**

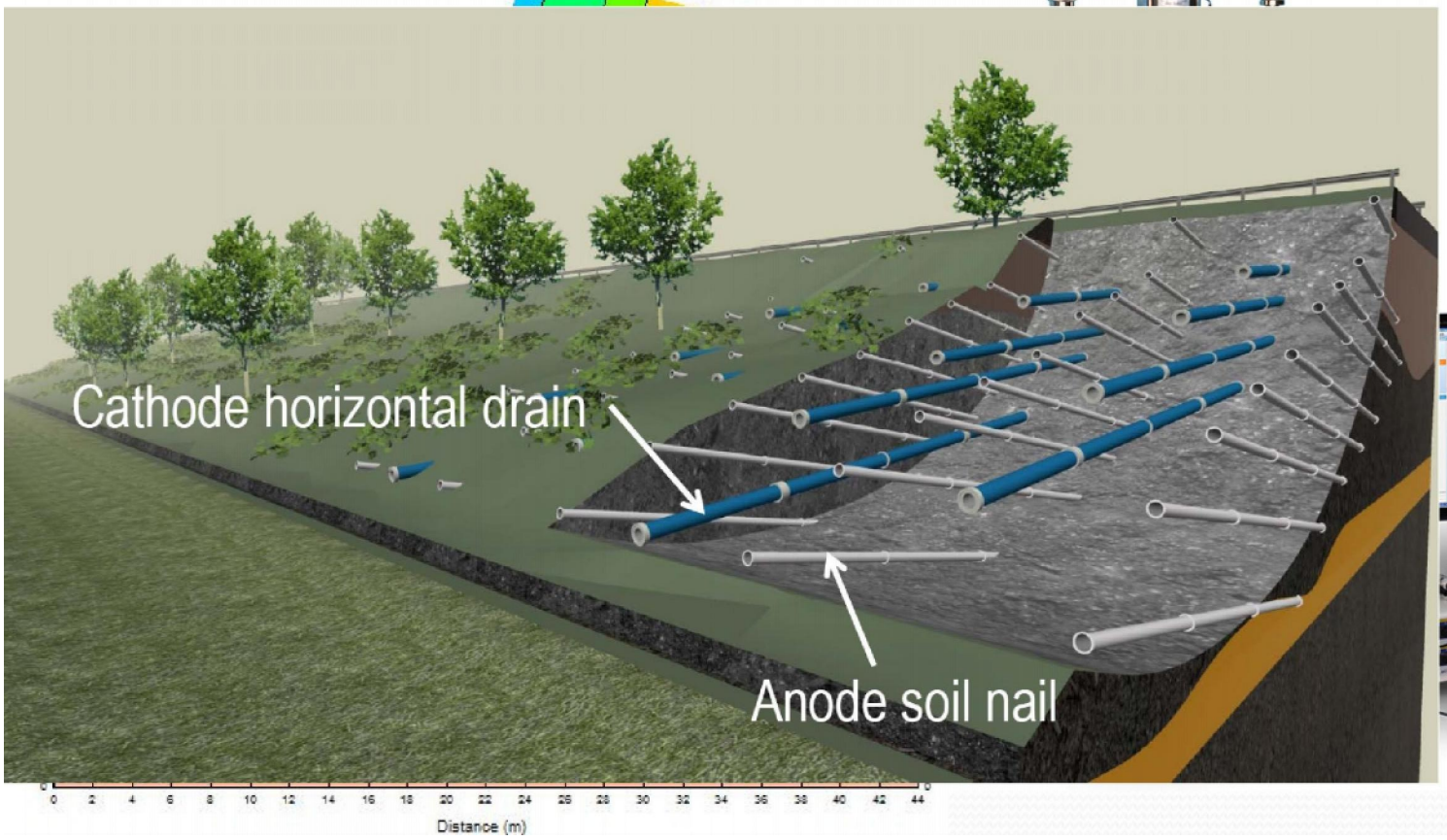
3) SOCIETY

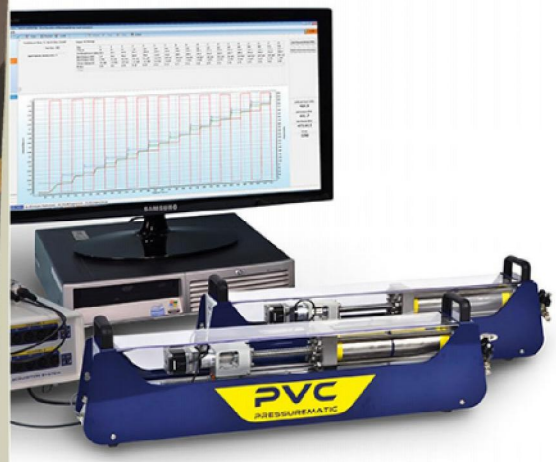
- **Solving the problem of landslides;**
- **Improvement of environment;**
- **Efficiency in the implementation of construction industry projects.**

5. *Implementation plan*

CHEMICAL – ELECTROKINETIC TREATMENT OF CLAY







6. *Research team - multidisciplinarity*

1) University of Niš (Serbia)
Faculty of Civil Engineering and Architecture of Niš

