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BRIDGING THE GAP FOR INNOVATIONS IN DISASTER RESILIENCE

Proceedings of the BRIGAID Conference in Venice (Italy)

9th-10th November 2017

End-users involvement in innovation on disaster resilience

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700699.The opinions expressed in this document reflect only the author's view and in no way reflect the European Commission's opinions. The European Commission is not responsible for any use that may be made of the information it contains.

BRIGAID CONFERENCE IN VENICE

End-users involvement in disaster resilience innovation.

November 9th - 10th 2017

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Table of contents

1. Foreword 4

2. Agenda of the conference 6

3. List of participants 8

4. Abstracts of the presentations 10

4.1. Introduction to BRIGAID 10

4.2. Recycling of Agro-Industrial Wastewaters using an Integrated System 12

4.3. The BRIGAID's Test and Implementation Framework 13

4.4. The Toolkit Method 14

4.5. Flood Proof Romania and Action plan in case of accident at the protection dikes 15

4.6. Innovative developments related to Smart Green Roofs 16

4.7. How to embrace innovative ideas from within the organisation? 17

4.8. Venice/MOSE Technology: development and innovation for coastal and environmental defence 18

4.9. Requirements for wildfire impact reduction 19

4.10. Impacts of extreme rainfall to transport networks 20

5. The innovation market 21

6. Lessons learned and recommendations to move ahead 25

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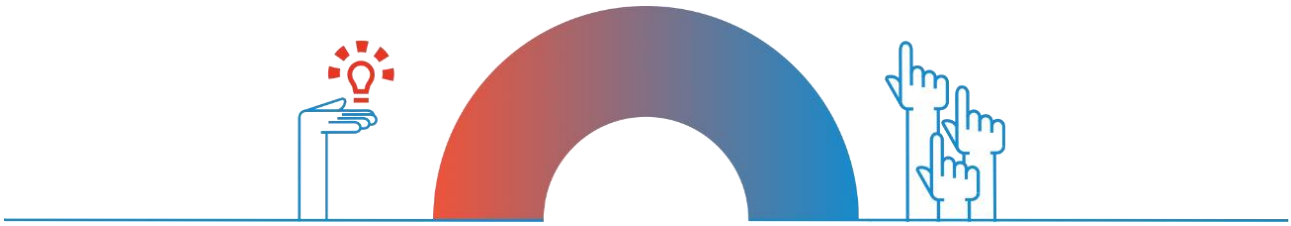
1. Foreword

Europe is particularly prone to natural hazards and evidence is now ever stronger that damages will increase in the future. Unfortunately, although that is a huge amount of climate adaptation innovations, many fail to reach the market.

BRIGAID (which stands for BRidging the Gap for Innovations in Disaster resilience) is a 4-year project (2016-2020) under EU Horizon2020 aimed to effectively bridge the gap between innovators and end-users in resilience to floods, droughts and extreme weather. It is being undertaken by a consortium of 23 partners coordinated by TU Delft.

BRIGAID is bridging the development of innovations by addressing the two “bridgeheads”, i.e. improvement of the characteristics of innovators and enhanced consideration of the needs and requirements of end-users.



On one hand, the BRIGAID’s approach aims to advance the technical, social and market readiness of innovations simultaneously. This smoothens the development path, because technical, social and market requirements can be incorporated in the design, business model and market approach early on.

However, there is not a clear agreement on how the points of view and operating frames of end-users should be incorporated into innovation. Indeed, in some cases, innovators can even question whether these needs should be a core part of the innovation process. BRIGAID considers the role of end-users as a key element to be integrated in the innovation development. Innovation because of innovation will not provide the answers to face the challenges posed by climate change. Building on this idea, BRIGAID contemplates that the role of end-users should go beyond the supply of basic information on their main requirements and evolve into a more direct contribution to the process of developing new products and solutions.

The BRIGAID Conference at Venice (9th and 10th October 2017) aimed to provide a better insight on how to foster the role of end-users for an improved development of climate resilience innovations.

A sample of innovations supported by BRIGAID and the main BRIGAID frameworks and methods to support the development of innovations were introduced. Moreover, a number of end-users across Europe presented how they are coping with adaptation to increasing natural disasters. These presentations showcased some specific case studies as example of how end-users are a key actor in bringing new products, new processes and new forms of organization into adaptation

solutions to climatic events. The integration of all these aspects was discussed in a plenary meeting to learn more on how and how end-users involvement can drive innovations' scouting and implementation processes and how this involvement can be supported by BRIGAID. The conference included an innovation market with pitch presentations and an exhibition area.

Follow us on Twitter (#brigaid_eu) to get regular information on the progress of BRIGAID project and/or sign up to receive our regular newsletter.

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2. Agenda of the conference

The conference took place at Thetis' headquarters, located within the Arsenale, in the Eastern part of the historic centre of Venice.

Program Thursday November 9, 2017

When?	What?	Speakers	Where?
14.00	Conference registration and coffee		Auditorium - Foyer
14.15	Welcome and opening	Giampaolo C. Cocconi – Thetis SpA (C.E.O.)	Auditorium
14.20	BRIGAID presentation	Bas Jonkman - TU Delft (Scientific Coordinator)	Auditorium
14.35	Program overview	Roelof Moll - TU Delft (Project Coordinator)	Auditorium
14.45	Innovations presentations	- Prof. dr. I. Litaor - "Recycling of Agro-Industrial Wastewaters using Integrated System: Coago-flocculation, Aerated Cells & Halophyte-Zeolite Wetland" - Dr. R. Bellamy - "The BRIGAID Test- and Implementation Framework" - Dr. F. Lanza – "The Toolkit Method: planning integrated measures against flooding for urban areas" - Dr. C. Popescu - "Flood Proof Romania and design of tests for innovations" - Prof. dr. ir. P.Willems - "Innovative developments related to Smart Green Roofs"	Auditorium
16.00	Coffee break		Auditorium - Foyer
16.15	End-users presentations	- Mr. M. Van Haersma Buma - "How to embrace innovative ideas from within the organisation?" - Ir. Valerio Volpe - "Venice/Mose Technology, development and innovation for coastal and environmental defense" - Mr. R. Almeida - "Requirements for wildfire impact reduction" - Prof. dr. N. Theodossiou - "Impacts of extreme rainfall to transport networks"	Auditorium
17.30	Open discussion and matchmaking	Marco Hartman – HKV (BRIGAID Business Manager)	Auditorium
18.00	Innovation market	Marco Hartman – HKV (BRIGAID Business Manager) - Pitch point presentations / Demonstration of innovations / Exposition area / Poster area	Auditorium - Foyer
20.00	Conference Dinner		

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Program Friday November 10, 2017

When?	What?	Speakers	Where?
8.30	Meeting and coffee		Auditorium - Foyer
8.45	Introductory presentation about the MOSE storm surge protection system	Consorzio Venezia Nuova	Auditorium
9.30	Boarding - Arsenale		
10.00	Arrival at Lido inlet and visit to the MOSE system	Consorzio Venezia Nuova / Provveditorato I.O.P.	
11.00	Boarding - back to Arsenale		
11.30	Plenary meeting: reflections on the first conference day and recommendations to move ahead		Auditorium
12.30	Closure of conference	Bas Jonkman – TU Delft (BRIGAID Scientific Coordinator)	Auditorium
12.45	Lunch and Farewell		

3. List of participants

Almeida, Rui	Institute of Nature Conservation and Forests (Portugal)
Anzaldúa, Gerardo	Ecologic Institute (Germany)
Bardhi, Diana	Metropolitan University of Tirana (Albania)
Bea, Manuel	I-CATALIST (Spain)
Bellamy, Rob	University of Oxford (UK)
Bica, Ioan	UTCB (Romania)
Bocci, Martina	Thetis (Italy)
Boonstra, Hidde	TU Delft (Netherlands)
Bruhn, Paul	Ecologic Institute (Germany)
Bude, Sebastian	Spectrum (Romania)
Cafini, Michele	Consorzio Acque Risorgive (Italy)
Carrer, Sebastiano	Thetis (Italy)
Cazzola, Giacomo	University of Venice (Italy)
Cecconi, Giovanni	Venice Resilience Lab (Italy)
Colaço, Conceição	Instituto Superior de Agronomia (Portugal)
Constantin, Dan	National Authority Romanian Waters (Romania)
Contreras, Sergio	FutureWater (Spain)
de Haan, Joost	Delfland Water Authority (Netherlands)
di Federico, Vittorio	Università di Bologna (Italy)
Fanelli, Angiola	Thetis (Italy)
Fuggini, Clemente	RINA (Italy)
Hartman, Marco	HKV (Netherlands)
Jonkman, Bas	TU Delft (Netherlands)
Jove, Roger	Balam Ingenieria de Sistemas (Spain)
Julián, Federico	AMBIENTA (Spain)
Lalaj, Nensi	AKPT (Albania)
Lanza, Francesco	Thetis (Italy)
Linetti, Roberto	PIOP (Italy)
Litaor, Iggy	MIGAL (Israel)
Loureiro, Carlos	GIFF (Portugal)
Mailli, Evdokia	ICRE8 (Greece)
Manfredi, Manuela	Thetis (Italy)
Marella, Tommaso	Thetis (Italy)
McDonald, Hugh	Ecologic Institute (Germany)
Mock, Randolf	Siemens AG (Germany)
Moll, Roelof	TU Delft (Netherlands)
Montanari, Alberto	Università di Bologna (Italy)
Musner, Tommaso	HYDROPro Consulting (Italy)
Negretto, Vittore	IUAV (Italy)

Noce, Elisabetta	RINA (Italy)
Pietratoni, Luca	Università di Bologna (Italy)
Popescu, Catalin	Aquaproiect (Romania)
Potirniche, Adrian	National Authority Romanian Waters (Romania)
Pozzato, Luca	VERA project (Italy)
Paprotny, Dominic	TU Delft (Netherlands)
Ramieri, Emiliano	Thetis (Italy)
Ramlal, Varsha	The Funding Company (Netherlands)
Raso, Emmanuele	Comune di Monterosso al Mare (Italy)
Realini, Eugenio	GRED (Italy)
Terpstra, Teun	HKV (Netherlands)
Theodossiu, Nicolaos	Aristotle University of Thessaloniki (Greece)
van den Berg, Sacha	TU Delft (Netherlands)
van Haersma Buma, Michiel	Delfland Water Authority (Netherlands)
van Loenhout, Joris	UCL (Belgium)
van Loon-Steensma, Jantsje	TU Delft (Netherlands)
van Os, Pieter	The Funding Company (Netherlands)
Verdone, Roberto	IDESIO (Italy)
Volpe, Valerio	PIOP (Italy)
Vonk, Bart F.	Rijkswaterstaat (Netherlands)
Wiktor, Pawel	Bureau Veritas (Poland)
Willems, Patrick	KU Leuven (Belgium)
Wysocka-Golec, Justyna	Bureau Veritas (Poland) Poland
Xepapadeas, Petros	ICRE8 (Greece)
Zanuttigh, Barbara	Università di Bologna (Italy)
Zarotti, Giovanni	Consorzio Venezia Nuova (Italy)

4. Abstracts of the presentations

The presentations were structured into three blocks:

a) Introduction to BRIGAID

b) Presentation of a sample of innovations supported by BRIGAID

c) End-users presentations

The next sections provide a summary of these presentations with a focus on the main messages and highlights.

4.1. Introduction to BRIGAID

by Dr. Bas Jonkman, from TU Delft (Netherlands)

Dr. Bas Jonkman, as Scientific Coordinator of BRIGAID, opened the conference with an introduction to BRIGAID project.

