

Water challenges for a changing world

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EDITORIAL

Time, like water, is flowing inexorably and we are close to the end of another year. It seems natural to take stock of the activities performed till now by our initiative on water challenge (Water JPI) and we feel we should share these results with the stakeholders of the Water JPI and the readers of this monthly newsletter. Good strides have been made since 2010. Our cooperation started five years ago and is aiming at increasing the value of national and European water research and innovation funding through joint planning, implementation and evaluation of national research programmes on water topics. An agreed Vision Document was developed; an Implementation Plan 2014-2016 was jointly elaborated, as well as three versions of our Strategic Research and Innovation Agenda prepared. Moreover, a mapping exercise of the water research in Europe was performed and two joint calls were launched in relation to Emerging Contaminants (2013) and Water Treatment (2015), while a third call (Water & Agriculture) is envisaged at the beginning of 2016. Meanwhile, contacts with the water research communities around the world are being developed to align agendas and procedures also beyond Europe. A lot of other activities are planned for the years to come. But now is time to enjoy Christmas holidays.

Best wishes to all of you!



PROGRESS ON WATER JPI ACTIVITIES

The 7th Governing Board



The meeting among the members of this internal body in charge of deciding policy and strategic issues was held in Paris on 19-20 November 2015 at short term after the terrorist attacks which caused 130 victims and hundreds of injured people. Despite this grievous event most representatives of the national institutions members of the GB decided to take part in the meeting which was open with the participative solidarity expressed to the French colleagues by all national delegates.

The works focused on the updating of the Vision Document and the possible evolution of the Water JPI strategy. Punctual information about the activities on the future version 2.0 of the Strategic Research and Innovation Agenda, the activities on alignment and good practices, the participation, and the first results of the second co-funded call for proposals was provided to the attendees. Time was dedicated to discuss and find a common resolution or the future activities on the implementation

plan, the internal cooperation development, and the improvement of the communication and dissemination tools.

More involvement of the Member States in achieving of the Water JPI objectives was recommended as well a connection with the activities of the working groups within the Common Implementation Strategy of the Water Frame Directive. The organization of regular state of art workshops on the most important water research topics was also suggested. A session was dedicated to the presentation of the activities carried out in the Task Force on interaction with Horizon 2020, in TF on alignment and in that on international cooperation. Next Governing Board will be hosted by the Spanish team and will be held on 14-15 April 2016.

The second workshop on alignment

The Water JPI ran its second workshop on alignment on the 19th November 2015 in Paris. Attendees included Water JPI members, as well as representative from the FACCE JPI and ERA-learn. Following groups discussion, the following top 10 recommendations were made:

Short Term (in next 6 months)

- Translate the non-technical vision document into language of each Member States.
- Disseminate the SRIA 2.0 in an effective manner at EU and National levels (in native languages).
- Prepare policy relevant flyers on the Water JPI for water directors and managers.
- Use the mid-term meeting/ERA-nets of those organisations involved in the pilot call as opportunities to develop wider engagement.

Medium Term (in next 2 Years)

- Arrange a meeting of research funders in member states to explain the work of the Water JPI.
- Improve contacts with water economic sector (e.g. WssTP) and, where possible, create clusters to discuss and generate new research topics with SMEs and innovators (along the supply-chain)
- Consider all relevant actions related to the EU Water Framework Directive and any associated issues related to climate change.

Long Term (over next 5 Years)

- Help the countries without a national SRIA to define priorities for water research.

- Develop mechanisms to gather and respond to wider national level RDI perspectives.
- Upgrade the Water JPI SRJA as the European Agenda (PC level)

Outcome of the Waterworks 2014 call

The step 2 international peer review process was concluded on the 29-30 October 2015, with the final meeting of the Evaluation Panel. This meeting was held in Lisbon and was observed by an independent observer in charge of reporting to the European Commission, by the Water JPI coordinator, by the ERA-NET coordination team and by Call Steering Committee members.