- **Accredited Laboratory for Geotechnics (staff, equipment).**

2) University of Niš (Serbia)
Faculty of Sciences and Mathematics of Niš
Department of Chemistry

- **Accredited Laboratory for General and Inorganic Chemistry (staff, equipment).**

3) University of Novi Sad (Serbia)
Faculty of Civil Engineering of Subotica

MULTIDISCIPLINARITY

- **Civil Engineering Geotechnics;**
- **Engineering Geology;**
- **Geophysics;**
- **Geochemistry.**

7. *First stage of research activities*

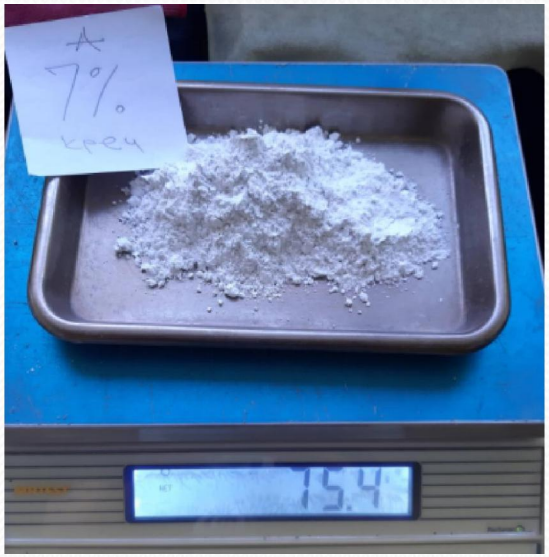
FIELD SAMPLING OF CLAYEY SOIL

Landslide (location: Crvena Reka, E-80 Niš–Dimitrovgrad Highway)

7. *First stage of research activities*

CHEMICAL STABILISATION OF CLAY

Lime | **Magnesium carbonate** | **Water glass** | **Stone flour**



→ **EFFECTS of stabilisers on physical and mechanical properties of clay**

7. *First stage of research activities*

CHEMICAL STABILISATION OF CLAY

3%

5%

7%

Determining the OPTIMAL AMOUNT OF STABILISERS in the mixture

7. *First stage of research activities*

CHEMICAL STABILISATION OF CLAY

3 days	7 days	14 days	28 days	90 days

Evaluation of the DURABILITY of clay stabilisation effect

8. *Second stage of research activities*

CHEMICAL – ELECTROKINETIC TREATMENT OF CLAY: LABORATORY EXPERIMENT

→ **EFFECTS of STABILISERS on physical and mechanical properties of clay IN COMBINATION WITH ELECTRIC FIELD**

→ **DURABILITY of clay stabilisation effects**

9. *Third (ongoing) stage of research activities*

CHEMICAL – ELECTROKINETIC TREATMENT OF CLAY: FIELD EXPERIMENT

→ **EFFECTS of STABILISERS on physical and mechanical properties of clay IN COMBINATION WITH ELECTRIC FIELD IN REAL CONDITIONS**

→ **DURABILITY of clay stabilisation effects**

10. Dissemination

CONFERENCE PUBLICATIONS

1. *5th International Scientific Conference "MAG 2022"*,
   Macedonian Association for Geotechnics and ISRM Specialized Conference,
   Ohrid, North Macedonia, June 23-25, 2022;
2. *12th International Conference "Assessment, Maintenance, and Rehabilitation of Structures"*,
   Association of Civil Engineers of Serbia,
   Vrnjačka Banja, Serbia, June 29 - July 01, 2022;
3. *International Symposium of Research and Application of Contemporary Achievements in Civil Engineering in the Field of Materials and Structures*,
   Serbian Society for Testing and Research of Materials and Structures,
   Divčibare, Serbia, October 19-21, 2022;
4. *17th Danube–European Conference on Geotechnical Engineering (17DECGE)*,
   Romanian Association for Geotechnics and Foundation and International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE)),
   Bucharest, Romania, June 07-11, 2023;
5. *International Conference "Sinergy of Architecture & Civil Engineering – SINARG 2023"*,
   Faculty of Civil Engineering and Architecture of Niš, and Serbian Academy of Sciences and Arts,
   Niš, Serbia, September 14-15, 2023.

10. Dissemination

JOURNAL PUBLICATIONS

1. *Environmental Engineering*
   Faculty of Geotechnical Engineering of University of Zagreb,
   Vol. 9, No. 1-2, 2022, pp. 21-28, DOI:10.37023/ee.9.1-2.3.

