The members of the European Network of Freshwater Research Institutes very much welcome the European Commission’s Proposal for a Council Decision establishing the Specific Programme implementing Horizon 2020 (COM(2011) 811 final). The three parts “Excellent science”, “Industrial leadership” and “Societal challenges” together provide the required simple framework to organize research and innovation. Overall, the proposal provides an excellent step towards a research and innovation investment that balances the various demands of the various stakeholders.

The EurAqua member institutes are typically positioned between basic research and governmental bodies, performing predominantly applied research and translating science to policy development and practical application in river basins. Several member institutes also collaborate with industry, including consultancy, again bridging the gap between science and practical systems of water use.

The EurAqua members would like to articulate the following issues regarding the current draft proposal:
- Water is a Societal Challenge
- Roadmaps from science to societal challenge
- Horizon 2020 funding and relations to other funding schemes

Water is a Societal Challenge

It is commonly believed that the world is heading towards several crises. Depending on the source these crises are energy, food, urbanisation, climate change, … ‘Water’ is a red wire to many if not all of these emerging crises: Entire conferences are organized around the Water-Energy-Food Nexus\(^1\). Water is a cross-cutting research issue, besides a research issue in its own right. Numerous reports have been published underlining the importance of water and water challenges. Several initiatives to tackle the societal water challenges are on the way. To quote just a few reports and initiatives:

- Recently the European Environment agency has published the report ‘Towards Efficient use of water resources in Europe’, stating ‘Europe needs to redouble efforts in using water more efficiently to avoid undermining its economy […]’. Inefficient water use impacts hard on the resources needed by ecosystems and people, both vital assets for European productivity and security’.
- In response to the European Environment Agency’s 2010 State of the Environment Report, which concluded that the achievement of EU water policy goals appears far from certain due to a number of old and emerging challenges, the European Commission’s DG Environment is developing the Blueprint to Safeguard Europe’s Water.
- EU’s citizens recognize the importance of water as such: a clear majority (68%) feels that water-related problems are serious and 75% of all citizens strongly support EU-level action\(^2\).

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\(^1\) For example: [http://www.water-energy-food.org/](http://www.water-energy-food.org/)

\(^2\) European Commission - Press release "Environment: Europeans call for stronger EU action on Water" Reference: IP/12/289 Date: 22/03/2012
A recent US Intelligence report reads: “Our Bottom Line: During the next 10 years, many countries important to the United States will experience water problems—shortages, poor water quality, or floods—that will risk instability and state failure, increase regional tensions, and distract them from working with the United States on important US policy objectives. Between now and 2040, fresh water availability will not keep up with demand absent more effective management of water resources. Water problems will hinder the ability of key countries to produce food and generate energy, posing a risk to global food markets and hobbling economic growth. As a result of demographic and economic development pressures, North Africa, the Middle East, and South Asia will face major challenges coping with water problems.”

Industry has taken up the challenge by developing a water shortage database. In light of the water challenges ahead, the Council of the European Union encourages member states to develop the Joint Programming Initiatives “Water Challenges for a Changing World” and “Healthy and productive Seas and Oceans”. Furthermore, preparation on a European Innovation Partnership on Water is advancing.

Against this background, water should be addressed explicitly and more coordinated in the Horizon 2020 proposal. EurAqua recommends to:

- Explicitly include the Water industry, including the water cycle technology sector and river basin engineering sectors alike, as one of the areas of European “Industrial leadership”;
- Include specific, coordinated paragraphs on water issues in the following societal challenges:
  - Food security, sustainable agriculture, marine and maritime research, and the bio-economy;
  - Secure, clean and efficient energy;
  - Smart, green and integrated transport;
  - Inclusive, innovative and secure societies;
  - Climate action, resource efficiency and raw materials.
- Explicitly include ‘water’ in the titles of two challenges:
  - Food security, sustainable agriculture, marine and maritime and inland water research, and the bio-economy;
  - Climate and water action, resource efficiency and raw materials.
- Include the overall Horizon 2020 coordination of societal water issues in the “Climate and water action, resource efficiency and raw materials” challenges.

EurAqua members acknowledge the strong relation between water and the subsurface beyond the ‘groundwater and hydrology’. EurAqua noticed that similar to water, the Horizon2020 proposal scarcely mentions the soil, subsurface and sediments. Like ‘water’, the (sub)surface provides vital ecosystem services, for example natural mineral resources, foundation strength for buildings, cities and physical infrastructure such as networks for communication, electricity, transport, water, sewers, etc. The soil, subsurface and sediments also deserve some additional attention in Horizon 2020.

Roadmaps from science to industry to solving societal challenges

Meeting the aforementioned societal challenges will require interactions between “Excellent science”, “Industrial leadership” and “Societal challenges” in the Horizon 2020 proposal. To leverage the full potential of Horizon 2020, EurAqua therefore recommends to:

- Establish a clear linkage mechanism between “Part 3: societal challenges” and “Part 2: Industrial Leadership”.

