Subject: EurAqua Response to the “Stakeholder consultation of the HORIZON 2020 Societal Challenge 5 Stakeholders, Providing advice on potential priorities for research and innovation in the Work Programme 2016-2017”

The network of Freshwater Research Institutes ‘EurAqua’ welcomes the invitation to send insights and recommendations for 2016-2017 work programme of H2020 Societal Challenge 5 “Climate action, environment, resource efficiency and raw materials”.

EurAqua is the network of freshwater research institutes in Europe. The network counts representation of 21 Member States and European Economic Area countries. The aim of EurAqua is to contribute substantially to the development of European freshwater science and technology and its dissemination on a European scale, thus having a significant input on the development of the scientific and economic basis of European water management.

EurAqua took note of the First Report of the Horizon 2020 Advisory Group (AG) for Societal Challenge 5: ‘Climate Action, Environment, Resource Efficiency and Raw Materials’. EurAqua welcomes the four main headers proposed. “Sustainable use and protection of water-sediment-soil systems and eco-systems”, is insufficiently prioritized in the SC5 header “sustainably managing natural resources and ecosystems”. As abiotic resources, such as water, are key to society, much stronger attention needs to be put on “water-sediment-soil systems and ecosys” to be able to reach many of the objectives set by the Advisory Group.

The advisory group rightfully addresses the connection with food production and hence the “Food security, sustainable agriculture and forestry, marine and maritime and inland water research” - challenge. EurAqua would like stress to add also the following essential water-connections and H2020 Societal Challenges: “Secure, clean and efficient energy”, “Secure Societies (water related disasters)” challenge and the “Smart, green and integrated transport (waterways)”. EurAqua advises to interweave the water-energy-food-biodiversity (WEFB) nexus thinking, policy instruments and smart solutions in the 2016-2017 programme, but more importantly ensure that this is included in other challenges, too. Finally, while water in all its forms is very important in cities, the Smart Cities initiative thinking does not encompass water – a missed opportunity.

SC5 strongly connects to several European Directives. A clear ambition should be pursued to facilitate cost-efficient implementation of for example the “Water Framework Directive (including groundwater)” and the “Floods Directive”. EurAqua recommends to strengthen the relation between policy, research and innovation topics and instruments on water (such as H2020, EIP on Water, Climate-KIC and JPI-Water), as austerity calls for more efficient means to meet Europe’s objectives.
Response to Consultation Questions