RADIO / TELEVISION / VIDEOS

1. *"Nauka privredi" (Science to the Industry)*
   Radio-Television of Vojvodina RTV 1
   season S08, episode E37 (*https://www.youtube.com/watch?v=NVKIM22FN1c*)
   season S08, episode E38 (*https://www.youtube.com/watch?v=hBhHghoL-5g*)

SOCIAL NETWORKS

1. *Research Gate* (https://www.researchgate.net/project/A-New-Concept-in-Improvement-of-Geotechnical-Properties-of-Ground-Chemical-Electrokinetic-Treatment-of-Soils-project-acronym-ElectroSoil)
2. *LinkedIn* (https://www.linkedin.com/in/zoran-bonic-63a518114/details/projects/)
3. *Facebook* (https://www.facebook.com/WorldBankSerbia)

www.electrosoil.rs

Principal Investigator of the Project:
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GRF-BG University of Belgrade
Faculty of Civil Engineering

GAF-NIŠ University of Niš
Faculty of Civil Engineering and Architecture

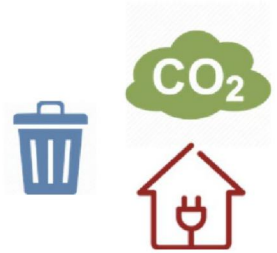
Towards Sustainable Buildings: Novel Strategies for the Design of Vibration Resistant Cross-Laminated Timber Floors

Substrate4CLT

Principal Investigator:
Dr Marija Nefovska-Danilović (GRF-BG)

PROBLEM STATEMENT

- **In Europe almost 40% of the total use of energy and materials, 40% of waste and 40% of the greenhouse gas emissions, come from the construction sector.**

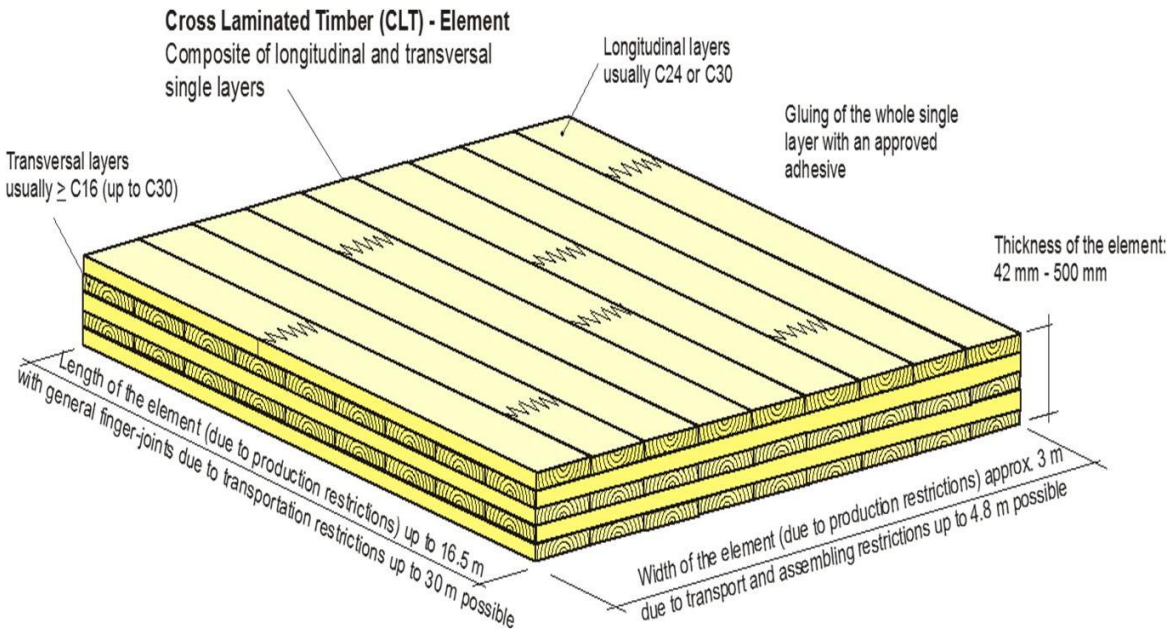


- **Concrete and steel produce alone approximately 9% of the annual global carbon emission.**

- Carbon emission in civil engineering can be significantly reduced by using timber: a natural, non-toxic and renewable raw material.

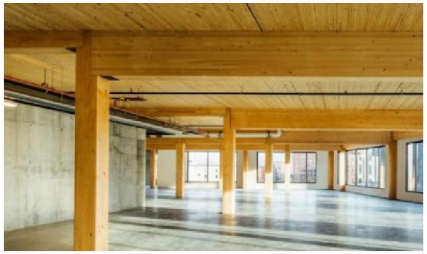
- **Cross-laminated timber** (**CLT**) – novel timber-based natural multilayer composite material, manufactured of several thin timber layers bonded together in a crosswise manner.