BRIGAID is funded by the H2020 programme under the Disaster Resilience & Climate Change Innovation topic. The project budget is around 7.8M€ and involves 24 partners from 14 countries. Our project aims to support innovations that offer potential for risk reduction to reach the market by improving technical readiness, social acceptance and market readiness. BRIGAID brings together innovators and end-users in Communities of Innovation to increase opportunities for market-uptake.

BRIGAID started in May 2017 and in these 18 months a significant progress has been achieved in many areas:

- A number of 80 innovations from 16 European countries have so far applied for support. These are dealing with floods, droughts, extreme weather or multi-hazard.
- The innovations that were selected as part of the BRIGAID first innovation cycle are working towards field tests.
- The initial methods, tools and information to support innovators have already been produced:
  - European maps of market attractiveness to several hazards
  - Technical guidelines for the implementation of the Test and Implementation Framework
  - Social readiness analysis
  - Business support through an online platform, i.e. the Market Analysis Framework.
  - Climate Innovation Window, as a dissemination tool for innovations
- BRIGAID is organising several dissemination and end-user events, e.g. tests in Flood Proof Holland, construction of Flood Proof Romania, Living Lab in Antwerp, etc.

As a final outlook, BRIGAID aims to get an increased involvement of end-users, which is one of the reasons behind the organisation of the conference.

4.2. Recycling of Agro-Industrial Wastewaters using an Integrated System

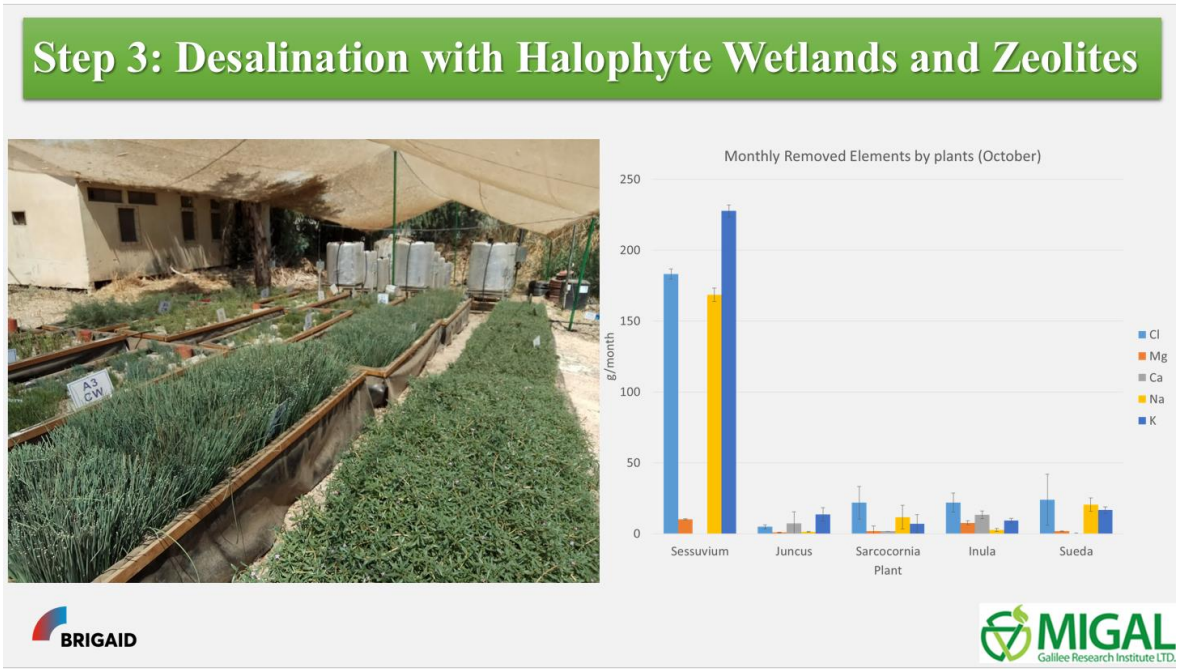
by Dr. Iggy Litaor, from MIGAL (Israel)

This is one of the innovations supported by BRIGAID. The Integrated System combines Coago-flocculation, Aerated Cells & a Halophyte-Zeolite Wetland.

The lack of freshwater resources produces the need to reuse water resources. Israel is the country with a largest percentage of water reuse by a large margin. This will be aan increasing need in many other countries.

This innovation surges as a costly alternative to existing options such as reverse osmosis which are highly energy-consuming. The challenge is to develop an operative Nature-Based Electricity Free Desalinization System. The solution follows a 3 steps approach:

- Step 1: TSS & COD Removal by Nanocomposites
- Step 2: COD Reduction in Bioreactor Aerated Cells
- Step 3: Desalination with Halophyte Wetlands and Zeolites



The system has been tested in laboratory conditions with good results, e.g. the regulatory target concentrations has been achieved although not enough water for irrigation was produced. With BRIGAID's support, operational testing will be conducted in the next months to determine the optimal wastewater recharge required to reach the ions target concentrations while still producing sufficient water for irrigation, to verify the simulations' results and to determine the right size of the system components for a given wastewater discharge.

4.3. The BRIGAID's Test and Implementation Framework

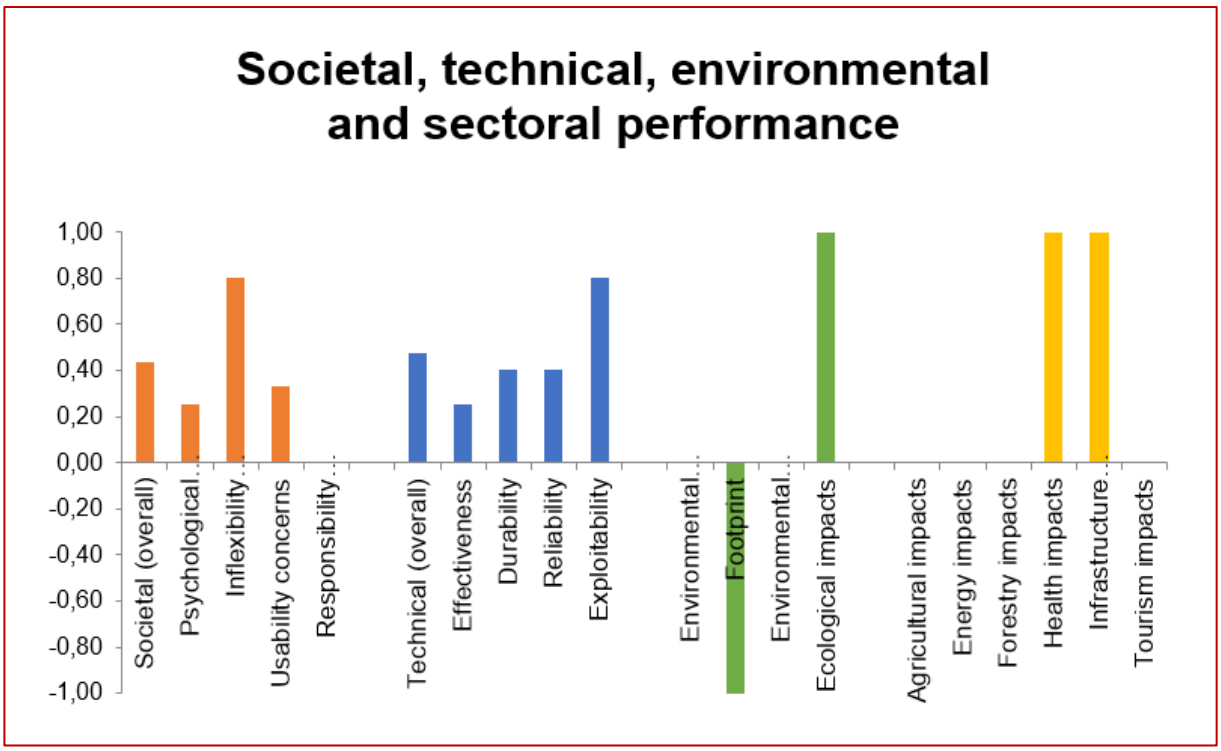
by Dr. Rob Bellamy, from University of Oxford (United Kingdom)

The Test and Implementation Framework (TIF) is one of the methodologies developed under BRIGAID. The aim of the TIF is to enable innovators to make a self-assessment of the socio-technical effectiveness of their innovations on various geographical scales and in various sectors.

The TIF provides information on four separate components:

1) Societal assessment, to reveal likely areas of societal acceptance and rejection.
2) Technical assessment, to reveal likely areas of technical success and failure.
3) Impact assessment, to reveal likely areas of environmental harms and benefits.
4) Sectoral impacts, to reveal likely areas of sectoral harms and benefits.

The toolkit automatically quantifies performance overall and by issue to provide an at-a-glance picture of where the strengths and weaknesses of an innovation may lie. In addition, guidance document provides information on how to interpret the results and advice on further testing and attending to any concerns raised.



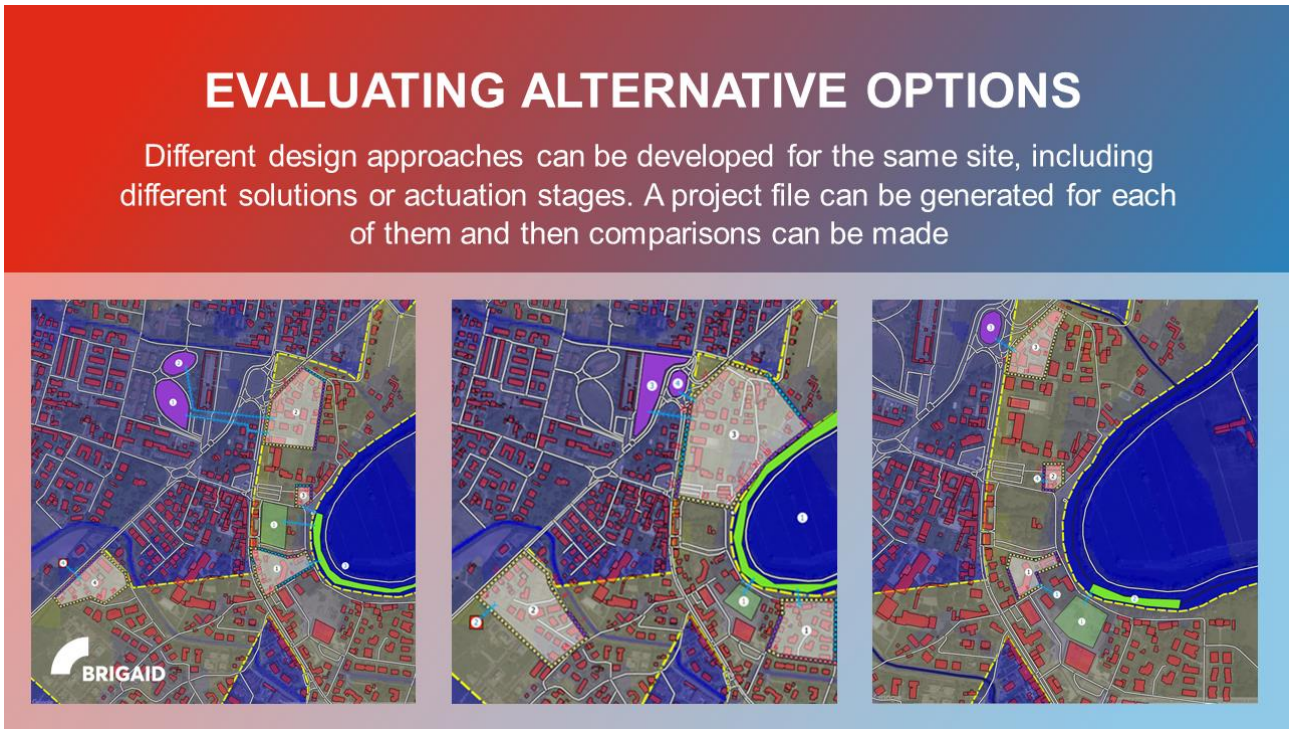
4.4. The Toolkit Method

by Francesco Lanza, from Thetis (Italy)

The Toolkit Method (TM) is another innovation supported by BRIGAID. It is a planning instrument aimed at providing a general evaluation of the feasibility of a protection strategy against flooding for an urban area. Such strategy may include different kinds of technical and technological solutions and their mutual combinations which are site specific.