The 41 full proposals are distributed among the three call topics as follows. 20 proposals are focused on the first topic '*Treatment, reuse, recycling and desalination*', 8 on the topic '*Resources management*', 9 on the topic '*Mitigate impacts of extreme events*', while 1 deals with both topic 1 and 2 and another one with 2 and 3.

All proposals were individually evaluated by three panel members, and during the panel meeting a final consensus report was drafted. The evaluation was based on three criteria: '*Excellence*', '*Impact*' and '*Quality and Efficiency of Implementation*'. A ranking list was produced based on the sum of the final scores given to each of the aforementioned criteria. On the 30 November the results of the evaluation were notified to the consortia coordinators. National funding procedures are now ongoing. After these procedures are closed, the projects recommended for funding and the experts that participated in this evaluation will be published in the Water JPI webpage.

FOCUS ON WATER RESEARCH AND INNOVATION in Estonia



Water is under the competence of the Ministry of the Environment which has created a research and development programme up to 2020. This programme is in line with the innovation strategy of Estonian research and development activities called (TAI) "Knowledge –based Estonia 2014-2020". TAI strategy establishes the general directions and aims of research, development and innovation in the country highlighting priorities for wise specialization to be enacted through national programmes. In pursuing its research and development objectives the Ministry of the Environment cooperates with the [Ministry of Education and Research](#), the [Estonian Research Council](#) and research institutions such as universities. The Ministry of the Environment coordinates and finances its RDI activities while the Ministry of Education and Research which is responsible for planning and financing general RDI programmes assigns specific initiatives to different ministries according to the area and topic focused. These ministries are responsible for the implementation of these specific activities in cooperation with experts and researchers in their field. The Estonian Ministry for Environment is member of three joint programming initiatives of the European Research Area (ERA): Water, Climate and Oceans.

Research funding in Estonia covers baseline funds, infrastructure funds and research projects. Competitive targeted financing is annually distributed through programmes owned by the Ministry of Education and Research.

Project-based state funding is provided directly to individual scientists and research groups on a competitive basis. [Estonian Research Council](#) (established in 2012) is a governmental foundation that was established on the basis of the Estonian Science Foundation (ETF) and combined with the Research Cooperation Centre, a department of the Archimedes Foundation. Estonian Research Council is main funding organization of R&D, consolidating different grants and types of funding and giving research more visibility in the society.

Targeted funding is the most important and sustainable source in terms of financing of specific research projects. The aim of targeted funding is to ensure a competitive basic structure for scientific research and continuity of the research areas needed for Estonia. These calls are open to all scientific fields and all research groups. Both basic and applied research is funded, proportionally 80% of funds are given to basic and 20% to applied research. The Estonian Scientific Competence Council (TKN) organizes the peer-reviewing of submitted applications (mostly done by foreign experts) and advises the Minister on opening funding for new research themes and continuation of funding for previously-approved ones. The funding period for approved research topics is up to 6 years.

During 2007-2013 Estonian Research Council (ETAg) has been funding different water-related RTD projects/schemes, for example collaborative water RDI projects within transnational calls annually for around 120000€, fellowship/mobility schemes as Post-Doc research grants, PhD research grants and as grants for top researchers. In addition ETAg is responsible for RDI related infrastructure funding, what is based on the guidelines of [Estonian Research Infrastructures Roadmap](#). The average annual funding during 2007-2013 to water related topics dedicated infrastructure has been around 680000€. During the same period of time ETAg funded annually ~650 RDI projects, of which 8 were on water RDI related topics. The dedicated budget was around 8M € per year with a budget around 115000€ for water RDI related projects (annually around 8 projects funded).

Archimedes Foundation is an independent legal person established by the Estonian government in 1997 with the objective of coordinating and implementing different international and national programmes and projects in the field of training, education, research, technological development and innovation. It is the Implementing Agency of Structural Support for several measures, including administrative support to the ESF. Among their programmes, two are related to this JPI: Environmental Protection and Health.