PROBLEM STATEMENT

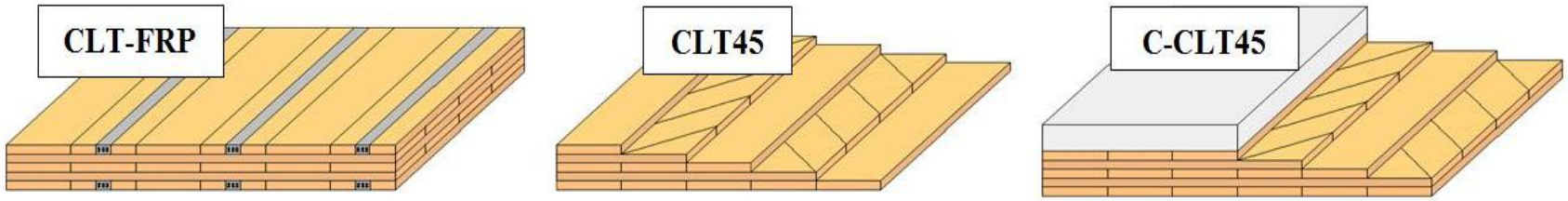


PROBLEM STATEMENT

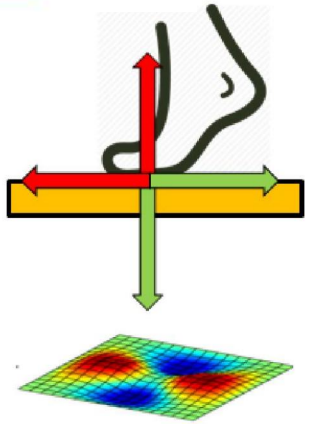
- **Long-span CLT floors are needed for CLT to become competitive against concrete and steel in spanning large open space areas.**



- **By using the conventional CLT floor solutions, long spans are relatively hard to achieve. Therefore, strengthening techniques of CLT are required:**



- **CLT, as a lightweight material, is particularly prone to human induced vibrations. Long-span CLT floors exibit vibration serviceability issues:**
  - annoyance to human occupants in buildings,
  - dysfunction of vibration sensitive equipment.



PROJECT GOAL

- **OVERALL GOAL**

  To deliver a sustainable, cost-effective and innovative solution for **vibration resistant** lightweight CLT floors, primarily designed for large open-floor areas in commercial buildings.

To **optimize** long-span CLT floors by proposing novel hybrid floor solutions and by using cost-effective timber layer compositions,

To **enhance** currently limited knowledge relevant to vibration serviceability issues of lightweight CLT floors via quantification of their dynamic response,

To provide novel **experimental** data on vibration performance of long span CLT floors and verify and calibrate numerical models through experimental testing,

To develop a **metamodel**-based stochastic prediction tool for uncertainty quantification of dynamic response of CLT floors induced by human activities,

To improve the overall knowledge and **awareness** regarding CLT applications among all relevant stakeholders in Serbia and Balkan region.

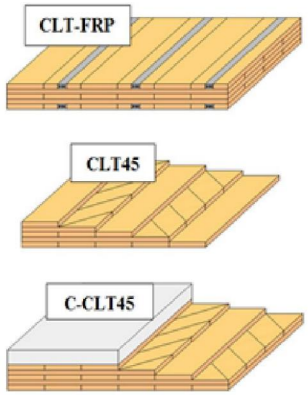
PROJECT NOVELTY

- **Novel strengthening strategies for CLT floors**

  - **CLT-FRP**: strategic positioning of FRP bars within the CLT,

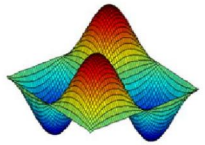
  - **CLT45**: introduction of angle-ply transverse layers to optimize the load-carrying capacity in the main direction (0°) of CLT panels,

  - **C-CLT45**: mechanical coupling of CLT45 panels with the concrete topping.



- **Vibration serviceability assessment**

  - The effects of **uncertainties** associated with material properties, support conditions and human-induced dynamic load on the dynamic response of both conventional and hybrid CLT floors.

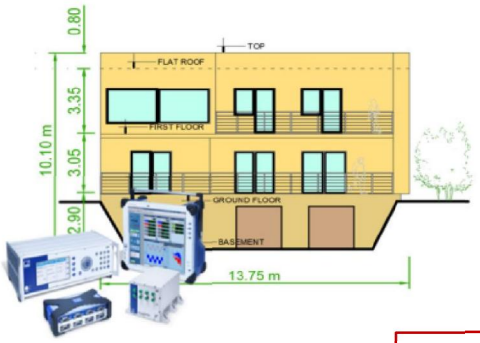


- **Novel experimental data**

  - Static tests of CLT, CLT45, CLT-FRP and C-CLT specimens,

  - Dynamic tests of CLT, CLT45 and CLT-FRP full-scale floors,

  - Full-scale dynamic testing of CLT buildings in Serbia.



IMPACT

TARGET GROUPS & BENEFICIARIES: Scientific community, timber producers, CLT manufacturers, building companies, policy makers, public.

SCIENTIFIC COMMUNITY: novel hybrid CLT floor solutions, vibration serviceability of CLT floors.

EDUCATION: Workshops, LLL courses, MSc and PhD courses, demo-site visits and elapse of the construction of the test building.

SOCIETY: Better quality of life for people, providing safer, more ecofriendly, pleasant and comfortable buildings by facilitating CLT uptake in construction.

ENVIRONMENT: CLT offsets carbon emission and avoids environmental damage. CLT has good thermal insulation properties - energy efficiency.

ECONOMY & INDUSTRY: Development of a CLT industry has the potential to develop a new value chain on the basis of domestic raw materials, with significant benefits for value- and job-creation in the areas with weak socio-economic conditions.