The tool has been developed in a GIS (Geographic Information System) environment as a QGIS module. It builds on previous experiences of the innovator, e.g. in Venice (Italy) and Boston (USA). It needs a reduced number of input data to operate (in example, digital elevation model or a flood map) but can integrate a large number of data for a more precise analysis.

As a result, the Toolkit Method provides an evaluation of alternative options considering protected perimeters, protected areas, water receiving bodies and water discharge system.



A first operable version of the plugin has been developed so far, a possible test site for further validation and implementation during BRIGAID's testing cycles is San Marco Square for which extensive and detailed information is available.

4.5. Flood Proof Romania and Action plan in case of accident at the protection dikes

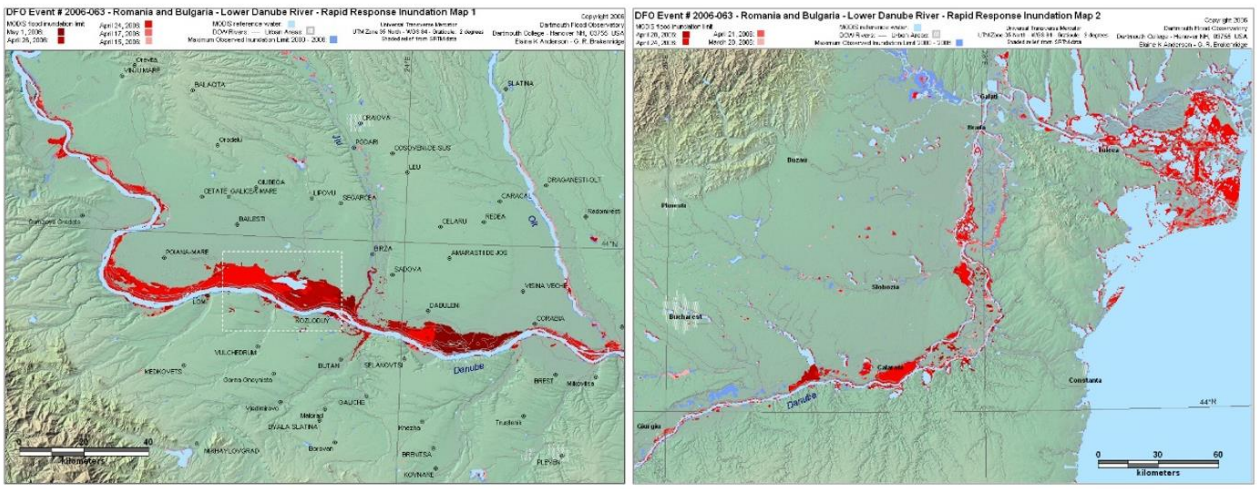
By Ir. Dan Constantin from NAAR (Romania) and Dr. Catalin Popescu from Aquaproiect (Romania)

The first part of the presentation introduced “Flood Proof Romania” through a video.

This is new testing facility that is being constructed by our partner NAAR in Romania, in the locality of Facau. Flood Proof Romania aims to support an innovation hub around floods protection for the Danube region. The facility offers a unique opportunity to develop, test and demonstrate innovations that aim to reduce impact from floods. It is especially suited to test and monitor innovations under high speed water flows as they appear during flash floods and landslides, and under extreme cold and hot land climate conditions. Moreover, the facility remedies the urgent demand for test facilities that are needed to structurally develop, test and demonstrate innovations in the Eastern European region.

The second part focused on a related innovation: an alarming-warning system of the floodable objectives located inside of dyke protected enclosures witch are exposed to failure risk during exceptional floods. This is being developed by Aquaproiect, one of the BRIGAID partners.

The innovation helps to anticipate a possible accident on dykes (using a sensors system integrated to the whole product) and provides a framework and procedural steps for an action plan in case of accidents on dykes.



The tool seeks to reduce damage by:

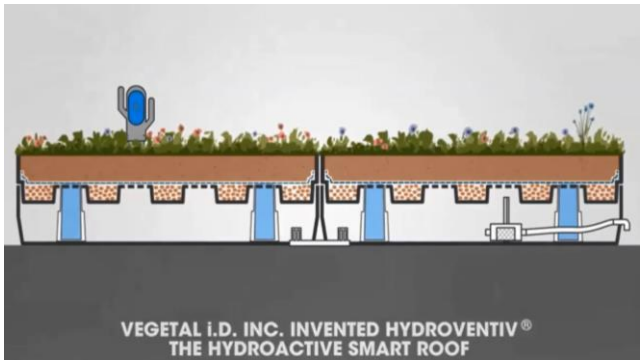
- determining areas sensitive to the occurrence of critical situations in indigestion,
- early anticipation of a possible dyke accident (using the early warning provided), and
- making a framework content for an action plan in the event of an accident at the dams.

4.6. Innovative developments related to Smart Green Roofs

by Dr. Patrick Willems, from KU Leuven (Belgium)

The leader of the BRIGAID activities on innovations dealing with extreme weather, i.e. KU Leuven from Belgium, presented a 15 minutes video summarising the works that currently are being undertaken in the Living Lab they have created in Antwerp city. This initiative involves a wide range of actors, from researchers and innovators to public authorities and social organisations.

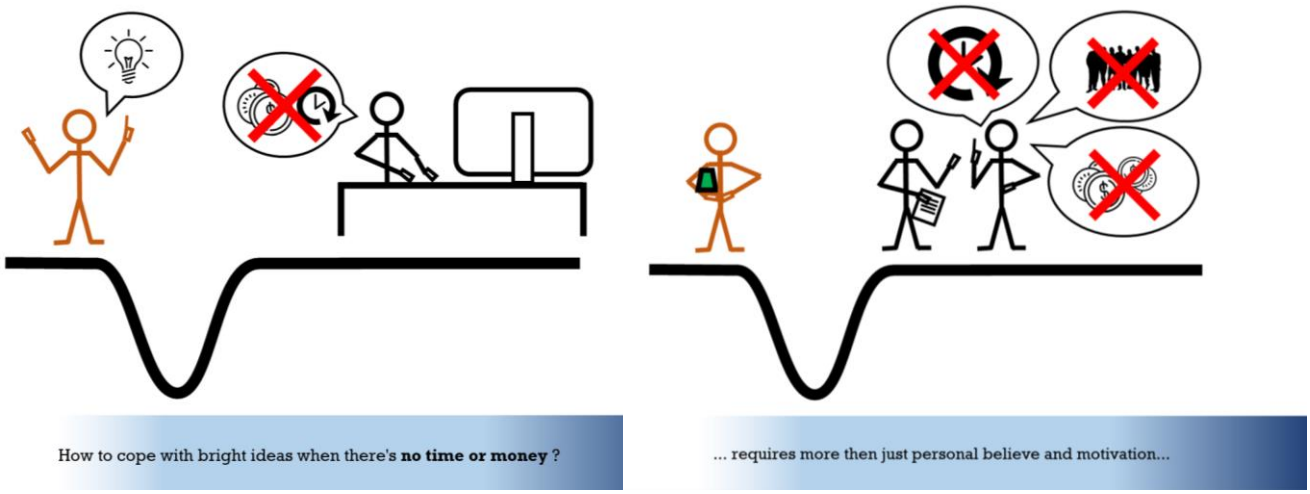
The video shows how one of the innovations supported by BRIGAID, i.e. Hydroventiv, an intelligent green roof is being installed for testing. This was happening at the same time of the celebration of the conference. The innovator (Vegetal i.D.) explains the advantages of the system, and some citizens, representatives of organisations and end-users, e.g. Antwerp local government, are invited to describe how they have participated in the selection of the testing location, explain why this kind of innovations is important to them and give their view on this initiative. The full video can be viewed here.



4.7. How to embrace innovative ideas from within the organisation?

by Mr. Michel van Haersma Buma, from Delfland Water Board (Netherlands)

This was the first presentation in the end-users session focusing on the experience and lessons learned by the Delfland Water Authority in the search and adoption of new solutions for a better preparedness against climatic events.



The figure of the 'innovation manager' has been key in this process. In particular this has been accompanied by three tools adopted by the organisation under the responsibility of this innovation manager: an innovation agenda, an innovation fund and the development of an effective professional network.

The innovation manager most important skills could be the search ability and the "2 P's": persistence and perseverance. These are required for a successful search of the best solutions for the organisation.

The main issue to be solved by this manager is who has the best solution to my organisation's problems. In order to answer this question, the innovation manager should be able to find assumptions and reluctance about the suppliers and quantify the expected effectiveness of not proven products.

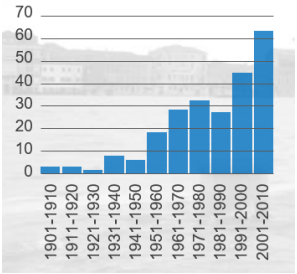
Mr van Haersma explained that on the other hand, an innovator should be aware that it is very important to do some research on how an organisation, and in particular the innovation component within an organisation, is managed. When an organisation is not willing to make changes it will be very challenging and difficult to move against this trend.

Finally, the WaterWindow platform was shown as an example of an initiative promoted by an end-user organisation to help in the identification of solutions. In this platform, end-users can find existent solutions or innovations including recommendations made by other end-users.

4.8. Venice/MOSE Technology, development and innovation for coastal and environmental defence

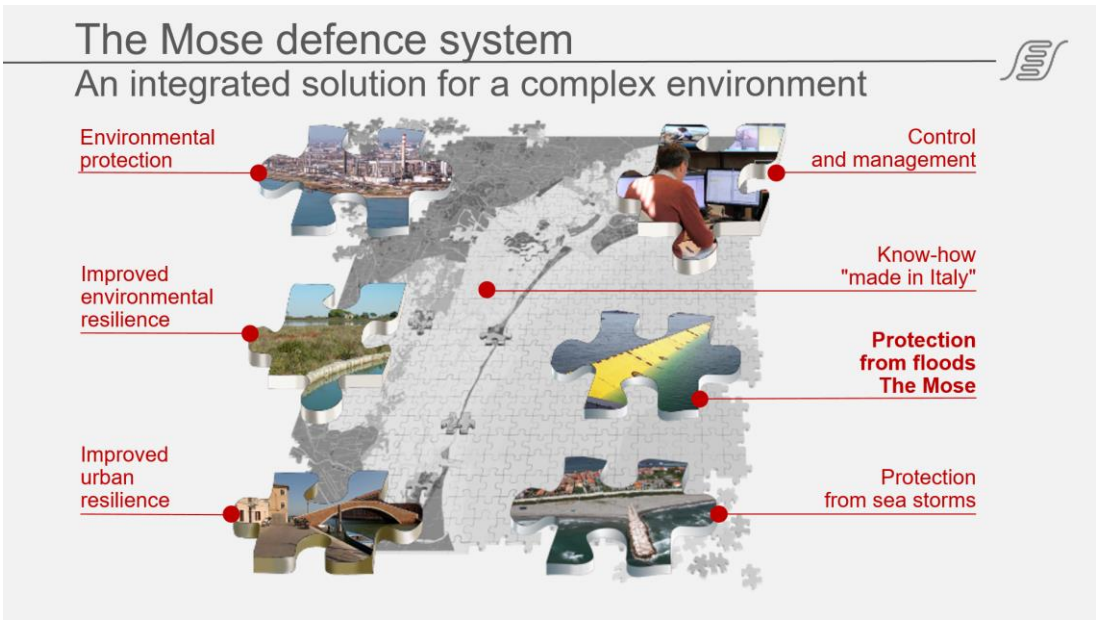
by Ir. Valerio Volpe, from Provveditorato I.O.P. – Venice Water Authority (Italy) -

This organisation is dependent on the Italian government and responsible of protection of the Venice city against flooding.