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Establish a clear linkage mechanism between on one hand Part 3 and Part 2, on the other hand Part 1 "excellent science", while maintaining the bottom up character of Part 1.

Explicitly account in part 2 and 3 for the fact that (besides technology producing industries), consultancy and engineering companies play a key role in innovation towards sustainable development: these firms are important developers of innovative methodologies and practices, and play pivotal roles in validation of innovation, spreading of innovation and development of European competitiveness.

Develop at the start of Horizon 2020, jointly with all stakeholders, specific roadmaps needed to tackle societal water challenges.

**Horizon 2020 funding and relations to other funding schemes**

EurAqua underlines that when EU aims to be world leader in Water, the funding should be available and grow accordingly. As ‘water’ is ‘scattered’ in the proposal for a specific programme, it is unclear if Horizon 2020 investments in the field of water will be sufficient. EurAqua wishes to emphasize that:

- The funding of water research needs to be explicitly available.
- The funding needs to grow and be in line with the importance of water and water related challenges to society and economy.
- Resources should be targeted on river basin management and engineering as well as on water supply and sanitation.

While Horizon 2020 is by far the largest research and innovation programme, other programmes and funding mechanisms are also very important to solve the societal and water challenges the European Union and the World are facing.

EurAqua strongly encourages the European Commission to explicitly include the ambition to facilitate close interaction with other programmes, including, but not limited to:

- The successors of Cohesion and Structural funds
- The new Programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME)
- The European Institute of Innovation and Technology, and its ambitions concerning new Knowledge and Innovation Communities
- The “Life+” programme
- …

EurAqua also encourages the European Commission to specify the Horizon 2020 interaction with the Joint Programming Initiatives such as ‘Water Challenges in a Changing World’, ‘Food Security, Agriculture & Climate Change’, ‘Urban Europe’, ‘Connecting Climate Knowledge for Europe’ and ‘Healthy & Productive Seas and Oceans’.

On the next pages (annex 1), EurAqua provides some detailed suggestions for improvements.
Annex 1: Specific comments

**Bold and blue: suggestions for change / Amendments. Italic: quote from the document.**

<table>
<thead>
<tr>
<th>page</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part 1 Excellent Science</strong></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Comment: The bottom-up approach is very relevant and important. The programme however could be reinforced if projects at an early stage are linked (where possible) to social challenges. EurAqua would like to suggest to develop the interaction between part 1, 2 and 3.</td>
</tr>
</tbody>
</table>
| 33   | Section 4, first lines:  
*The activities will aim at developing, operating and providing access to the European research infrastructures for 2020 and beyond, fostering …. […] …. And a coherent approach for the development, operations and provision of access of the research infrastructures.*

**Argument:** There are important infrastructures that can not survive without structural support on operations. As long as Member States do not find other means to support the projects currently known as I3’s, the Commission should continue supporting operational stages and access to research infrastructures. |
| 34   | 4.1.1. *Developing, operating and providing access to new world-class research infrastructures*  
**Argument:** See previous comment. |
| 34   | Sections 4.1.2, 6th line:  
*Around one hundred networks of infrastructures in all fields of science and technology would require such (long lasting to permanent) support*  
**Argument:** See previous comment. |
| 35   | Section 4.1.3. (Development, deployment and operation of ICT-based e-infrastructures), add at the end  
*… that links global to local information sources, and vice-versa, including where appropriate space observations.*  
**Argument:** The important point here is the link from local to global. We expect major scientific (and environmental) value of the opening up at different levels. |
| **Part 2 Industrial Leadership** |  |
| 39   | 1.1.4.  
…. *Data mining, machine learning, statistical analysis, data assimilation and visual computing technologies*  
**Argument:** Data assimilation is an important discipline that is not part of statistical analysis. The summary is therefore incomplete. Data assimilation is important in many disciplines, including environmental. |
| 41   | 1.3.4.  
…. *that reduce energy, water and material demand and facilitate…..*  
**Argument:** Water (supply and management) is seen as one of the major crises that the world will face (even if it is not as such to be found in Horizon 2020). This warrants specific mentioning of water. |
| 41   | 1.3.4.  
**Comment:** The alignment between this section and 5.4 (eco-innovation) is unclear. |
| 41   | 1.4.2.  
*e.g. chemical, health, mining, water, energy* |
**Argument:** the water industry is one of the larger industries in Europe, and therefore can not be missed in this summary. The water industry comprises besides of the water sector also civil engineering.