IMPLEMENTATION PLAN

PROJECT TEAM

PI

Dr Marija Nefovska-Danilović
GRF-BG

P1

Dr Ivan Glišović
GRF-BG

P2

Dr Miroslav Marjanović
GRF-BG

P3

Dr Zoran Mišković
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Dr Marija Todorović
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P5

Dr Radovan Cvetković
GAF-NIŠ

P6

Dr Vitomir Racić
Politecnico di Milano

P7

Marija Milojević
GRF-BG

P8

Nemanja Marković
GAF-NIŠ

P9

Emilija Damnjanović
GRF-BG

Industry partners:

KOLAREVIĆ

Сремска Митровица СРЕМПЛАН

Thank you for your patiente !

Niš, Serbia

This project receives funding from the European Union's Horizon Europe HORIZON-WIDERA-2021-ACCESS-05 under grant agreement No 101071306

The WATERLINE Project

Presenting: Vuk Milošević

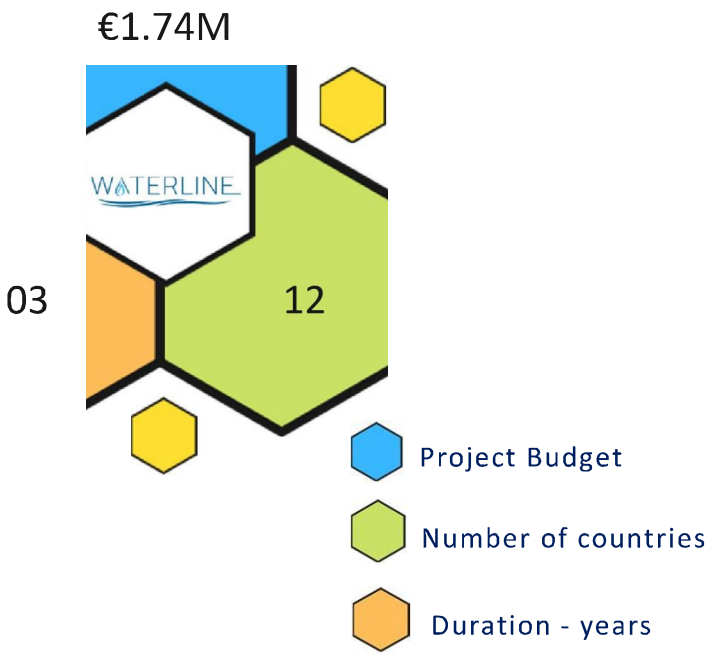
WATERLINE – at a glance…

PROJECT TITLE

Transforming advanced water skilling through the creation of a network of Extended Reality Water Emulative Centres

MAIN AIM

WATERLINE's main aim is to create a European Digital Water HEI Alliance, based on the quadruple helix model of innovation.



Project Partners

WATERLINE's Specific Objectives

1. Support consolidation of the Digital water HEI alliance
2. Build capacity for academics/researchers, based on a shared R&I capacity building plan, with a focus on Widening HEIs
3. Co-create a portfolio of digital water components for curriculum at Master level and leverage innovative extended reality emulative learning environments (LEs)
4. Build and foster a European network of academics/researchers
5. Sustaining the alliance of extended-reality water emulative centres

Project Implementation

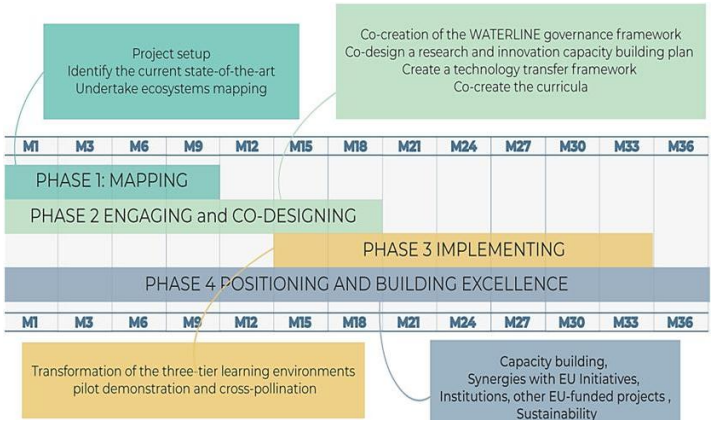


Figure 1.1: The WATERLINE overall implementation methodology

Reach Us

For questions or more info

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International Conference
Synergy of Architecture & Civil Engineering – SINARG 2023

Niš (SERBIA) _ 14-15 September 2023 _ Science & Technology Park Niš

Organised by the University of Niš - Faculty of Civil Engineering and Architecture & Serbian Academy of Science and Arts – Branch in Niš

Co-funded by the European Union

smartWB

Marija Jevrić

University of Montenegro, Faculty of Civil Engineering

Co-funded by the European Union

is Erasmus+ Capacity Building in Higher Education project, titled:

Curricula innovation in climate-smart urban development based on green and energy efficiency with the non-academic sector (SmartWB)

720.000 €, January 2023 (3 years)

Motivation

- In this era of **increasing urbanisation**, according to the 2030 Agenda for Sustainable Development and other global development frameworks, cities should be well-planned and well-managed.