There is a multiplicity of problems affecting the Venice lagoon, i.e. storms, pollution, and erosion, but according to the measures taken in last decades, flooding is the most relevant. (see graph on the average height of water in floods episodes in Venice between 1900 and 2010).

In this presentation, the Mose defence system was described, as a highly innovative project for the protection of Venice city and the Venetian Lagoon from flooding, through a major environmental, coastal and urban protection plan. The Mose includes a series of mobile gates that are able to isolate the lagoon temporarily from high tides coming from the Adriatic Sea. These are designed to protect the city from sea level increases of up to 3 meters. The project also includes other accompanying measures, e.g. environmental protection and improvement of urban resilience.

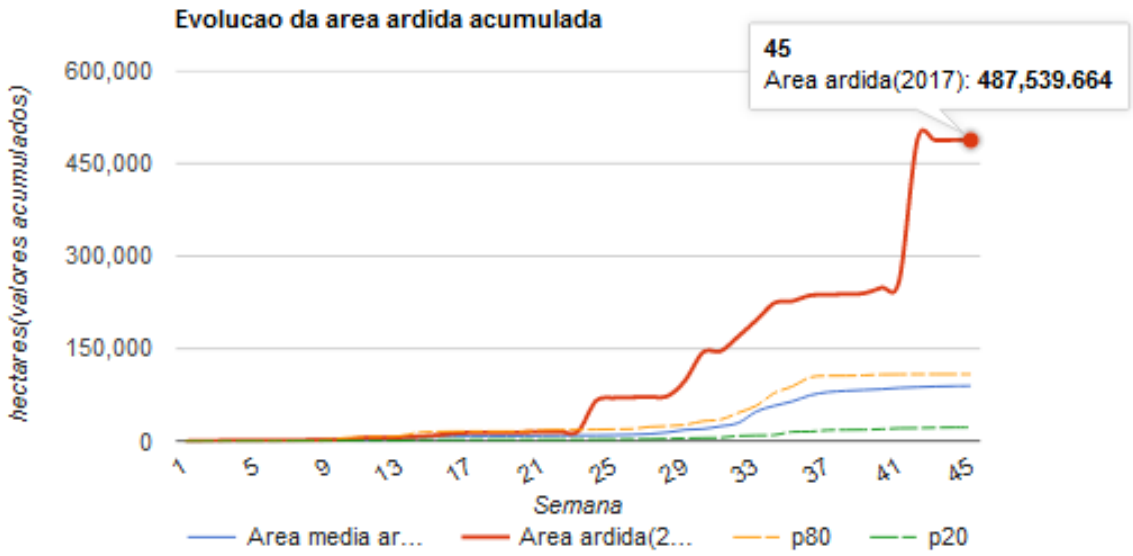


In such a context innovation has played a central role to provide new solutions to old problems and to rethink existing instruments to face new challenges. As a result of the application of the Mose project Venice is better protected from the negative effects of climate change. Additionally, there is an improvement in the quality of the environment and an increase in the biodiversity of the ecosystem. Moreover, the project has developed a system of multi-disciplinary knowledge and expertise and Venice has become a reference for other areas facing sea level rise.

4.9. Requirements for wildfire impact reduction

by Ir. Rui Almeida, from Institute of Nature Conservation and Forests (Portugal)

In Portugal, 2017 has been a terrible year in terms of impact from wildfires: 108 dead, more than 700 homes affected and a burnt area near 490,000 hectares, including 260,000 ha of forest stands, 180,000 ha of bushes and 50,000 ha of agricultural areas.



Drought has reduced fuel humidity and stronger winds than usual in summer increased the fire risk and the fires propagation. In summer 2017, a 81% of Portuguese territory was in condition of severe drought and a 7.4% of extreme drought. However, most of the fires are caused by human behaviour.

Portugal is actively looking for solutions to deal with this problem.

There are several fields where wildfire impact can be reduced.

First, it is possible to improve prevention in terms of a reduction of fires, burned area and damage in infrastructures. Second, there are several components of the fire-fighting chain where improved information can help to reduce the damages, e.g. detection, analysis of fire evolution or consolidation of fire suppression.

Finally, in terms of strategy, there are three main components where there is space for innovations that may lead to a reduction of fire damage: 1) human behaviour, 2) fuel management and 3) organization.

4.10. Impacts of extreme rainfall to transport networks

by Dr. Nicolaos Theodossiu, from Aristotle University of Thessaloniki (Greece)

Flooding of highways is one of the most severe problems that we have to deal with in order to ensure the operational requirements of transport networks.

This presentation showed an example of a flooding in a Greek highway (Egnatia highway, 2008) that was caused by an extreme heavy rain and exacerbated by the effects of drought, thus combining the main hazards BRIGAID is dealing with.

There was an important soil erosion and sediment transport joint to the flooding episode that provoked an important damage to the infrastructure.

As a reaction, soil retention basins have been built and the main fields for innovative actions have been identified:

- Low cost humidity sensors deployed over large areas in order to monitor soil moisture and alert in case of increased possibility of soil erosion
- Surveillance measures (using drones for example) in order to identify the status of prevention structures (like soil retention basins) and their ability to prevent soil transport

As a main conclusion, Prof. Theodossiu explained why we need to rethink the methodology that is currently applied for the design of hydraulic works, to include estimations of the impacts of climate changes and not trust only in the expected occurrence periods calculated on the basis of past events.

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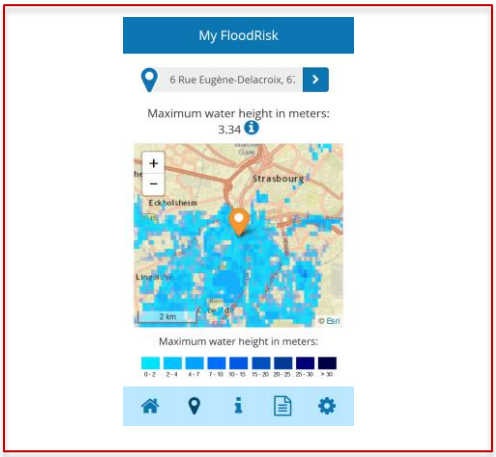
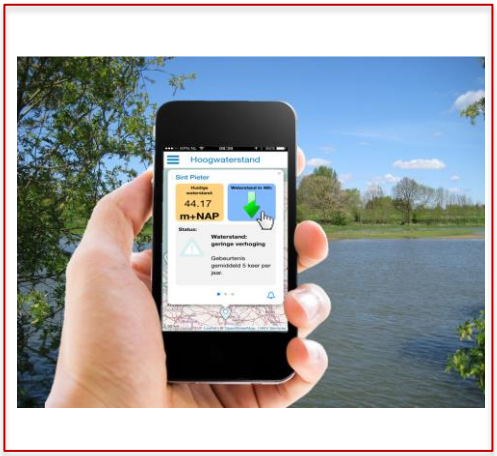
5. The innovation market

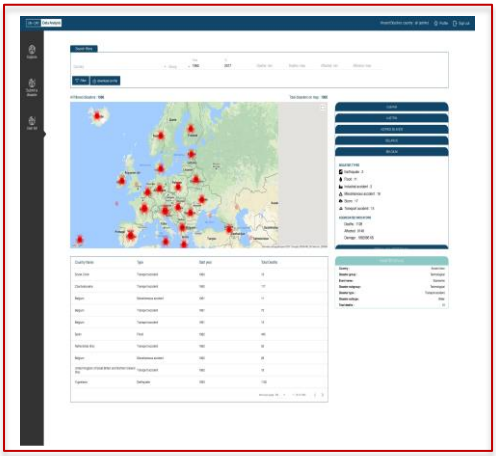
A number of 19 posters were presented as part of the innovation market which are listed below. By clicking on the name of the innovation you can get to the related poster.



"My Flood Risk" (by HKV consultants)



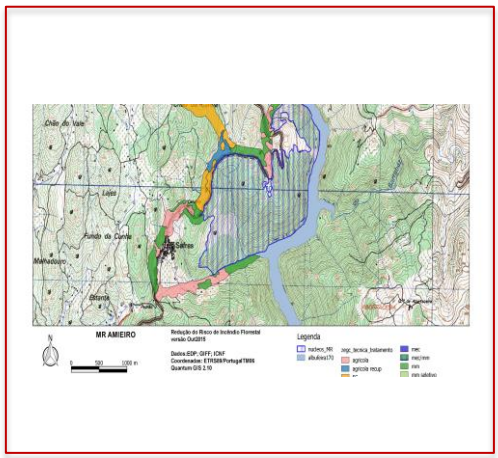
"My Water Level" (by HKV consultants)



"European Emergency Events Database" (by Université Catholique de Louvain – UCL)

"IRRIFRAME" (by University of Bologna)

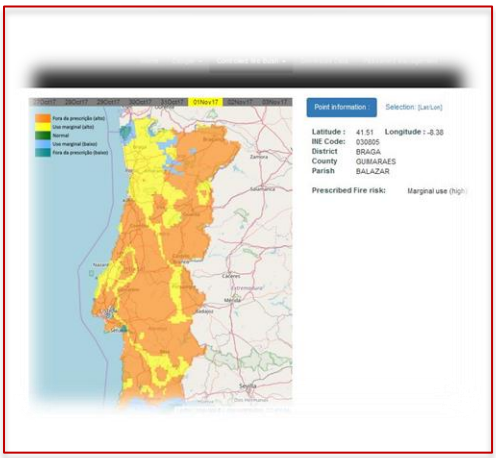
"OBREC" (by University of Bologna)



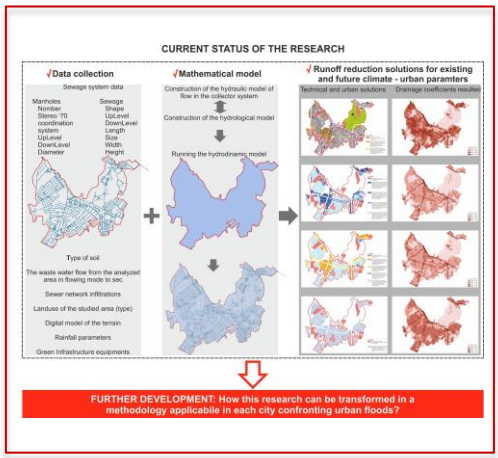
"Eco-Wildfire Management System" (by GIFF)

"ThirdEye" (by FutureWater)

"Precipitable water vapour monitoring" (by GReD)



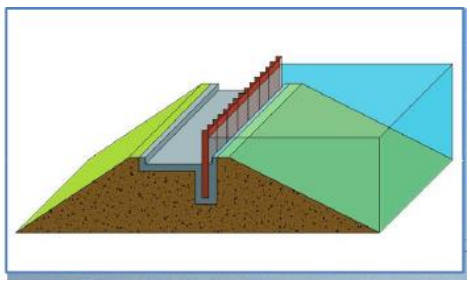
"Fire Risk monitor advisor" (by Instituto Superior de Agronomia – Universidade de Lisboa)



