GLOBAQUA is a EU-funded project aiming to identify the prevalence of, and interaction between, stressors under water scarcity in order to improve knowledge of relationships between multiple stressors and to improve water management practices and policies. To have more information please visit www.globaqua-project.eu

Bye bye GLOBAQUA...

I hope that all GLOBAQUA partners are doing well and that your new year is getting off to a good start. As you are aware this is our final Newsletter. GLOBAQUA is ending January 31, following our successful Final conference held in Barcelona on December 17-18, 2018. Our scope was on multiple stressors research, i.e., organic and inorganic pollution, nanomaterials, microplastics, dams, water abstraction, channelization, changes in land uses, climate variability, invasive species and pathogens. Such stressors were successfully investigated and prioritized in our case river basins: Adige, Ebro, Evrotas, Sava and Souss-Massa. It was a great pleasure to follow insightful and inspirational talks given by our project guest speakers working on similar subjects like Daniel Hering and Werner Brack, coordinators of MARS and SOLUTIONS, respectively.

We do believe that all three projects contributed to a better understanding of multiple stressors in aquatic ecosystems, mainly rivers. We did publish a large number of scientific publications in virtual special issues of several journals like Science of the Total Environment, journals like Science of the Total Environment, Elsevier. PhD theses and policy briefs were also an important part of GLOBAQUA. In doing so we did help to increase this pan-European vision to other parts of the world. We do believe that the outcomes of these three projects will inspire future projects on multiple stressors in aquatic systems at a global scale, such as the US, China or Australia.

That being said, a key question remains. What is going to happen in Europe after ending such large projects with an overall budget all three of them of almost 38 Million Euros (9,985,396.08 for GLOBAQUA, 11,645,832.84 for MARS and 16,323,009.85 for SOLUTIONS, respectively. The European Union together with the Member States did decide to split the environmental water budget in small projects of maximum 2 Million Euros.

Three major European programmes were launched in the last few years: JPI WATER, JPI OCEANS and PRIMA. Project funding is limited to 2 Million Euros and duration to 3 years for each project. This is a clear limitation to undertake in-depth studies in this field of research, not only from the budget point of view but also from the duration. But this was a political decision and we need to live with it. A completely different approach compared to other EU programs, i.e., health, where large projects of 10-30 Million are being funded.

I know that some of you are already participating in these programmes. Please do it because some of the topics being funded are 100% in line with GLOBAQUA, MARS and SOLUTIONS outcomes. You will certainly benefit a lot from your previous experience.

To finalize, just to let you know that it was a great pleasure to work with you in GLOBAQUA. I am very proud of the project achievements during these 5 years of working together in sampling campaigns, workshops, summer schools, project meetings, conferences and training of students.

I do believe as well that GLOBAQUA was able to bridge science and policy working together with all river basin managers of the project. Certainly the outcomes and experiences of GLOBAQUA, MARS and SOLUTIONS did bring new tools to better achieve a good ecological and chemical status of European Freshwater bodies.

Thanks for reading and good luck in your future research!

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Thanks for reading and good luck in your future research!

GLOBAQUA e-learning course now available!

This course is designed to give a general overview of the GLOBAQUA project outcomes, and to provide a number of key messages, insights, recommendations, and results for improving policy making and implementation and for sustainable freshwater management. In particular it aims to improve the professional competences, knowledge and information of those working in water management and water protection. Also students and researchers may find useful and interesting information about the most recent developments in the field of freshwater management and water protection in multi-stressor conditions.

Access is free-of-charge at https://goo.gl/WsPK2q

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GLOBAQUA has received funding from the European Community’s 7th Framework Programme under Grant Agreement No. 603629
The conference gathered together scientists and practitioners to inform, exchange and raise awareness about the latest knowledge and innovations in areas most affected by water scarcity. More than 280 participants attended the conference from about 30 countries including Europe, North Africa, Sub-Saharan Africa, Middle East and West Asia. The conference was conducted in 14 sessions, including 4 plenary sessions, 9 technical sessions and 1 side event. About 60 oral communications and 34 posters were presented covering mostly all issues related to water management.