- **Climate change** represents a challenge and business opportunity for the creation of new green jobs, boosting new and innovative technological solutions and business models, especially for developing countries.

- The first step towards creating an environment for climate-smart urban development (CSUD) is introducing **education** that will raise awareness and profile new professionals who will incorporate a CSUD approach in all aspects of their professional activity.

- WB HEIs should **improve the existing education** in CSUD, **build** professional and technical **capacities**, apply innovative teaching methods and ICT, and create permanent links with the **non-academic sector**.

Objectives

- To **improve the quality of higher education** in the CSUD field by:

- the exchange of knowledge, experience, and good practices,
- modernising university courses in line with EU trends,
- improving the level of competencies and skills of teaching staff.

- To **strengthen universities' relevance for the labour market and society** by procuring up-to-date equipment, i.e. creating technological preconditions for WB HEIs.

- To enhance **WB community engagement by promoting emission reduction approaches and low-carbon technologies**.

- To set up and implement **an interactive web-based platform to share knowledge and know-how practical examples among project partners and stakeholders**, enhancing relations between HEIs in WB partner countries and the economic and social environment

Consortium

To achieve this objectives, it is necessary to **transfer** innovative technologies and know-how best practices from the Programme countries to WB HEIs.

6 universities from **EU Member States and third countries associated to the Programme**: Austria, Croatia, Germany, Norway, Serbia and Spain**.**

7 universities from **Western Balkans** countries: Albania, Bosnia & Herzegovina and Montenegro,

supported by 3 non-academic partners and 2 associated partners in urban development**.**

Partners

1	University of Montenegro	Montenegro
2	University of Nis	Serbia
3	University of Natural Resources and Life Sciences	Austria
4	Norwegian University of Life Sciences	Norway
5	University of Zagreb	Croatia
6	Universidad Rey Juan Carlos	Spain
7	Technische Hochschule Ostwestfalen-Lippe	Germany
8	University of Sarajevo	Bosnia and Herzegovina
9	Dzemal Bijedic University of Mostar	Bosnia and Herzegovina

10	University of Bihac	Bosnia and Herzegovina
11	European University of Tirana	Albania
12	Polytechnic University of Tirana	Albania
13	Polis University	Albania
14	Co-Plan	Albania
15	Environmental movement Ozon	Montenegro
16	Association of Consulting Engineers of Bosnia and Herzegovina	Bosnia and Herzegovina
17	Engineers Chamber of Montenegro	Montenegro
18	Association Resource Aarhus center in B&H	Bosnia and Herzegovina

Work packages

Work Package	Work Package Name	Status	Start Month	End Month
1	Project management and coordination	***ongoing***	M1	M36
2	Analysis of current status in climate-smart urban development	***completed***	M1	M6
3	Capacity building of WB HEIs	***in progress***	M1	M17
4	Creating technological platform	***started***	M1	M17
5	Implementation of modernized courses and platform	*pending*	M17	M36
6	Quality assurance and monitoring	***ongoing***	M2	M36
7	Impact and dissemination	***ongoing***	M1	M36

WP3 Capacity building of WB HEIs

Modernisation of university courses in collaboration with the industry sector
At least 20 university courses are to be innovated on the basis of the results of WP2.
Development of training programme for students' internships
Training programmes for students' internships is currently in the process of design.

Theme-based training of teaching staff for acquiring new practical skills
6 theme-based training for teaching staff will be organized and the knowledge and skills acquired will be disseminated.
Providing agreements for the future cooperation between WB HEIs and the non-academic sector
14 agreements for providing students' internships will be signed with business sector.

Purchasing of software and laboratory equipment, installation and activation
New laboratory equipment will be purchased for 7 HEIs from WB countries. It will be used for innovating the teaching process and better acquisition of skills related to CSUD.

What has been done so far?

10 deliverables were carried out

Kick off meeting was held in Podgorica (UoM)

Theme-based training was organised in Dubrovnik (UNIZG)

Topics:

- Universities in digital revolution era

- Bologna process for curriculum development: course descriptors and learning outcomes.

- Mobile phone as educational tool

- Problem based learning

- Smart cities

- Education for sustainable development

Theme-based training was organised in Niš (UNI)

Topics:

- IoT and smart cities

- Augmented collaboration toolkit

- E-Learning modules for serious games

- Urban resilience with nature based solutions

- Urban hydrology

- Managing built heritage for climate-smart development

- Advances in Managing Built Heritage for Climate-Smart Development

Workshop on climate-friendly and innovative sollutions in UD was held in Vienna (BOKU)

Theme-based training was organised in Oslo (NMBU)

Topics:

- Buildings, storm water management and sculptures in harmony with urban living

- Innovations in water quality surveillance

- ChatGPT in Education: opportunities and challenges

- Timber as a sustainable urban building materials with a low carbon-footprint

- International Project development

- Sustainable urban architecture & water management in buildings with historical conservation values

Knowledge gained has been disseminated...