1) What is the biggest challenge in the field concerned which requires immediate action under the next Work Programme? Which related innovation aspects could reach market deployment within 5-7 years?
   a. “WEFB”: Water-energy-food-biodiversity nexus thinking, research and related policies and solutions must continue to be at the top of the agenda. It is essential that this involves all related societal challenges. Innovative linkages are required to avoid unintended pressure on any parts of the WEFB-nexus. Innovative approaches reducing pressure in the nexus are partly available (e.g. efficient irrigation) or can be developed in the near future. For example, storage using water basins or water use for new energy sources (shale gas, blue energy) requires new knowledge and tools to mitigate pressures on the WEFB-Nexus.
   b. “Waterborne transport infrastructures”. Maintenance and optimisation of the (aging) water transport infrastructures along rivers, lakes, in cities and in harbours and coastal areas are very important for uninterrupted transport. It includes ecosystem friendly dredging schemes and sediment management and use. It is a challenge to improve water transport measures contributing water framework directive objectives.
   c. “Green Infrastructures”: Green Infrastructure, nature based solutions and Eco-systems services promise to be cost-efficient means to reach the objectives of several European Directives. An innovation push is needed to mainstream approaches and technologies for in particular floods and drought mitigating infrastructures. However, many more governance and legislation barriers exist for large scale use. This needs to be addressed.
   d. “Climate Feedback loops on water systems”: The challenge is to improve the understanding of the feedback loop of climate change in the water cycle and the provision of reliable climate – water system projections in such a way that “Extreme Event Tools” (item e) and “Adaptive Water Management” (item f) are fed with reliable information.
   e. “Extreme flood events tools and measures / climate services”: This item concerns the development of innovative tools (early warning systems) for extreme events prevention and protection, including sensor technology and monitoring networks. Societal damage by untimely or unreliable early warning. Also the innovative solutions for cost effective maintenance of existing aging flood defense infrastructures and climate proof critical infrastructures enhance resiliency to extreme events. Commercial products and services will meet an increasing world-wide demand.
   f. “Adaptive and transboundary Water Management”: Besides major investments in water systems to ensure availability of sufficient water and WFD compliance, major investments are expected to adapt water management to climate change consequences such as increasing drought severity, increasing water temperature, and salt intrusion. Proper methods to develop adaptive pathways for water management are essential to make wise use of scarce (public) resources and avoid lock-ins. Such methods also open up joint governance and decision making on new adaptation measures and technologies in spatial planning. Of particular importance is transnational governance on different administrative levels to ensure reaching WFD objectives. Transboundary River Basin Management has barely been subject of research and requires scientific support.
   g. “Water pollution and hydro-morphological changes” In order to restore Europe’s surface and ground water resources to meet societal needs (de facto the different directive requirements) knowledge gaps need to be addressed concerning emerging pollutants, micro-pollutants, plastics, hydro-morphology pressures, invasive species, etc. as well as diffuse pollution by leaching from soil and sediments that adversely influence water quality. In addition the gap from knowledge to solutions and field application needs to be addressed in order to strengthen development of innovative technologies and other prevention measures?
   h. “Cross-pillar coordination”. Similar to WEFB, coordination on water-related topics is required between projects in H2020 pillar 1, 2 and 3. Inclusion of water-issues in programmes such as ‘Smart Cities’, ‘Energy Efficient Buildings’ is essential. This should facilitate faster uptake of novel ideas but also avoid unintended negative developments.
2) What are the key assumptions underpinning the development of these areas (research & innovation, demand side and consumer behaviour, citizens’ and civil society’s concerns and expectations)?

The key assumptions in the aforementioned fields are:

i. Proper water management is essential for societies and societal function everywhere, now and for next generations. Good water management is conditional for good eco system services and human health.

ii. Total yearly investments in various – sometimes aging - water infrastructures (supply and sanitation, water transport, water/energy, water/food, flood defence and water retention) are significant. Cost reductions, future proof solutions and wise timing of investments are essential in general, but in particular in a period of austerity.

iii. Inadequate water management will lead to significant societal costs and disruption due to floods, reduced agricultural production due to droughts, transport disruptions and electricity production limitation due to limited (cooling) water resources.

3) What is the output that could be foreseen, what could the impact be, what would success look like, and what are the opportunities for international linkages?

a. “WEFB”: Products concern a decision making framework balancing the different demands on water, allowing projections considering global and local changes. Within Europe, but in particular outside Europe such tools are needed to cope with societal developments (population, economic growth and related and increase in consumption). Flexible water allocation infrastructures and water usage solutions are essential. Success:

i. European tools and technology solutions provide competitive advantage in a global market.

ii. European nexus is robust and cost-efficient, while European Directives are met.

iii. European research in the field is world leading.

b. “Waterborne transport infrastructures”. Maintenance and optimisation solutions for the (aging) water transport infrastructures along rivers, lakes and in harbours and coastal areas are essential for uninterrupted transport, which are ecosystem friendly and contributing Water Framework Directive objectives. There is a growing worldwide market.

i. European smart solutions and tools in engineering transport infrastructures provide competitive advantage in a global market. International connectivity is stimulated.

ii. European transport infrastructure is robust and cost-efficient meeting WFD goals.

iii. European research in the field is world leading.

c. “Green Infrastructures”: A set of green infrastructure and ecosystem based solutions, including design aspects and societal cost-benefit assessment methodologies. Success:

i. Ready to use ideas, taken up and demonstrated in real life applications.

ii. European lead in global roll-out of green infrastructure thinking, contributing to WFD and biodiversity objectives.

iii. European research in the field is world leading.

d. “Climate Feedback loops on water systems”: This knowledge forms the basis for (e) and (f) and is globally applicable. Success:

i. Societal success via (0) and (f)

ii. European research in the field is world leading.

e. “Extreme events tools”: Products and smart solutions in this field can meet an increasing world-wide demand in the next decade. Success:

i. Increasing market share of Europe based tools and smart engineering solutions

ii. Reduction in societal costs of floods and droughts, increasing safety of people.