INTERVIEW WITH CÉLIA MANAIA



Célia Manaia is a senior researcher of the Catholic University of Portugal. She is the coordinator of the project StARE (Stopping Antibiotic Resistance Evolution) funded by some Water JPI member organisations within the Pilot Call launched in November-December 2013 on the topic "*Emerging water contaminants-anthropogenic pollutants and pathogens*". The project partnership is also composed of the University of Helsinki, Nireas International Water Research Centre of the University of Cyprus, Fundació Institut Català de Recerca de l'Aigua, Consejo Superior de Investigaciones Científicas, Norwegian School of Veterinary Science, Technical University of Dresden, Karlsruhe Institute of Technology, University of Aveiro, National University of Ireland Maynooth and the company Aquantec GmbH (Aquantec).



How dangerous are antibiotics as new water pollutants?

The main concern associated with the antibiotics as water contaminants is the effect they may have on the natural microbial communities and, specifically, the effect that may have on the promotion of antibiotic resistance dissemination. Together with the considerable load of antibiotic residues, also millions of antibiotic resistant bacteria are discharged in the sewers. The problem is that in the presence of such residues, antibiotic resistant bacteria may be stimulated, somehow, to spread antibiotic resistance determinants, being favoured to survive and proliferate when have acquired antibiotic resistance genes. Then, those antibiotic resistant bacteria can be disseminated, through water, to different places, where they will proliferate and give their antibiotic resistance genes to other bacteria. In simple words, a never-ending story that may have already led us to the growing public health threat that we are facing nowadays.

How will the project StARE tackle the water quality challenge?

The World Health Organization has been expressing serious concerns about the growing public health threat that antimicrobial resistance represents. This is a problem without boundaries of any kind, connecting different world regions and crossing different sectors of human activity.

Water is not only an important habitat for bacteria, but also a privileged way for transport of contaminants, including microorganisms and genetic material, from the reservoirs where they are produced; usually areas subjected to strong anthropogenic impacts. Therefore, wastewater plays a pivotal role on the transport of contaminants, including antibiotic resistant bacteria and genes. Numerous studies have shown that the removal of some wastewater contaminants, including antibiotic resistant bacteria and genes, cannot be achieved by the conventional wastewater treatment systems. In addition, except for research purposes, the assessment of the quality of the treated wastewater does not take into account the efficiency of removal of such contaminants. Hence, there is an urgent need in establishing adequate methods to monitor antibiotic resistance in water, and encourage data sharing across different countries and sectors of activity. The efforts made to survey antibiotic resistance in clinical settings in Europe and other world regions had important implications on antibiotic resistance control. It is high time to apply identical strategies to the environment. In parallel, the development of cost-effective processes to reduce antibiotic resistant bacteria from water is a priority. We believe that in this way StARE will contribute to tackling the water quality challenge.

Which main outcomes do you expect to achieve with your research?

StARE involves two major lines of action – 1) the diagnosis of the status of contamination by antibiotics residues and antibiotic resistance genes in wastewater treatment plants across Europe, focused on partner countries; and 2) the development of advanced wastewater treatment processes efficient for the removal of both antibiotics residues and antibiotic resistance genes to levels at which proliferation would be minimized. One of the problems of some of advanced technologies is that due to the stress conditions imposed to bacteria, antibiotic resistance selection and dissemination can be stimulated. Hence, this is another focus of our research; to assess the potential of some stress factors to enhance the dissemination of antibiotic resistance.

We expect to produce a first overview of the occurrence of antibiotic resistance genes and antibiotic residues in municipal wastewater in countries with different patterns of use of antibiotics and different levels of prevalence of antibiotic resistant bacteria in the clinical settings. This big picture of the antibiotic resistance gene pool in wastewater across Europe may bring interesting insights into the relationship between antibiotic resistance in the environment and in the clinical ambient. And, certainly, it will contribute to improve water treatment in the future.