The project has been promoted...

... and results have been communicated

Thank You for Your Attention

marijaj@ucg.ac.me

Transport of Dangerous Goods - Modernization of Curricula and Development of Trainings for Professionals in the Western Balkans HEIs

DGTRANS

Milan Protić, Faculty of Occupational Safety, University of Nis

Sept. 2023

"Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them"

Call: ERASMUS-EDU-2022-CBHE-STRAND-2
Project number: 101082187

BASIC INFORMATION

Project type	ERASMUS+ Capacity building in the field of higher education
Project acronym	DGTRANS
Project name	Transport of Dangerous Goods - Modernization of Curricula and Development of Trainings for Professionals in the Western Balkans HEIs
Project duration	1st December 2022 - 30th November 2025
Program	ERASMUS-EDU-2022-CBHE
Budget	793.889,00 €
EU Contribution	713.889,00 €
Coordinator	University of Pristina in Kosovska Mitrovica
Project website	www.dgtrans.pr.ac.rs
Project e-mail	dgtrans@pr.ac.rs

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MOTIVATION

- Need for modernization of safety education at the academic level, especially with regard to the **transportation of dangerous goods**
- Requirements for additional trainings for professionals
- Demand for safer and more controlled DG supply chain
- Necessity for adaptation to Smart and Sustainable Mobility goal of the EU Green Agenda for WB

General objective

Improve the quality of higher education in the field of the TDG and **enhancing the level of competences and skills of professionals** already working in TDG domain in WBC by **developing new and/or improving/upgrading existing undergraduate/master academic programms in line with EU trends.**

Specific objectives

- To identify key risks of the TDG by road in WB partner countries
- To improve existing and develop new TDG curricula for undergraduate and master studies
- To develop and implement the training program for the TDG professionals in line with ADR and up-to-date scientific knowledge on issues related to the TDG

Consortium

Program country partners

University of Maribor (UM, Slovenia)

Polytechneio Kritis (TUC, Greece)

Obuda University (OU, Hungary)

Lublin University of Technology (LUT, Poland)

University of Nis (UNI, Serbia)

Consortium

WBC partners

University of Pristina in Kosovska Mitrovica (UPKM, Kosovo*)

University of Sarajevo (UNSA, Bosnia and Herzegovina)

University of East Sarajevo (UES, Bosnia and Herzegovina)

International business college Mitrovica (IBCM, Kosovo*)

University Adriatic Bar (AUB, Montenegro)

University of Montenegro (UoM , Montenegro)

Universiteti Politeknik i Tiranes (UPT, Albania)

Universiteti Polis Shpk (UPOLIS, Albania)

Consortium

Associated partners

Road Traffic Safety Agency (ABS, Serbia)

Traffic Safety Agency of Republic of Srpska (TSARS, BiH)

Naftagas-naftni Servisi Doo Novi Sad (NAFTAGAS, Serbia)

Work Packages

Work Package 1: Project management
Leader: University of Mitrovica (UPKM)

Work Package 2: Introduction with key issues for TDG in WBC and PC
Leader: University of Maribor (UM)

Work Package 3: Development of TDG Curricula and Laboratories
Leader: OBUDAI EGYETEM (OE)

Work Package 4: Development of trainings for TDG professionals
Leader: Lublin University o Technology (LUT)

Work Packages

Work Package 5: Implementation of TDG Curricula and Trainings
Leader: University Adriatic Bar (AUB)

Work Package 6: Quality Assurance and Monitoring
Leader: University of Nis (UNI)

Work Package 7: Dissemination and Exploitation
Leader: University of Mitrovica (UPKM)

Deliverables

Deliverables

THANK YOU FOR YOUR ATTENTION!

Soft-sensors Enabling Advanced Control for Biological Wastewater Treatment Processes - SEACWater

Xiaodong Wang, PhD

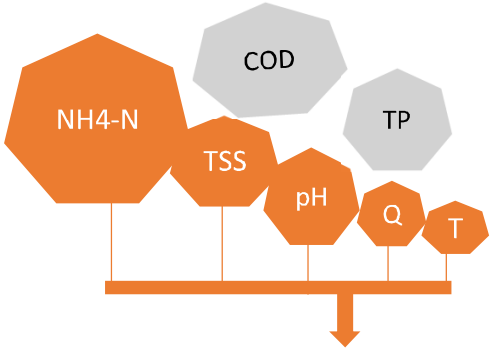
Associate professor, Qingdao University of Technology

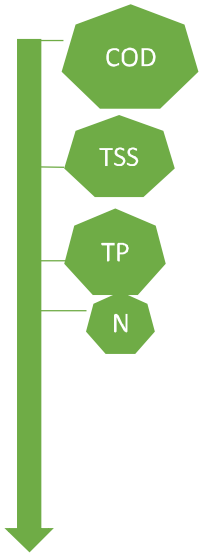
SEACWater info sheet

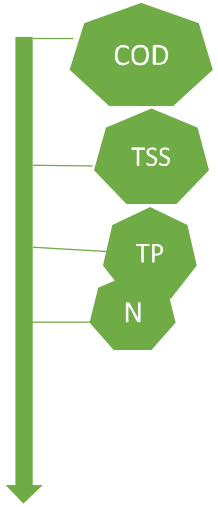
- **S**oft-**se**nsors **E**nabling **A**dvanced **C**ontrol for Biological Wastewater Treatment Processes
- Funded by NSFC – National Natural Science Foundation of China
- 2020-2022
- Coordinator- Xiaodong Wang
- Grant rate: 18%