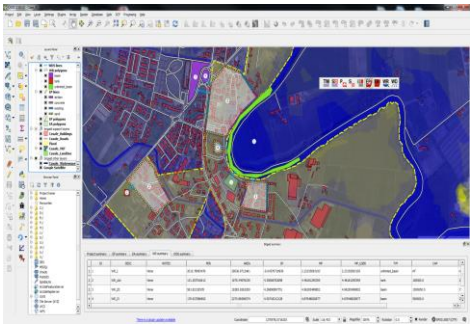
"URBRAIN" (by Technical University Civil Engineering Bucharest)

"Food Vertical Farming" (by RINA)

"Application framework with drones" (by RINA)



"Flip-Flap and Blitz Dam" (by SPECTRUM)

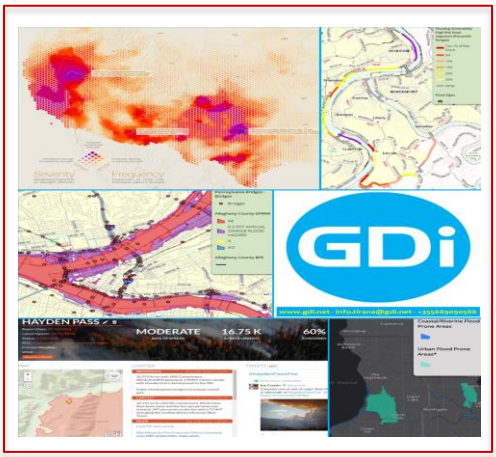


"The Toolkit Method" (by Thetis)

"Nature-based agro-industrial wastewater treatment" (by MIGAL)

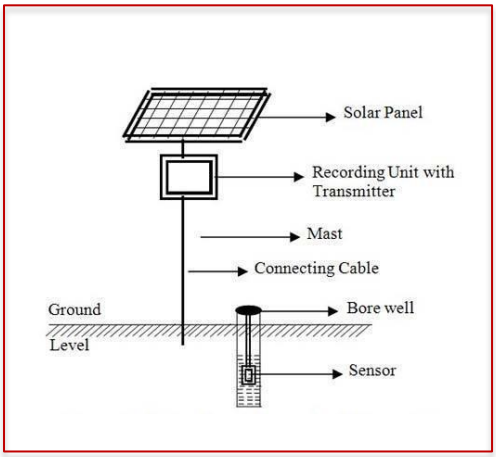
WaterWindow

"Water Window" (by Delfland Water Authority)



"Disaster Mitigation & Response Information System" (by GDI Tirana)

"Albania Alert EWS" (by Klodian Zaimi)



"Flood Local Tool – Albania" (by Klodian Zaimi)

In addition a session of pitches was organised with the presentation of 8 innovations:

- My flood risk (by HKV)
- The European Emergency Events Database (by UCL)
- IRRIFRAME (by University of Bologna)
- The Fire Risk monitor advisor (by ISA)
- InfoSequía (by FutureWater)
- Precipitable Water Vapour Monitoring (by GReD)
- Food vertical farming (by RINA)
- WaterWindow (by Delfland Water Board)

6. Lessons learned and recommendations to move ahead

The Conference provided an adequate environment for open discussions between innovators and end-users and interaction between BRIGAID partners and all the external invitees. As a result, a number of useful recommendations and advices did arise:

- The need to work on BRIGAID has been made more apparent recently through the disastrous floods in the Alpine region, droughts in Southern Europe, heavy rain episodes in urban areas or the wildfire disasters in Portugal.
- The interest in BRIGAID is rapidly growing, demonstrated by the fast increasing number of applications for participation in BRIGAID's innovation cycles. Furthermore, the development of methodological standards and indicators for monitoring the performance of innovations is positively perceived by actors involved in the innovation process. For example, the simultaneous consideration of technical readiness and social acceptance is considered as a strength by end-users with a direct role to promote the adoption of innovative solutions.
- The Conference proved to be a very inspiring meeting platform for enhancing the dialogue between end-users and innovators. One of the central conclusions extracted after the matchmaking session was the need to find adequate spaces and fora where end-users and innovators can meet. The interaction during the conference showed how when an end-user made a question on a specific problem, a number of useful answers were rapidly obtained. BRIGAID will continue working in this line.
- This dialogue between end-users and innovators is particularly important due to the effects of climate change. The classical solutions are starting to fail under rapidly changing conditions and this is something that managers and decision-makers must be prepared for. Innovation is central to finding new solutions or adapting existing methods to this new context.
- End-users require not only innovations that can solve a problem but also that these solutions can be easily operated and maintained with the resources they manage. Innovative business models can play a role in securing that an end-user may chose a specific innovation, e.g. specific contracts for the application of an innovation in case that specific climatic conditions occur.
- The combination of digital communication and face-to-face meetings is essential for effective dissemination in a people-to-people innovative environment.
- The impact of the Conference will be strengthened by dissemination of these Proceedings through the BRIGAID Newsletter, website and social media.

The next BRIGAID Conference will be organised in autumn 2018 in Bucharest (Romania) and will aim to build in these conclusions.

BRIGAID

BRIDGING THE GAP FOR INNOVATIONS
IN DISASTER RESILIENCE

ANNEX I: POSTERS

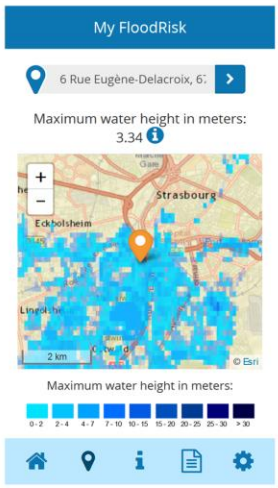
BRIGAID

BRIDGING THE GAP FOR INNOVATIONS IN DISASTER RESILIENCE

MyFloodRisk

Description

In the EU many citizens are at risk of floods from rivers, seas and heavy rainfall. Reliable, science based information does exist, such as the EU Flood Directive maps. Unfortunately, these maps are non-uniform, of various methodologies, scenarios, coverage, resolution, and without climate change projections. On top of it their availability as reusable GIS files is extremely limited. Hence, online pan-European floods maps that can be easily accessed by researchers, businesses and citizens are still unavailable. The EU FP7 project RAIN therefore developed pan-European maps for various hazards for a set of defined time periods and climate scenarios using EURO-CORDEX climate data. Based on these data, HKV Services launches a series of apps providing this information in a user friendly and clear manner, for each country in the EU.



Results

The app will be available per EU country in the app stores, early 2018. For each country there is a basic app containing the flood depths with an estimated return period of 10 years, based on the IPCC climate predictions for the period 1971-2000. A series of pro apps also contain data for longer return periods (30, 100, 300, 1000 years) and future climate projections (2050, 2100). The Pan-European flood maps were prepared within project "Risk Analysis of Infrastructure Networks in response to extreme weather" (RAIN).

Further Development

Based on other hazard data, HKV considers similar apps for other hazards such as heat and droughts.

End-users

EU citizens with smart phones can download the app from the Android or Apple stores. The app contains a map showing the exposed areas. By ticking a location (e.g., your home) the app provides the estimated flood depth for a given return period. In the pro app users can view flood depths for different combinations of return periods and climate projections using a filtering menu.

Implementation

EU citizens are provided with easy access to science based information about one of the most destructive natural hazards in the EU, through modern day technology. It stimulates awareness of floods, and provides a starting point for modern day risk communication by local authorities. HKV invites national, regional and local authorities in the EU to validate the data against local data sets.

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BACK TO LIST OF POSTERS

BRIGAID

BRIDGING THE GAP FOR INNOVATIONS IN DISASTER RESILIENCE

MyWaterLevel

Description

Due to climate change river flood plains and coastal areas will more frequently face extreme low and high water levels, all around the world. Sometimes events come at unusual times, such as the 2016 floods in the river Rhine that occurred in the summer season. The prediction of extreme water levels is also bound with uncertainty. Early warning of floodplain users such as inhabitants, businesses, farmers, and recreational sector (e.g., camp owners, festival organizers) is crucial to the safety of people and property, or to reduce losses in agricultural sectors. The app "My Water Level" provides a modern-day opportunity to users to set automatic, location-based warnings for self-chosen low and high water levels.

Results

The app "My Water Level" automatically warns anyone who wants to be notified of low or high water levels. The app can be downloaded to smart phones and tablets. The current version of the app contains data about the water levels in the Dutch branches of the river Rhine and Meuse and along the Dutch coast. Users can select locations and set the water levels (s)he wants to receive an automatic notification for. The app sends a push message in case a predefined water level is expected to be exceeded within the next two days.

Further Development

My Water Level provides risk information about low and high water levels in a mordern-day fashion. It facilitates risk communication to the general public and can be applied in any region as long as monitoring and/or forecasting data is available. This may concern a wide range of hazards including extreme water levels, water quality indicators, drought and extreme weather events.

End-users

End-users are citizens and companies in the Netherlands.

Implementation

The app has been tested in-house for (extreme) water levels in the Netherlands. These tests have shown that technology works correctly. Usability testing to gain customer experience feedback has not been performed yet. The free and pro versions of My Water Level are available in the app stores.,

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BACK TO LIST OF POSTERS

European Emergency Events Database (eEM-DAT)

Centre for Research on the Epidemiology of Disasters (CRED)

BRIGAID

Platform Components

1 Explore

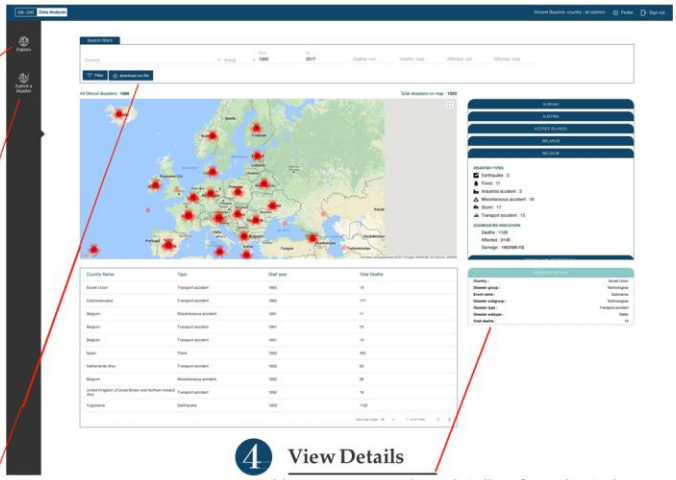
Use this function to search for and view disasters. You can filter by year, country, no. of deaths/affected, and type of disaster.

2 Submit a Disaster

As a country administrator, you can submit a disaster in your geographic area for eEM-DAT. The submission will be reviewed and either approved or more details will be requested for resubmission.

3 Download Data

Your desired results can be downloaded as a .csv file for data analysis.



4 View Details

Here, you can view details of a selected disaster from your search results.

Goals

- create a standardized and structured method of collecting and validating disaster impact data across Europe
- provide a user-friendly tool for stakeholders to obtain evidence in order to create evidence-based policy change.
- compile disaster and climate-related disaster impact data in one place

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What is eEM-DAT?

eEM-DAT is an online platform that is based on EM-DAT (Emergency Events Database), an international disaster database. EM-DAT contains essential core data on the occurrences and effects of over 22,000 mass disasters in the world from 1900 to the present day. eEM-DAT is more precise than the original database and collects impact data on a regional level. This will allow for a comprehensive understanding of disaster impact on a region.

Who will use it?

European governments, health ministries, local disaster response teams, civil protection, and researchers.