Have you established links with other initiatives on the same topic?

StARE is integrated in a network of synergic projects and activities that have the potential to enhance the goals and impacts of individual initiatives. For instance, the COST action "New and emerging challenges and opportunities in wastewater reuse" (*ESSEM COST Action ES1403, NEREUS*), the Working Group 5 on the topic "**Wastewater reuse and Contaminants of Emerging Concern**" of the NORMAN network, the H2020 MSCA ITN "ANTibioticS and mobile resistance elements in WastEwater Reuse applications: risks and innovative solutions" (ANSWER) are complementary projects coordinated by Dr. Despo Fatta-Kassinos (University of Cyprus) that involve also some of the StARE partners, are now establishing interesting synergies with what we are doing. Another promising partnership is with the project Halting Environmental Antibiotic Resistance Dissemination (HEARD), integrated in the programme Partnerships for International Research and Education (PIRE) financed by the US National Science Foundation, which is coordinated by Dr. Peter Vikesland of the Virginia Tech, that involves an international committee of researchers from Europe and from Asia. This will be another opportunity to develop harmonized methods and for sharing data at international level. HEARD and StARE are twin projects acting in different world regions. We hope these combined efforts will have significant impacts on the improvement of water quality control, not only on technical aspects but also on policy making.

Which kind of water technologies would be necessary to reduce water contamination?

The answer to this question is one of the expected outcomes of StARE. We believe that the highest the removal of bacteria from wastewater, the better. But it is necessary to assess the risks of advanced treatment processes to select for antibiotic resistant bacteria. This is something that requires further research.

Are you carrying out communication and dissemination activities to the citizens?

As researchers working in an area that affects directly the quality of life, StARE team members are often involved in activities with diverse public societies, in particular through high schools and the media. We believe that making people aware of these issues is also important to help improve attitudes, behaviors and policies.

Have you read the Strategic Research and Innovation Agenda of the Water JPI?

Yes, with particular attention to the sections more related with my area of research.

Which is your opinion on the alignment of research and innovation fostered by this international initiative in the water sector?

Innovation is a word that is on the agenda in several areas of research. However, depending on the context, its meaning and implications can be different. Unfortunately, this is not always clear.

Regarding the water sector, innovation is often associated with technological developments and marketing products. Although this is very important and to be encouraged, the potential conflicts between the economic sector and the management of a natural and life-indispensable resource, as is the case of water, is something that needs to be seriously considered. The alignment of research and innovation towards the achievement of sustainable water use and the availability of good water quality is indeed a major priority of our days and SRIA will be certainly an important contribution to reaching this goal.

**Useful StARE contacts:**

<https://stareurope.wordpress.com/>

Twitter account (@STARE_WATER)

StARE team - jpistare@googlegroups.com

Célia Manaia – cmanaia@porto.ucp.pt

RESEARCH HIGHLIGHTS**Managing wastewater treatment at the river-basin scale**

The EU Water Framework Directive requires policymakers to consider the management of water e.g. in rivers, lakes and streams, at the scale of the river basin, but can wastewater treatment systems be managed at the same scale? To help policymakers answer this question, a team of Spanish researchers (Morera et al., 2015) have created a method for assessing the integrated operation of wastewater treatment plants in a river basin. Uniquely, the method considers both local and global environmental factors and an economic assessment. Applied to a pair of integrated wastewater treatment plants in the Besos river catchment in north-east Spain, the researchers found that linking the two plants produced economic and broad-scale environmental benefits.