f. “Adaptive Water Management”: Products concern methods and solutions to develop adaptive pathways and hence investment pathways. Success:

i. Improved information tools underpinning decision making.

ii. Reduction in societal costs of water dependent sectors vulnerable for water shortage

g. “Water pollution and hydro-morphological changes”: Products concern policy advice to meet the demands of European Environmental Directives, but also new water technologies to avoid water pollution in the first place or to restore water quality and ecosystems. Success:
i. Informed advice on water pollution issues for WFD
ii. New technologies and strategies to avoid water pollution and reach good ecological status.
iii. Improved European export position.

h. “Cross-pillar coordination”. Water related projects in all pillars should be made more aware of each other. Facilitation by SC5 to truly stimulate collaboration. Success:
   i. A number of researchers in pillar 1 are linked to pillar 2 or 3.
   ii. Pillar 2 projects are put in wider perspective in pillar 3.
   iii. Urban water topics are addressed in ‘Smart Cities’

4) Which are the bottlenecks in addressing these areas, and what are the inherent risks and uncertainties, and how could these be addressed?
   i. Many investments in water management are made by public authorities in Europe. These tend to be risk-averse, complicating demonstration and roll-out of innovative solutions. A strong push is required to increase the engagement of the public sector, sharing risks and benefits. As many issues are stretching over national borders, even outside EU, there has to be a mandatory border-crossing demand when formulating the calls.
   ii. The water sector at large might globally move towards more private sector responsibility for water infrastructures. There is an increasing use of public-private partnerships which include at least “Design, Build, Operate”. Europe businesses should aim for playing a leading role in such contracts.
   iii. In general, barriers to innovation in the water sector have been summarized by the EIP on Water.

5) Which gaps (science and technology, markets, policy) and potential game changers, including the role of the public sector in accelerating changes, need to be taken into account?
   i. Most urgent gaps in science and technology have been addressed in reply to question 3. The availability of and access to leading universities and public research institutes, including their experimental and numerical facilities should be fostered.
   ii. The role of public sector / policies setting in priorities for research and water infrastructure investments and setting the scene for the private sector activities can hardly be over-estimated, and can be found in reply to question 4. A different approach by the public sector, focussing on innovative solutions, will likely be a game changer which speeds up the market uptake of innovative solutions.
   iii. Regarding game-changers water management and water availability is not a “luxury article”. As time-scales of climate change and water overexploitation are typically longer than political time-scales, there is a risk of delaying action, in particular if the economic crisis would unexpectedly deepen. On the other hand, occurrence of climate related natural hazards may quickly expand the market.

6) In which areas is the strongest potential to leverage the EU knowledge base for innovation and, in particular, ensure the participation of industry and SMEs? What is the best balance between bottom-up activities and support to key industrial roadmaps?
   i. Several of the aforementioned fields are or can be shaped in a way that consultancy and industry, including SME’s, can benefit from a leading European position in a globalised market.
   ii. More importantly, any consultant and industry is highly dependent on water and uninterrupted production. Appropriate water management is essential for Europe’s economy and society, like food, mobility, information, peace, etc.

7) Which areas have the most potential to support integrated activities, in particular across the societal challenges and applying key enabling technologies in the societal challenges and vice versa; and cross-cutting activities such as social sciences and humanities, responsible research and innovation including gender aspects, and climate and sustainable development? Which types of interdisciplinary activities will be supported?
   i. As has been addressed in question 1 and 2, Water-energy-food-biodiversity nexus and water transport optimisation thinking, cross pillar coordination and
implementation are very important to improve the effectiveness of H2020. With respect to water, several other H2020 societal challenges must step up their effort to avoid water stress. This can and should not be the responsibility of SC5, as this reflects an end-of-pipe mentality.

ii. Social sciences and humanities, and in particular stakeholder involvement and governance issues are essential to implementing water management and reducing health ecosystems risks caused by human pressures, water extremes or pollution. In this document this mainly related to “Green Infrastructures”, “Extreme event tools and measures”, “Adaptive water management” and “Water pollution and hydro-morphological changes”.