BACK TO LIST OF POSTERS

BRIGAID

BRIDGING THE GAP FOR INNOVATIONS IN DISASTER RESILIENCE

IRRINET-IRRIFRAME

Description

Irrigated agriculture is the most relevant water use sector, therefore highlighting the key role that efficient irrigation plays for saving water at the global level. Smart irrigation, supported by on-line assessment of soil and crop conditions, as well as weather forecasting, is unanimously recognized as a potential solution to mitigate global water scarcity. However, it is still an open question how to design the optimal structure of a smart irrigation system.

IRRINET-IRRIFRAME is an expert system for irrigation backed by the results of more than 50 years of research on sustainable irrigation. It processes several data bases and develops irrigation schedules that are available through different communication channels. Its main feature is the real-time irrigation scheduling, i.e. daily information on how much and when to irrigate.

Irriframe
IL PORTALE DELL'IRRIGAZIONE

Results

IRRINET-IRRIFRAME has been first implemented in the Emilia-Romagna Region, in Italy, since 1999, and then in 2011 the service has been extended to several Italian regions (see Figure above and https://ssl.altavia.eu/Irriframe) During the period 2007-2013, the IRRINET-IRRIFRAME system allowed to save more than 50 millions of m^3 of water in the Emilia Romagna region (Italy).

A smartphone app, IRRIFRAME Voice, has been prepared for facilitating the access to IRRIFRAME. The app is available in the Android and Apple operating systems.

References

Mannini, P., R. Genovesi, and T. Letterio. "IRRINET: large scale DSS application for on-farm irrigation scheduling." Procedia Environmental Sciences 19 (2013): 823-829.

Further Development

IRRIFRAME can be extended to support efficient management of irrigation networks, by optimizing water delivery to the farmer, by processing several layers of information related to the irrigation network. Processed data are related to Irrigation demands, water resources availability and operating conditions of the system.

End-users

Several irrigation boards in Italy including (the complete list is available at http://www.irriframe.it/ProjectOngoing.htm):

- **Consorzio Emiliano Romagnolo**
- **Consorzio Bonifica Burana,**
- **Consorzio Bonifica Renana**
- **Consorzio Bonifica dell'Emilia Centrale**
- **Consorzio Bonifica Parmense.**

IRRINET-IRRIFRAME is recommended by the Associazione Nazionale Bonifiche ed Irrigazioni (ANBI).

IRRINET-IRRIFRAME is promoted under the patronage of the Ministry of Agriculture in Italy.

IRRINET-IRRIFRAME has been promoted in several international scientific venues.

Implementation

Regions

IRRINET-IRRIFRAME has been implemented in several regions in Italy (see the above map).

A list of end users is available at **http://www.irriframe.it/ProjectOngoing.htm**

Markets

IRRINET-IRRIFRAME is widely applied in Italy but its use is not extended abroad.

The system can be easily extended to other contexts. Currently it is not available on the market

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BACK TO LIST OF POSTERS

BRIGAID

BRIDGING THE GAP FOR INNOVATIONS
IN DISASTER RESILIENCE

OBREC – Overtopping Breakwater for Energy Conversion

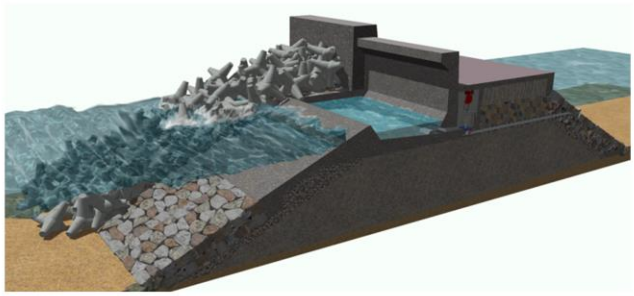
Description

The OBREC is a device that can be integrated in harbor breakwaters. The OBREC front reservoir has been designed with the aim of capturing the overtopping waves to produce electricity. The energy is extracted via low head turbines, using the difference in water levels be-tween the reservoir and the mean sea water level.

The OBREC (TRL 5) is aimed to:

1) produce energy;

2) protect the harbor from flood and extreme weather.



Further Development

- Design optimization to maximize the energy production in ordinary conditions, according to the typical climate;
- Design optimization to improve the survivability design in extreme conditions;
- Choice of the turbine;
- Identification of the size of the basic module.

End-users

Municipality
Region
Government

Implementation

Mediterrenean sea
Oceans

Markets

- Renewable Energy;
- Harbor Engineering;
- Infrastructures.

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BACK TO LIST OF POSTERS

BRIGAID

BRIDGING THE GAP FOR INNOVATIONS IN DISASTER RESILIENCE

Active Eco-Wildfire Management System

Description

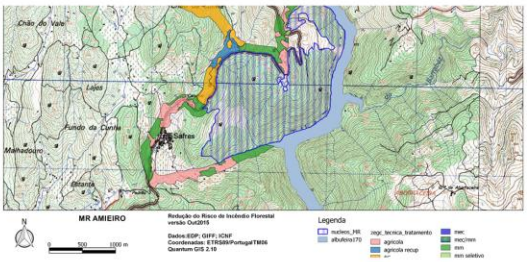
Methodology for **Strategic Forest Fuel Management and Prescribed Burning to reduce wildfire hazard.**

Based in:

- Wildfire mitigation
- New approach to fuel management at landscape level
- Fire adaptation of vegetation and traditional use of land

Already applied on the national market where has demonstrated market potential, by the interest of reference customers, including a forest estate investment fund, having also been recognized by international consultants in forest insurance.

Given the scientific developments and current implementation, we consider that this service is on a technology level corresponding to system prototype demonstration in operational environment.



Further Development

Assess the efficiency of the methodology in real wildfire conditions.

Monitoring vegetation dynamic after treatments to evaluate wildfire hazard increase along time (relation with potential wildfire behavior) and optimization of fuel treatment interval.

Evaluate the level of potential fire propagation after treatment with different fuel management techniques – prescribed fire *vs* mechanical treatments.

Improve knowledge about interval between fuel treatments and effects in vegetation.

End-users

Forestry and nature conservation services

Local public forests

Municipalities

Forest Investment funds

Forestry associations

Forest managers

Land owners

Implementation

Regions

Portugal
Mediterranean countries
Southern Africa
South America

Markets

Forestry and nature conservation services in areas with wildfire risk

Forestry companies plantations with high risk of wildfire – pine and eucalyptus forests

Giff
Gestão Integrada e Fomento Florestal, Lda

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BACK TO LIST OF POSTERS

BRIGAID

BRIDGING THE GAP FOR INNOVATIONS IN DISASTER RESILIENCE

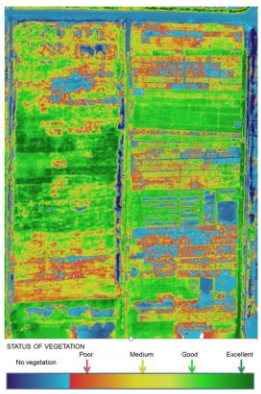
ThirdEye: Flying Sensors for early crop stress detection

Description

Flying Sensors, sometimes referred to as drones, provide high resolution information on crop status. Our innovation uses the latest technology and spatial analysis techniques to detect stress (water, diseases, etc) in an early stage – around 10 days sooner than can be detected based on visual inspection.

Climate change will intensify the occurrence of weather extremes and crops in drier regions will face an increase in droughts and heat stresses. ThirdEye provides farmers with high resolution crops status and forecasts stress in an early stage to better adapt to weather-related hazards affecting crop performance.

ThirdEye



Results

The Flying Sensor approach information has been tested, validated and demonstrated the different components of the system (monitoring, processing, communication) at very different boundary conditions and in the frame of different projects (REDSIM, GEISEQ, DMIAT, ThirdEye – see FutureWater website www.futurewater.eu for details). The current innovation integrates these components into one single service (TRL 4).

Currently the innovation is being tested in Mozambique in a complex setting with high variabilities in crop performance. The dominant crop is maize for this test site.

Besides, testing has started two months ago in a completely different setting: a highly intensive and profitable farm in southeastern Spain, where a producer is collaborating with the innovation. The farm is equipped with the latest technology and optimally managed in terms of water, pests, nutrients, etc. Several vegetable crops are cultivated and will be included in the testing. Currently, imagery is being processed and first tests are carried out with the early stress detection algorithm.

Further Development

Further developments include to validate the service on different crops, biophysical and economic conditions, as well as optimize the processing algorithms.

End-users

- Farmers and farmers associations
- Insurance and re-insurance companies
- Local authorities
- Decision-makers: strategic and emergency planners
- Consultants/private companies
- Researchers (universities, research institutions)
- Environmental organisations

Implementation

Regions

- The Flying Sensor approach can be implemented to any agriculutural region, specially to those which are located in drought prone areas, such as semiarid and arid regions (i.e. Mediterranean countries).

Markets

- Private and public sectors

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BACK TO LIST OF POSTERS

BRIGAID

BRIDGING THE GAP FOR INNOVATIONS IN DISASTER RESILIENCE

PRECIPITABLE WATER VAPOUR MONITORING

Description

Precipitable water vapour (PWV) at local scale can be a precursor of rainfall. Local-scale amount of PWV at a height of 1 km increases from about 30 minutes to 1 hour before the formation of rain drops because of the ground surface convergence process. That is why PWV is useful to be assimilated into numerical weather prediction models, to enhance the forecasting of deep convection that may result in heavy rainfall.

The innovation provides new technology for the reliable and continuous PWV monitoring with high horizontal resolution. It is based on low-cost single-frequency Global Navigation Satellite Systems (GNSS) receivers, designed and developed by Geomatics Research & Development srl (GReD), in collaboration with Selesoft srl. GNSS data processing is carried out with the goGPS open source software, developed by GReD.

The first BRIGAID water vapor monitoring station was deployed at TU Delft in September 2017, three more are about to be deployed around Rotterdam area, and four more around Monterosso al Mare (in Liguria region, Italy).

Further Development

The lack of a second frequency in low-cost GNSS devices could be overcome by developing cost-effective multi-constellation receivers that exploit the new civilian frequencies L2C, L5 (GPS) and E5a (Galileo), in order to use proper ionospheric-free observations. The E5a observations can be used to compensate for the ionospheric delay, since E5a would effectively act as a second frequency. These new devices would be, in fact, E1/E5a and L1/L5 GNSS receivers, with a targeted cost significantly lower than that of currently available dual-frequency (generally L1/L2) geodetic receivers.

Prototypes of such receivers are emerging on the market; in particular, GReD has recently started a collaboration with research and industrial partners to design and produce cost-effective monitoring units based on GPS and Galileo dual-frequency receivers, equipped with the additional sensors needed for water vapour retrieval (i.e. pressure and temperature).

End-users

- Environment protection agencies
- Weather agencies
- Environmental, climate agencies
- Weather forecast companies
- (Re-) Insurance companies
- Research groups

Implementation

Regions

- Europe
- Americas
- Japan
- Australia

(at the moment, pre-existing dual-frequency GNSS permanent stations are needed)

Markets

- Government institutions (national/regional)
- Weather- and climate-related services

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BACK TO LIST OF POSTERS

BRIGAID

BRIDGING THE GAP FOR INNOVATIONS IN DISASTER RESILIENCE

Fire risk monitor advisor

Description

The Fire Risk Monitor is an ITC-desk solution able to regularly advice forest and fire managers on windows of opportunity for forest management practices aiming at reducing the risk of wildfires.

Our main focus is the prescribed burning practice (PB), whose main reason is the reduction of wildfire risk.

Providing accurate meteorological data will increase safety at work (low risk use of fire) and the burning prescription efficiency for fuel management.

The tool generates spatial visualization of the modelling outputs in a user-friendly way providing information about the windows of opportunity to safely burn, based on the analysis of meteorological indices (i.e. FWI) and vegetation indices (i.e. FFMC, DMC).