However, when the researchers looked at local environmental concerns they found that the connection between the two plants should only be operated under certain conditions, thereby reducing the economic and global environmental benefits gained from building the pipeline. All wastewater treatment systems must in any case comply with the Urban Waste Water Treatment Directive to ensure that there is no risk of pollution by inadequately treated wastewater. Previous studies of integrated wastewater treatment systems have looked at either environmental or economic factors, but none have examined the two at the same time. For example, Zengwei et al. (2010) determined the actual costs by an extensive survey of 493 firms registered with the park. These data are also used to create a benchmark model assuming that each firm complies with environmental regulations by constructing its own wastewater treatment plant (WTP). The results show that sharing the WTP greatly reduces the overall treatment cost. Furthermore, it reduces illegal discharges and improves the overall environmental performance of the park. Lastly, it enforces cooperation among companies located in the park and creates a good image attracting more enterprises to join in. Costs of impact on environment are underestimated because the infrastructure is usually very expensive and therefore it is important to consider both environmental and economic factors. Morera et al. (2015) noted that any such assessment would benefit from a *Life Cycle Assessment* approach, and that environmental concerns must include local factors, such as the condition of nearby water bodies fed by the outflow from the treatment plants. These are in addition to 'global' factors, such as impacts on the air, water or soil caused by emissions from the plants. The study also highlighted global environmental benefits, as connecting the two plants reduced natural resource use, greenhouse gas emissions, ozone-depleting gas emissions, the impact of toxic substances on marine ecosystems and the production of reactive chemicals due to exposure of other pollutants to sunlight.



[To know more](#)

DROPLETS

First Indo-European Water Forum

Representatives of the European Union and Indian officials met with water experts of both sides in New Delhi for this [forum](#) focused on the water sector. The event took place on last 23-24 November. The European water policy, centered on management at the river basin scale and integrated water management, was presented as a viable model for cooperation between the EU and India. A representative of the Arno River Basin Authority (Florence, Italy) highlighted the different measures implemented on the field in a presentation available at this [link](#).



Paris Pact on Water and Climate Change Adaptation

A coalition of nations, together with almost 290 water basin organisations, business and civil society announced the creation of this international pact under the Lima to Paris Action [Agenda](#). The pact includes commitments to implement adaptation plans, strengthening water monitoring and measurement systems in river basins and promoting financial sustainability and new investment in water system management. More information is available [here](#)

Proceedings of the 11th EWA conference

The European Water Association held its annual conference last 16-17 November in cooperation with the DG Environment of the European Commission with the main objective to establish a dialogue between the EC and European water professionals and stakeholders. To know more read the [proceedings](#).

JRC report on priority substances polluting water

This first "Watch list" under the Environmental Quality Standards Directive, 2008/105/EC describes the procedure to identify a short-list of substances, based on the suspected risk to or via the aquatic environment, as well as on the unavailability of sufficient monitoring data or data of sufficient quality to identify the risk posed by those substances, and to prioritize them at EU level. From the short-list, seven additional substances are proposed for inclusion in the first [watch list](#)

EC package on circular economy

The new circular economy package proposed by the European Commission within its 2016 work programme acknowledges a relevant contribution of water services to a more sustainable European economy and will stimulate the development of an EU-wide market in organic and waste-based fertilizers. Water is the most important shared resource across all supply chains, and a lot of resources can be recovered from wastewater and water scarcity can be addressed through the reuse of treated wastewater in safe and cost-effective conditions. The EC Plan is available [here](#).

Guidance on new approaches for assessing water mergers

On the basis of expected changes to the special water merger regime in the Water Act 2014, the UK Competition and Markets Authority (CMA) has recently published a final guidance on its new approach for assessing water mergers. Following a consultation started in September on the draft guidance, this final version incorporates changes made as a result of the responses received. The CMA aims to provide clarity to the industry, and other interested parties, on what procedures it will follow for its analysis under the new regime. [To know more](#)

Air quality in Europe: exposure and impacts on European ecosystems

The European Environment Agency (EEA) has recently published the [report](#) "Air quality in Europe – 2015". Air pollution poses the single largest environmental health risk in Europe today. This report represents an updated overview and a deep analysis of air quality in Europe. It examines population's exposure to air pollutants and provides a snapshot of [air quality based on data from official monitoring stations across Europe](#). It makes a review of the progress towards meeting the requirements of the air quality directives, gives an overview of the latest findings and an estimation of the effects of air pollution on health and its impacts on ecosystems. The affection of vegetation as well as the quality of water and soil and the ecosystem services that they support represent some of the most important environmental impacts induced by air pollution. The atmospheric deposition of sulphur and nitrogen compounds has acidifying effects on soils and freshwaters.