The conference raised the critical situation of water scarcity in several regions in the world and the need for more collaboration and coordination between all water sector stakeholders including governmental entities, private sector, users, managers, politicians and NGOs. The conference stressed the importance of exchanging experiences and lessons especially between the North and the South for better management and highlighted the European and national Southern Mediterranean strategies on water. Most of communications recommended the potential of water reuse from municipal wastewater treatment, the use of brackish water, seawater desalination, water efficiency and reuse in agriculture and discussed decentralized solutions for sustainable development.

There was also a great interest to consider the Water, Food and Energy Nexus and integrated water resources management to achieve the sustainable use of this precious substance. Biosaline Agriculture and the use of unconventional water resources along with efficient technology of irrigation seems to be key solutions to save more freshwater and produce more food (More crop per drop).

The conference showed also water strategies from several European countries, Gulf Cooperation Council (GCC), North Africa and Near East under the context of water scarcity, highlighting the main challenges facing the sustainability of the water sector (e.g. climate change, pollution, overuse).

The introduction of alternative crops in areas suffering from water scarcity and salinity problems attracted the participants attention thanks to their nutritional and agronomic importance and their positive impacts to improve poor farmers’ income.

One of the big challenges faced by the water sector is climate change. Several presentations showed the dramatic situation that will happen under the worst scenarios. Therefore, adaptation and mitigation measures need to be urgently implemented to save water resources and produce enough food for future generations.

Agriculture, which consumes already more than 85% of available fresh water resources, will face strong challenges in keeping the same water allocation while sustaining food security and rural economy. Countries in the region need to plan strategically their water resources allocation, review their water, food security and energy strategies to ensure that they are aligned with the imperatives of: (i) setting the sustainable limits of water consumption and (ii) making the best use of each single drop of water.

Finally, regional collaborative initiative and platforms as FAO WASAG: The Global Framework on Water Scarcity in Agriculture are very recommended to exchange experiences among water actors and sharing knowledge on innovative technologies to increase water use efficiency and water productivity.

Capacity building is an important tool to disseminate generated knowledge about water management and use. Thus, more efforts are needed to integrate innovative solutions within training programmes.

The conference was mainly sponsored officially by IsDB, OCP group, ICBA, and Agadir Region.

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Workshop on knowledge brokerage for River Basin Management

The one-day training workshop on knowledge brokerage for River Basin Management was held on 3rd October 2018 in Agadir (Morocco) by Adriaan Slob and Tara Geerdink from TNO. The training was given to deliver knowledge and skills for a better use of scientific and stakeholder knowledge essential for River Basin Management. The objective was to build the capacity with water authorities, scientists and stakeholders involved in water management to:

1. Share all available knowledge to better manage the river basin/water system under complex multiple stress conditions;
2. Involve stakeholders in river basin management planning;
3. Integrate scientific information in the river basin management plan.

The target groups for this training were scientists, policy makers, river basin managers, and (local) stakeholders who are (or should be) involved in river basin management. In total 19 persons participated in the training, dominantly from a university and a research institute. Also persons from a farmer organization, regional/local government and consultancy firm participated.

The training consisted of two parts: explanation of the theory on knowledge brokerage and group exercises on two knowledge brokerage instruments. The first exercise was a role playing game. This knowledge brokerage instrument is used to gain a better understanding of the complexity of the issue and the roles and positions of the involved actors. Role playing games resemble real-life situations to a certain extent. The second knowledge brokerage instrument exercise was a scenario planning exercise. Participative scenario planning is a tool to create a joint language and measures. This knowledge brokerage instrument is used as a strategic planning instrument, for formulation of responses to possible situations in future. Scenarios are developed in a group process aimed at joint stories of the future. The scenarios help to develop a common language, exchange knowledge and a mutual understanding of future issues. Participants had a positive experience with the very interactive session and the role playing game exercise. On the other hand the scenario exercise was perceived as difficult.