This innovation addresses extreme fire weather since fire ignition and spread are both enhanced by cumulated drought, high temperature, low relative humidity and the presence of wind.

Results

- In a first stage, focusing the innovation in the promotion of prescribed burning as a tool for forest management and wildfire risk reduction;
- Development of the algorithms that will provide the windows of opportunity for the use of prescribed burning in pine, eucalyptus and shrubs;
- Preparation and integration of the different innovation modules into a user friendly platform;
- First phase of the test plan: assessment of the meteorological data required by the technicians and the utility of the different competitors meteo websites.

Further Development

- Testing the usefulness of the innovation in the platform and its applicability;
- On-going adjustments and improvements along with end-users feedback on the testing phase;
- Dissemination of the test results and their applicability to other regions during workshops, fairs and thematic exhibitions;
- Extending the focus of the innovation to address windows of opportunity for wildfire fighting and forest planning.

End-users

1. Paper and Pulp Industry
2. ICNF (National Authority for Nature and Forest)
3. Municipalities
4. Forest Technicians certified in prescribed fire

Implementation

Regions

- Test phase:
  - Viana do Castelo district (northern Portugal)
- Other forested regions in Portugal.
- In other countries:
  - Mediterranean forest ecosystems.

Markets

Forestry and civil protection sector.

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BACK TO LIST OF POSTERS

BRIGAID

BRIDGING THE GAP FOR INNOVATIONS IN DISASTER RESILIENCE

Method for urban flood mitigation in the context of climate change (URBRAIN)

Description

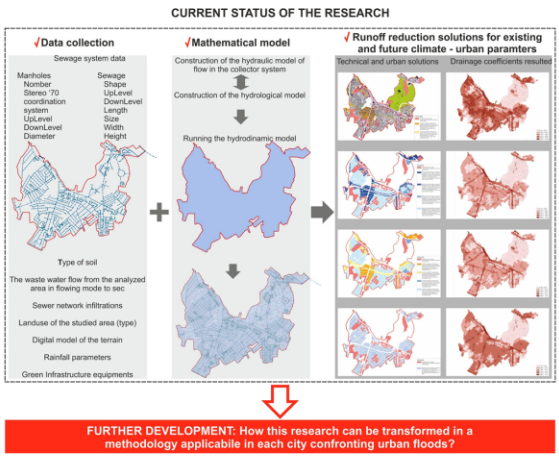
The innovation is based on a joint approach between urban planners, civil engineers and geoscientists.

So far, the components of “Green Infrastructure” ("rainwater ponds", "bioswales" etc.) identified by international research projects have been studied mostly individually. The main objective of the innovation is to ensure the rainwater collection at the raining point in a way to allow integration in urban planning. There is an obvious need for a model that uses these components globally, in a system, applicable at the city scale.

The URBRAIN model uses urban data that is already available (land use, sewage system, soil etc.) and the processing chain that can be performed from district scale to city scale.

The innovation provides techincal solutions that are integrated in the urban planning framework for green and blue infrastructures in cities with flood problems.

The inovation addresses heavy precipitations in urban areas.



Results

The innovation has been tested on the case study of ‘Tineretului District’ - Bucharest. The objective of the project was to reduce more than 20% of runoff by using green infrastructure systems like rainwater ponds, bioswales, ditches planted with vegetation etc. Additionally, the purpose of the project was mainly to identify which green infrastructure equipment can be more efficient in reducing runoff, on what type of site the equipment should be implemented and how many of these pieces of equipment are necessary to achieve the main objective.

The mathematical model developed simulated the flow in the sewage system and the surface drainage of rainwater. The results identified the impact of green infrastructure solutions on the sewage system and on local development.

Further Development

For the next step, we want to extend the research and develop a methodology (guideline) applicable to every city that is facing urban floods.

The methodology will be an adaptive tool for urban areas to reduce the flood effects, by combining urban planner criteria with an engineering approach in using green infrastructure solutions for stormwater management.

End-users

Local administration

Sewerage network administrators

Residents (kids, adults, teenagers)

Real estate investors (the use of Green Infrastructure systems – rainwater recirculation – can substantially reduce the amount of water used for domestic purpose and thus the cost of a dwelling would be considerably smaller)

Industrial companies (the re-use of large quantities of rainwater in technological processes is a huge benefit for this companies)

Implementation

Regions:

Austria
Belgium
Bulgaria
Denmark
France
Germany
Greece
Hungary
Italy
Netherlands
Romania
Spain

Markets

Landscape market
Stormwater equipments
Real estate
Construction market

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BACK TO LIST OF POSTERS

BRIGAID

BRIDGING THE GAP FOR INNOVATIONS IN DISASTER RESILIENCE

Food vertical farming

Description

This innovative vertical-farm concept is designed for the outbound production of plant organisms on technologically advanced vertical platforms that are associated with minor water consumption and can be inserted into a bioclimatic casing that compensates for the high energy demand of the aero-hydroponic cultivation system.

The main specific objective of this innovation lies in recreating, indoor, environmental conditions suitable for the growth of various types of vegetal organisms.

Such novel indoor growing system for aero-hydroponic cultivation can address drought issue as adaptation measure to climate change by decreasing the need of water and farmland.

Results

RINA Consulting (formerly D'Appolonia) was recently involved in studies about living wall systems on building envelope aimed at obtaining a relevant improvement of its environmental benefits. Nevertheless, water use was not specifically optimized to face resilience to water scarcity.

RINA Consulting set up a collaboration with Area Engineering in order to study innovative solutions to address resource efficiency aspects that are not satisfactorily solved yet. Thanks to the contribution of Fondazione Cassa di Risparmio di Pistoia e Pescia, a preliminary design of an innovative building has been drafted with vertical-farm concept with aero-hydroponic cultivation system and bioclimatic casing.

Further Development

RINA Consulting intends to investigate the test of the innovative indoor cultivation system, aiming to target 90% water saving, with lab experimentation on vegetables, strawberries and stevia, by collaborating with Area Engineering and SVECOM PE. A demo project, including food, nursery gardening, farmaceutic and algae production, will be then developed on the territory of Pistoia (Centro di Sperimentazione per il Vivaismo).

End-users

Operators of agricultural sector

Farm laborers in urban centers

Implementation Regions

Italy

Other

Markets

Food

Building design and renovation

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BACK TO LIST OF POSTERS

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BRIDGING THE GAP FOR INNOVATIONS IN DISASTER RESILIENCE

Application Framework with Drone simulator

Description

System for early warning and monitoring composed by:

- on site sensors (e.g. along a river);
- an automated application framework to provide warning system features;
- a software allowing the simulation of the use of patrol drones for a deeper check

The sensors aim at monitoring the river level in real time, looking for readings outside normal parameters to detect problems. Through this implementation we will simulate the case of anomalies, during which the automated warning system would be able to ask to the drones fleet to inspect the affected area, taking pictures, recording videos or even deploying extra sensors. This would make it possible to have a much more detailed report to be sent to the public bodies with respect to fixed sensors, thus speeding up the process to solve the emergency and preventing its extension.

The warning system should use different inputs:

- sensors data (e.g. level of the river water)
- calls from citizens (automated call center);
- social media analysis to automatically see if anyone is talking about problems in the river.

End-users

- Municipalities
- Civil Protection
- Public Safety Bodies
- Citizens

Implementation

Regions

- Italy
- Spain
- The Netherlands

Markets

- Civil protection
- Municipalites,

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BACK TO LIST OF POSTERS

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BRIDGING THE GAP FOR INNOVATIONS IN DISASTER RESILIENCE

FLIP-FLAP AND BLITZ DAMS

"Flip-Flap" Emergency Dam

is designed to prevent floods in urban areas. Dam will be placed on the river bank and it will be raised in case of flood **only**. During non emergencies, it will be used as board walk for pedestrian and/or bicycle traffic. It is intended for large rivers where flood wave is known in advance (ex: Danube river).

"Blitz" Emergency Dam

will be used to protect against flooding that exceeds 1/100 years level.

Results

Tests conducted have concluded that we can guaranty no leackage between the pieces that form the wal, when it is rised.

Further Development

We are conducting (as we speak) a project to build together with RWNA (Romanian Water National Administration) a test site (Facau, Romania) where these dams will be tested on many criteria and where we will be able to demonstrate its functionality.

End-users

- "Flip-Flap" dam is intended for all municipalities that have river banks prone to flooding (for Danube river we can name Bratislava [SK], Vienna [A], Budapest [H], Belgrade [SRB], Galati [RO], Braila [RO], Tulcea [RO]).
- "Blitz" dam is intended to protect against river floods that exceed 1/100 years level for the protection of the localities, economic areas and farmland.

Both can be put in place in a record time, that is at a fraction of time for other means of flood protection.

Implementation Regions

- Flip-Flap dam - all large river banks that cross city boundaries.
- Blitz dam – all areas that need protection against flooding.

Markets

Flood prevention.

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BACK TO LIST OF POSTERS

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BRIDGING THE GAP FOR INNOVATIONS
IN DISASTER RESILIENCE

The Toolkit Method (TM)

Planning integrated measures against flooding for urban areas

Description

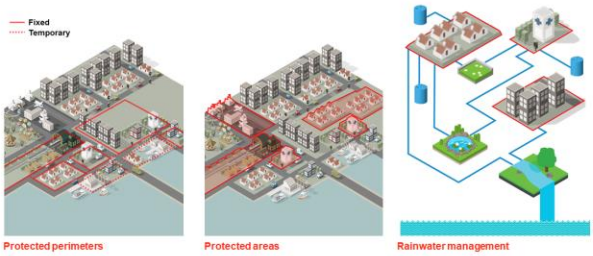
The Toolkit Method (TM) is a planning instrument aimed at providing a general evaluation of the feasibility of a protection strategy against flooding for an urban area. Such strategy may include different kinds of technical and technological solutions and their mutual combinations which are site specific .

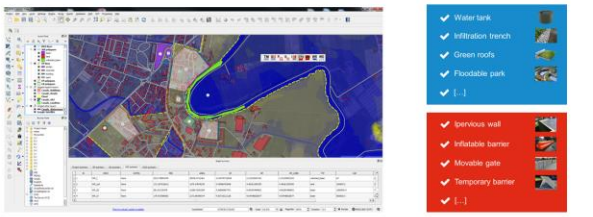
It has been developed as a QGIS plugin. It is based on a limited set of easily available data (DTM, buildings and streets map, land use, flooding map, etc.) and it guides the user through the design of protected areas and perimeters to which different kind of technical solutions can be assigned.

The plugin includes also a set of elements for a preliminary evaluation of rainwater management within the protected areas and perimeters.

All the data are collected and ordered within a single project file which can be used as a base for a collaborative design process.

The plugin allows to print a report containing a key-map and tables with project data which can be used to easily compare different intervention strategies.





Further Development

- Implementation of library sets of protection measures (protected perimeters, protected areas, etc.);
- Inclusion of UNICLASS 2015 within the library classification system in order to provide data consistency within a BIM process;
- Optimization with existing QGIS and GRASS GIS additional tools and end-user customization.

End-users

Public entities:

- Administrations
- Town Planning offices
- Organizations for Cultural Heritage conservation
- Protection agencies

Private entities:

- Engineering, Architecture and Planning companies
- Citizens Associations

Implementation

- Regions
- Historic cities prone to flooding, e.g.
- Italy: Venezia, Firenze, Vicenza, Catania, Genova, Agliana, Cesenatico
- Europe: Prag, Passau, York, Leed, Chemnitz, Rosenheim, Tubinga

Markets

- Public administartion services
- Decision support systems
- Sustainable development
- Cultural Heritage protection

THETIS

knowledge for a better environment

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BACK TO LIST OF POSTERS

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BRIDGING THE GAP FOR INNOVATIONS IN DISASTER RESILIENCE

MIGAL Galilee Research Institute LTD.