The project idea came from previous research work

- Model predictive control (MPC) is considered as an advancedcontrol scheme to optimize wastewater treatment plants (WWTPs).
- For the successfully use of MPC, real time monitoring of the treatment process and appropriate models which can describe process behaviors are required







A fundamental research project in process analysis and data science

- Soft sensors for influent prediction – data mining of the regulation of how residences use water

- Intermediate process variable/parameters identification for more accurate process models

- Sensor network construction – integration of physical sensor and soft sensor for a higher level of automation

Limitation and outlook of the project

- Not enough fund for international cooperation/communication
  - Need to submit for additional proposals during or after this project.
- Only fundamental research is encouraged for NSFC
  - Theoretical study with tracked record is necessary for NSFC.
  - Development or application research should seek fund from other program (e.g. MOST, also encourage bilateral joint international project).
- The project outcome
  - Did not go deep enough in sensor network construction – next proposal.
  - Several pilot-scale plants/reactors were constructed and used, but quite limited results were generated – could be used in other and continue the investigation in other projects.
  - Commercial values have not been created – we need partners.

Thank you

Xiaodong Wang, PhD

Associate Professor in Water and Environmental Engineering

Qingdao University of Technology

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ARSINOE

CLIMATE-RESILIENT REGIONS THROUGH SYSTEMIC SOLUTIONS AND INNOVATIONS

Coordinator

This project has received funding from the European Union's Horizon H2020 innovation action programme under grant agreement 101037424.

Presentation of the ARSINOE project

Key facts

ARSINOE

Climate-resilient regions through systemic solutions and innovations

41	15	9	15	48
Partners coordinated by the University of Thessaly	European countries	Case studies in Europe	Million Euros	Months (October 2021 – October 2025)

Challenges & approach

Climate change is complex and interconnected with other global challenges such as food security, water scarcity, biodiversity depletion and environmental degradation.

Adaptation refers to all approaches taken to adjust, prepare for, and accommodate new conditions that are created by changing climates.

ARSINOE will apply a three tier approach to address the growing complexity, interdependencies and interconnectedness of modern societies and economies and propose climate change adaptation solutions

Objectives progress monitoring

Objective #1 *Fundamental transformation of economic, social and financial systems*	Objective #2 *Support recovery from the COVID-19 crisis and climate resilience*	Objective #3 *Two-way learning: introducing collaborative design and citizen engagement*	Objective #4 *Offer advanced Environmental Intelligence services and tools*	Objective #5 *Quantify, model and manage climate risk in a systematic way through resilience*	Objective #6 *Facilitate knowledge transfer and exploitation for start-ups and SMEs*
Stakeholders mapped and shortlisted according to Influence / Interest for all CSs	Mapped policy landscape: EGD, UN and EU SDGs, EU Taxonomy, NDCs, CSRs, SDG transformations	Educational & training activities—Train the Trainers Seminars and Youth Assemblies	Collective Environmental Intelligence Data Hub created	Simulation models to evaluate resource allocation among permutable services	Massive presence in social media and national and international fora for diss & comm activities
Mapping / scoping / objective setting in all LLs			Knowledge Graph infrastructure created (SustainGraph)	Biodiversity assessment framework, socio-economic vulnerability assessment for CS1	Climate Innovation Window: Innovation Bazaar Funding Scheme—1 open call published
Problem statement / envisioning in all LLs	Development of package of technological / governance / financial innovations, including the Institutional structure for each CS				
Backcasting & innovations (currently completed for 3 CSs)					

Status
Achieved
Continuous
Ongoing
Not started yet
At risk

9 Case studies in Europe

CS#1: Greening the Athens metropolitan area

CS#2: Mediterranean Ports

CS#3: Main River

CS#4: Ohrid/Prespa lakes

CS#5: Canary Islands

CS#6: Black Sea

CS#7: Southern Denmark

CS#8: Torbay and Devon county

CS#9: Sardinia

The ARSINOE Concept – Three Tier Approach

SYSTEMS INNOVATION APPROACH

The Systems Innovation Approach addresses the growing complexity, interdependencies and interconnectedness of modern societies and economies. It focuses on the functions of the cross-sectoral system "as a whole" and on the variety of actors.

CLIMATE INNOVATION WINDOW

The Climate Innovation Window is the EU reference innovations marketplace for climate adaptation technologies. It facilitates the market exploitation of validated tools and technologies by interested parties.

CLIMATE CHANGE ADAPTATION SOLUTIONS IN THE INNOVATION PACKAGES

Pathways to solutions are co-created and co-designed by stakeholders to form an innovation package for resilience to climate change.