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GLOBAQUA has received funding from the European Community’s 7th Framework Programme under Grant Agreement No. 603629
The GLOBAQUA conference titled “Water river management under water scarcity and multiple stressors” took place on 17-19th December 2018 at the Residència d’Investigadors, in Barcelona (Spain). This conference was the final one of GLOBAQUA and was organised by CSIC in collaboration with project partners, in order to disseminate relevant project outcomes. The conference also aimed to show synergies with other EU aquatic science projects. In this context, a round table session was carried out (integrating GLOBAQUA / MARS / SOLUTIONS outcomes into EC water policy) and the sister projects SOLUTIONS and MARS participated as well as a representative from the Catalan Water Agency (ACA).

The conference was structured in five oral sessions and five poster sessions, all of which focused on the main topics of the project. Global change & Hydrology (session 1), Fate & Risk assessment of pollutants (session 2), Multiple stressors & Biological response (session 3), Assessment and prioritization of pollutants (session 4), and Ecosystem services & Water management (session 5). The event was an excellent opportunity to share knowledge generated around Europe. 74 persons assisted the event (39 % women), coming from 13 countries: Croatia, France, Germany, Greece, Italy, Mexico, Morocco, Serbia, Slovenia, Spain, Sweden, The Netherlands and UK.

The Springer editorial participated sponsoring the Best Oral presentation, and the Elsevier editorial sponsored the Best Poster presentation, both with a book voucher. The winners were Janja Vrzel from the Ludwig-Maximilians-Universität München, LMU (Best Oral presentation), and Raimon M. Prat from the Spanish Council for Scientific Research, CSIC (Best Poster presentation).

GLOBAQUA Final Conference

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The GLOBAQUA Policy Briefs

Further to the first set of GLOBAQUA Policy Briefs that identified the policy needs where GLOBAQUA could deliver benefits, additional recommendations related to findings from the project’s work packages were integrated into a final Policy Brief summarising GLOBAQUA’s total policy impact. The latter represents a synthesis of five years of research on the prevalence, interactions and linkages between stressors and their effects on the chemical and ecological status of freshwater ecosystems in the context of climate change and water scarcity by using six contrasting river basins and by following a cross-scale approach.

GLOBAQUA delivered spatially explicit and process-based simulation tools for integrating climatic and socioeconomic changes, geophysical techniques, chemical multi-stress hot-spots analysis and biological community characterisation. It also investigated the historical changes in river ecosystem functioning of the selected basins and explored community characterisation. It also investigated the historical changes of research on the prevalence, interactions and linkages between stressors and their effects on the chemical and ecological status of the selected basins and explored community characterisation.

The final spatially explicit land use simulations were further used to obtain future water use maps for the Evrotas basin as well as parts of the Adige and Sava basin. First, statistics on sectoral water uses reported in the RBMP 2015 scenario show a decrease in both classes as small irrigated agriculture grows in the SUSTAINABLE scenario as formerly abandoned farmlands are reactivated. The irrigated agricultural modelled land (irrigated agriculture grows in the SUSTAINABLE scenario as formerly abandoned farmlands are reactivated.

The final spatially explicit land use simulations were further used to obtain future water use maps for the Evrotas basin as well as parts of the Adige and Sava basin. First, statistics on sectoral water uses reported in the RBMP 2015 scenario show a decrease in both classes as small irrigated agriculture grows in the SUSTAINABLE scenario as formerly abandoned farmlands are reactivated. The irrigated agricultural modelled land (irrigated agriculture grows in the SUSTAINABLE scenario as formerly abandoned farmlands are reactivated. Still, the water use efficiency increases in both scenarios, which means that less water per areas is used. Some key findings are summarized below:

- The irrigated agricultural modelled land (irrigated agriculture grows in the SUSTAINABLE scenario as formerly abandoned farmlands are reactivated.
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**The GLOBAQUA Policy Briefs are available at** https://goo.gl/Yp2eBu