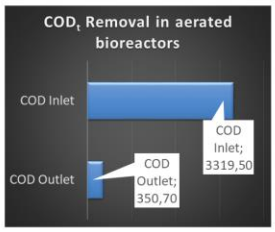
Nature-Based Agro-Industrial Waste Treatment

Description

The purpose of the project is to increase available irrigation waters from agro-industrial wastewater in times of droughts. Dairy farm wastewater is being used as a case study, characterized by high suspended solids, organic matter, salinity and nutrients. Pre-treatment of the dairy farm wastewater includes almost complete removal of TSS with nano-composite clay polymer[1] followed by aerated bio-reactors for COD and nutrient removal[2]. The combined modules have been successfully implemented in a commercial winery. Our current technical challenge in the terminology of BRIGAID of 'bridge the gap' is sodium removal with halophytes and natural ion-exchange resins (zeolite). The resultant water meets regulations for inland irrigation.

Fig: Background: Aerated bioreactors (COD, nutrients removal). Foreground: Halophyte-Zeolite Wetlands (sodium removal)

Results



Further Development

- We have achieved our target of dairy farm waste treatment on a pilot scale (1/30th of overall waste volume) and are in the process of upscaling.
- We narrowed down the halophyte collection (five species) to two model plants (*Sesuvium portulacastrum* and *Juncus maritimus*) based on growth and salinity uptake.
- We are in the process of characterizing the relative importance of competing salinity removal processes (ion exchange and plant uptake) in the system.
- *Sesuvium portulacastrum* produces unique secondary metabolites with biological activity and the plant material can be used for economic gain.

End-users

- Onsite treatment systems for a variety of agro-industrial concerns including wineries, dairy farms, canning factories, etc
- Environmental buffers for riparian systems to mitigate brines intrusion and runoff pollution
- Inland treatment of brines and RO reject
- Biological recharge of spent ion-exchange resins

Implementation

Regions

The process is best applied in hot arid regions where drought is most prevalent and most closely matched to the natural habitats of the halophyte species.

Markets

The agro-industrial market is most immediate as 1) they are required by regulation to implement treatment in most cases and 2) they have economic incentive to recycle/mitigate impact

1.Rytwo, G. Method for pretreatment of wastewater and recreational water with nanocomposites. (2014).
2. Litaor, M. I. *et al. Environmental Nanotechnology, Monitoring & Management* **4,** 17–26 (2015).

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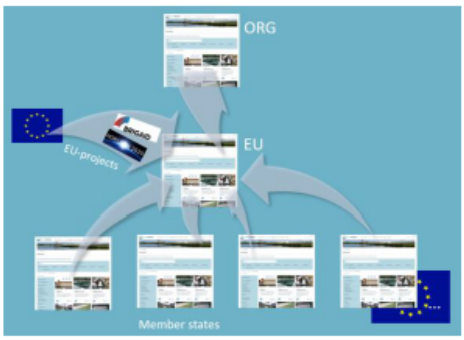
BACK TO LIST OF POSTERS

Local solutions for global water problems

Find solutions for water and climate problems at

WaterWindow.eu

European Information Sharing Platform
As an ISP WaterWindow shares available research data and key results from EU funded projects related to the water and climate research sectors, set out in a clear and easy to understand manner. This collection of emerging insights from research projects facilitates the uptake of new ideas, research results, data, products and services by industry, policy makers, civil society and other interested parties.



The ISP function will make key results from EU funded projects available after project termination and the formal project publication periods have ended.

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- Provides opportunities for the further development of innovations.

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BACK TO LIST OF POSTERS

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BRIDGING THE GAP FOR INNOVATIONS IN DISASTER RESILIENCE

Disaster Mitigation & Response Information System

Description

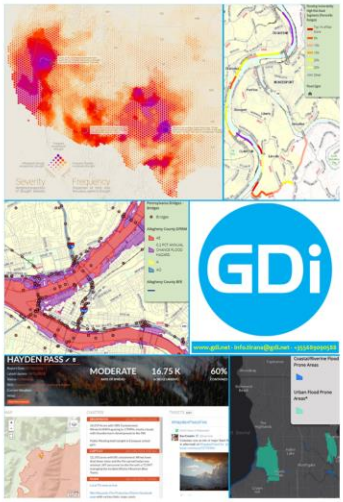
As technology is improving alongside with the human evolution, more and more emergency management information systems are seen worldwide. As it was introduced in the problem description above the emergency management systems play an important role in gathering data, managing the data itself and the data including data from as many countries as possible to prevent disasters happening.

"Disaster Mitigation & Response Information System" – DMRIS

This all-in-one solution is designed to cope with all three types of emergencies in the BRIGAID Project:

- **Floods;**
- **Droughts;**
- **Extreme weather.**

It is also designed to support each stage of the crisis operations life span: from prevention, preparedness, mitigation, to management, damage control and recovery.



Results

The innovative solution that is proposed for this BRIGAID project is based on the Esri ArcGIS Platform alongside with data coming from specialized sensors and specialized agencies which provide data about Demography, Topography, Transportation, Environment and other relevant aspects that might be affected by extreme weather conditions. By integrating the above mentioned software components alongside with specific thematic sensors it is aimed to achieve an integrated emergency information management solution which will provide the following benefits. Real-Time data collection through sensors and automatic data processing through Esri's ArcGIS for Server software application.

By having this opportunity with integrating Real-Time data in the powerful software as it is ArcGIS for Server all the data will be easier to be accessible through a Portal for emergency responders, public safety personnel and citizens in order to maintain a situational awareness and to be prepared for any event in order to have an effective planning and reaction approach before the disaster strikes.

End-users

- Emergency Management Agency
- Meteorological Agency
- National Territory Planning Agency
- Institute of Geoscience Energy Water Environment (IGJEUM)
- Environmental, Climate Agencies

Implementation

The proposed innovative solution is composed of already made, of-the-shelf, ready to be used, Industry Standard technology components such as proven commercial software and hardware as well as professional IT services to implement and congure them together in order to achieve the desired functionalities. Such solution benets also from the proven and positive experience of past implementations in countries such as the USA, at county, state and federal level, thus providing an excellent integrated multi-tenant information platform

Markets

- Govermment institution (national/regional)
- Weather and climate related services

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BACK TO LIST OF POSTERS

BRIGAID

BRIDGING THE GAP FOR INNOVATIONS IN DISASTER RESILIENCE

Albania Alert -EWS-

Description

In the framework of cooperation between the Civil Protection of Albania, and the Institute of Geosciences, Energy, Water and Environment (IGEWE), National Centre for Forecast and Monitoring of Natural Risks has been established in 2012. The Center is an operational unit within IGEWE, responsible to forecast different types of natural hazards such as: floods, flash floods and landslides susceptibility, forest fires, snowstorms, fog, cold and heat waves, hail, Sahara dust, etc.

Albania Alert (EWS) is an APP for the dissemination of warnings in the Albanian territory. Inputs to the APP are collected from the NCFMNR. This APP, which can be installed smartphones with a GPS system, is able to provide risk warnings where the user is located. The APP retrieves the detailed descriptions provided by the National Center, and can also include more details for specific areas inside the prefectures and additional advices for inhabitants or travelers. Every day the Center publishes a bulletin, describing the natural hazards for the next days. The warning messages are disseminated via e-mail, Viber, web page and Facebook to Civil Protection agency and to other governmental and public entities.

Results

Every day the Center publishes a bulletin at 12:00, describing the natural hazards for the next three days including maps. The warning messages are disseminated via e-mail, Viber, web page and Facebook to Civil Protection, other governmental entities, mass media and public. Early Warning System (EWS) can help decreasing the effect of natural disasters including human losses and considerable socio-economic damages.

Dissemination of the information in time and in the correct place is the core of the EWS in Albania. The information will have input from the experts of IGEWE and will include all type of warnings related to the natural hazards in all Albanian territory. This free APP installed in Smartphone will divide the Albanian territory in 12 areas that are the prefecture levels.

Based from the location of the user (GPS) the APP can give the situation of the natural risks in area that the user is located. This information can be connected with detailed descriptions such as the bulletins in PDF. Depended from the type of products of the National Centre for Forecast and Monitoring of Natural Risks in the future this APP can include much more details for specific areas inside the prefectures with suggestions to the inhabitant or travelers.

End-users

- Emergency Management Agency
- Meteorological Agency
- National Centre of Forecast and Monitoring
- Regional Institutions)
- Municipalities

Implementation

- 12 Albanian Prefectures

From a technological point of view, there are no limitations for the application of this innovation. The connection between the different components has been proven with other similar applications that could work together.

Markets

- Government Institution (national/regional)

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BACK TO LIST OF POSTERS

BRIGAID

BRIDGING THE GAP FOR INNOVATIONS
IN DISASTER RESILIENCE

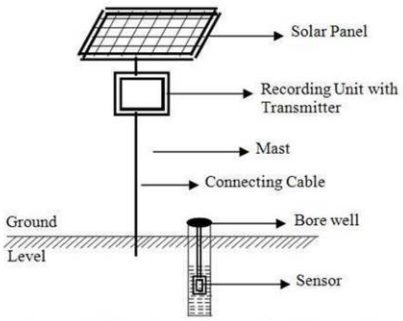
Flood Local Tool - Albania

Description

Albania in respect to water recourses assets, ranks among the first countries in Europe, because high precipitations. Flood waters in Albania may occupy the floodplain for a matter of hours, as in case of flash floods, or for several weeks, as sometimes occurs during the winter period, when the period of rainfall is longer or during the floods of spring.

The damages due to flooding from the main rivers are considerable causes of human loss, eroding of agricultural land, and abnormal functioning of the flood management schemes, high economic damages for the inhabited areas. The number of gauges in Albania is sufficient, but for the data to be used for early warning and online information, it is necessary that the manual stations are replaced with automatic equipment.

Stream automatic gauges play a critical role in complex contingency plans for flood management and decision making. Automatic stations are used to send streamflow data and water levels anywhere in the world. The Flood Local Tool consists of an automatic flow river gauge station comprised by a water level sensor, a data logger, and a GPRS module to communicate stream water levels to electronic tables, mobile internet or sirens.



Automatic Water Level Recorder (Schematic)

Results

The installation of new automatic stations is only the first link in a long and complex flood management chain. For measurements of the level in a river this type of automatic station is used to send the information of the level in another location that can be anywhere in the word. The station has three main components that are: sensor, data logger and the GPRS module for communication with the center that collect the information.

The sensor, water level meter is an electronic equipment used for the measurement of hydrostatic pressure in surface waters. Physically is a piezoresistive silicon cell that traduces the water pressure in a colon of water. Is connected with a special cable that connects the sensor with the data logger.

Data logger is the part that can traduce the information in another usable data, have inside or outside the battery, is able to memorize the information from one to three months independently with a memory card removable or not, have the possibility of configuration of the sensor, have the possibility of configuration of the transition in time, is able for online use and configuration in a distance. GPRS module is the part that communicates with the center that can be in another location.

Using the mobile internet is possible to receive the information from the center in a case of reconfiguration or emergency call.

End-users

- Emergency Management Agency
- Meteorological Agency
- Institute of Geoscience Energy Water Environment (IGJEUM)
- Municipalities

Implementation

- 12 Albanian Prefectures

Potencial testing areas:

- Drini River
Located in Lezha City;

- Gjanica River
Located in Fier City.

Markets

- Govermment Institution (national/regional)
- Weather and climate related services

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BACK TO LIST OF POSTERS