OPPORTUNITIES

New Horizon 2020 calls on water and nature-based solutions

Nature-based solutions are understood as living solutions that are inspired or supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. This includes water services such as flood prevention and mitigation, or drinking water supply. The European Commission will invest almost €16 billion in research and innovation in the next two years under Horizon 2020, including calls

for proposals around the subject of Water and Nature Based Solutions. The new Work Programme 2016-17 offers funding opportunities through a range of calls for proposals, public procurements and other actions like the Horizon Prizes, together covering nearly 600 topics. The programme's structure reflects flexibility of Horizon 2020 which focuses on the EU's long-term priorities and the most pressing societal challenges. Research funding with the water topic is considered throughout the work plan: water-related calls on nature-based solutions; water-related calls in wider circular economy topic; SME calls with seal of excellence. More information is provided [here](#).

H2020 call on water in the circular economy

Water is the most shared resource across all supply chains. Wastewater is the largest untapped waste category. This two-stage call is focused on innovative water treatment models and technologies able to create new business opportunities. First deadline is fixed on 8 March 2016 h. 17:00 CET. The call text is provided [here](#).

INTERREG-MED call

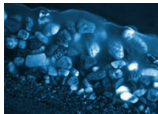
A two-step call for horizontal projects in the Mediterranean area is open. Horizontal projects are the unifying element of a thematic community of projects oriented to build community activities, joint communication and joint capitalisation of the relevant projects. They shall allow real synergies and provide a better visibility to reach policy making level. Terms of reference are available [here](#)

UPCOMING EVENTS



Annual conference on JPIs

The event was scheduled for 23-25 November in Brussels but unfortunately the city was under an alert for possible terrorist attacks in those days. So the event focused on "Building and sustaining commitment to public-public partnerships" was shifted to 14-15 January 2016. [To know more](#)



GranularFlows 2016 - Winter School (January 25-29 2016)

This course titled "Mechanics of sediment transport: theory and models" is organized by the Department of Civil, Environmental and Mechanical Engineering CUDAM and the University Centre for Advanced Studies on Hydrogeological Risk in Mountain Areas. It is primarily addressed to PhD students, post-doctoral fellows and researchers interested in acquiring the basic instruments for theoretical, experimental and numerical research on sediment transport and granular flows. [Granularflows-2016](#) introduces a revision of the rational principles of river hydraulics and sediment transport phenomena considering recent findings in the mechanics of two-phase granular flows.



European Innovation Partnership conference

The [EIP Water conference 2016](#) will take place on 10 February 2016 in Leeuwarden, The Netherlands. The one-day event will be preceded by a series of side meetings on 9 February and followed by several [site visits](#) on 11 February. Participants will learn how the European Commission and EIP Water are working to overcome the established five key barriers & bottlenecks to innovation in water in Europe, and they will gain insights on regulation, financing and public-private partnerships. This third EIP annual event will be followed by a [mayors and water](#) conference focused on urban water management.

CALL FOR PAPERS



EGU general assembly

The European Geosciences Union will gather for its next General Assembly on 17-22 April 2016 in Vienna (Austria). A call for papers to be presented during the conference session is open till 13th January 2016 13:00 CET. More information is provided [here](#).



10th ISEB conference 2016

The event of the International Society for Environmental Biotechnology will be held in Barcelona (Spain) on 1-3 June 2016. Groundwater bioremediation, biological wastewater treatment, water valorization and reuse will be focused topics. The deadline for abstract submission is 1st February 2016. For details see [here](#)