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ESPRES: Efficient Strategies for anthropogenic Pressure Reduction in European waterSheds

Integrated river basin management must address multiple environmental pressures while preserving its communities’ welfare. Managers need to consider potential trade-offs between environmental and economical targets, and to take transparent and accountable decisions. ESPRES is a web-based Decision Support Tool (DST) that can be used to explore management options for achieving environmental targets of European water bodies. The DST helps multi-criteria river basin analyses of Drivers, Pressures, Status, Impact and Responses to identify most efficient investments to strike a balance between benefits to nature and to people.

The user friendly web interface provides a point of access to perform analyses of efficient pressure reduction strategies reflecting the perception of stakeholder effort, which includes monetary costs, political difficulty, and social acceptability of available solutions. Two main pressures are currently enabled in ESPRES: water stress and nutrient application. Management options consider reductions by administrative regions and pressure drivers. Environmental impacts of management scenarios are assessed with European-scale models. Stakeholders express perceived difficulties in addressing drivers of environmental pressure by assigning relative weights. ESPRES includes an optimization engine that identifies trade-offs in terms of non-dominated (Pareto front) solutions between improvements in the status of water bodies and the effort required to achieve it. The web interface also includes practical tools to compare and identify efficient management strategies.

The online trial version of ESPRES is available at www.espres.eu for four GLOBAQUA River Basins (Adige, Ebro, Evrotas, and Sava). To access the web tool please request log-in credentials at angel.udias-moinelo@ec.europa.eu. A tutorial is available on the GLOBAQUA e-learning course at http://www.globaqua-project.eu/en/content/E-Learning.93/
Recent publications

Module 1 ▪ STRESSORS
Fate of wastewater contaminants in rivers: Using conservative-tracer based transfer functions to assess reactive transport – Guillet et al., Science of the Total Environment, 1250-1260.


Contamination patterns and attenuation of pharmaceuticals in a temporary Mediterranean river – Mandaric et al., Science of the Total Environment 647, 561-569.

Module 2 ▪ RECEPTORS
Testing wastewater treatment plant effluent effects on microbial and detritivore performance: A combined field and laboratory experiment - Solagaistua et al, Aquatic Toxicology 203, 159-171.

Immediate and legacy effects of urban pollution on river ecosystem functioning: a mesocosm experiment - Pereda et al., Ecotoxicology & Environmental Safety 169, 960-970.

Multiple stressor effects on biodiversity and ecosystem functioning in a Mediterranean temporary river - Smeti et al., Science of the Total Environment 647, 1179-1187.

Potentially toxic elements in muscle tissue of different fish species from the Sava River and risk assessment for consumers – Zuliani et al., Science of The Total Environment 650, 958-969.


Module 3 ▪ IMPLICATIONS
Evaluation of geochemical processes and nitrate pollution sources at the Ljubljansko polje aquifer (Slovenia): A stable isotope perspective – Ogrinc et al., Science of the Total Environment 646, 1588-1600.

Module 4 ▪ ENVIRONMENTAL MANAGEMENT
A participatory ecosystems services approach for pressure prioritisation in support of the Water Framework Directive – Giakoumis & Voulvoulis, Ecosystem Services 34, 126-135.

Integrated catchment management for reducing pesticide levels in water: Engaging with stakeholders in East Anglia to tackle metaldehyde – Ibrahim et al., Science of the Total Environment 656, 1436-1447.

These are the articles published in 2018, these ones and those published in previous years can be downloaded at www.globaqua-project.eu

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SAVE THE DATE
Forthcoming events

- **EGU General Assembly 2019** - 7-12 April 2019, Vienna, Austria
- **SETAC Europe 29th Annual Meeting** - 26-30 May 2019, Helsinki, Finland
- **2nd International Conference on Risk Assessment of Pharmaceuticals in the Environment** - 28-29 November 2019, Barcelona, Spain