<table>
<thead>
<tr>
<th>42</th>
<th>1.5.1.</th>
</tr>
</thead>
<tbody>
<tr>
<td>... using less energy and water and creating less waste and pollution.</td>
<td></td>
</tr>
<tr>
<td><strong>Argument:</strong> See previous comments.</td>
<td></td>
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</tbody>
</table>

**Part 3 Societal Challenges**

<table>
<thead>
<tr>
<th>54</th>
<th>2.1., 2nd line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productive, resource efficient, sustainable and resilient agriculture;....</td>
<td></td>
</tr>
<tr>
<td><strong>Argument:</strong> resource efficient and resilient does not fully cover sustainable, hence sustainable deserves inclusion</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>54</th>
<th>2.1., 7th line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reducing leaching of nutrients and agrochemicals</td>
<td></td>
</tr>
<tr>
<td><strong>Argument:</strong> Agrochemicals are a key problem in the environment. Agrochemicals may also concern pharmaceuticals used in cattle farming.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>54</th>
<th>“2.1.1. Increasing production efficiency and coping with climate change, while ensuring sustainability and resilience” (fourth line)</th>
</tr>
</thead>
<tbody>
<tr>
<td>... low energy demand, low water demand, low emission and low waste economy</td>
<td></td>
</tr>
<tr>
<td><strong>Argument:</strong> See previous comments.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>54</th>
<th>2.1.1., continued, last line on the page.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(water, agrochemicals, energy, soil)</td>
<td></td>
</tr>
<tr>
<td><strong>Argument:</strong> See previous comments.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>55</th>
<th>2.1.3. Empowerment of rural areas, support to policies and rural innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd line</td>
<td></td>
</tr>
<tr>
<td>...diversified products (food, feed, water (infiltration), materials, energy, (emergency) flood protection)</td>
<td></td>
</tr>
<tr>
<td><strong>Argument:</strong> (Ground) water can also be a product, in a.o. in the Netherlands: “blue services”</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>55</th>
<th>2.1.3., bottom of the page</th>
</tr>
</thead>
<tbody>
<tr>
<td>... various types of resource use (Land/soil, water, and other inputs)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>57</th>
<th>2.3.1.</th>
</tr>
</thead>
<tbody>
<tr>
<td>New insights, (integrated) tools and models will be developed...</td>
<td></td>
</tr>
</tbody>
</table>

*Activities will support research on the biology, genetic and dynamics of fish populations, on the role of key species in the ecosystems, on ecosystem functioning, on fishing activities and their monitoring, on fishing sector behaviors and adaptation to new markets e.g. eco-labeling on fishing industry involvement in decision-making.*

<table>
<thead>
<tr>
<th>58/62/65</th>
<th>Issue: There is a need to coordinate the issues surrounding bio-fuels: 2.4.1., 3.3. and 4.1. (4.1.1.b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In all cases the availability of water and space/soil is a prerequisite, and should be explicitly mentioned.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>59</th>
<th>2.5., 5th paragraph:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consideration may be given to support the relevant Joint Programming Initiatives (JPIs) [Optional....: including 'Agriculture, Food Security and Climate Change'; 'Water Challenges in a changing world'], .. .</td>
<td></td>
</tr>
<tr>
<td><strong>Argument:</strong> EurAqua recommends that special attention is given to JPI’s here, to avoid further fragmentation and duplication. We understand that specific JPIs can not be mentioned here, hence the optional sentence.</td>
<td></td>
</tr>
</tbody>
</table>

| 59 | 2.5., 5th paragraph: |
Why is such a connection with JPIs not specified in other parts of the document (including in ‘excellent science’)?

3.2.1. Develop the full potential of wind energy
Addition: Research will extend into maintenance of energy infrastructure under extreme events.
Argument: For example, windmills need to be maintained in extreme events as well (both on land and at sea).

3.2.4. Geothermal, Hydro, chemical gradient (osmosis) and marine ocean/wave energy
Argument: marine energy is not very specific, and does may not include near-shore energy.

3.2.4. Develop geothermal, hydro, marine and other renewable energy options:
Addition: Research will extend into maintenance of energy infrastructure under extreme events.
Argument: Any energy infrastructure needs to be resilient and maintainable in extreme events. Also resilience to natural hazards should be addressed.

4.1.2. …Particular attention will be given to the climate resilience of transport infrastructures (including waterways), cost efficient solutions based on a life-cycle approach, and the wider take-up of new materials allowing for more efficient and lower cost maintenance….
Argument: also waterways need to be resilient to climate (low water levels hamper navigation, extreme weather events hamper port shipping… ).

4.1.3. Improving transport and mobility in urban areas
Public and non-motorised transport as well as other resource-efficient (sub-)surface transport options should...
Argument: It is important to the Netherlands to investigate building in and on soft soil. This has often implications on hydrology.

4.3.3. Advanced production processes
These will allow customization, lower lifecycle cost and development time and facilitate the standardization and certification of aircraft, vehicles and vessels, and related infrastructure (production of vehicles and transport networks, accounting for environmental aspects).
Argument: the efficient construction of (road, water, rail) networks should also get attention, including environmental implications, and not as EurAqua currently understands the efficient production of the vehicles only.

5.1.2. Assess impacts, vulnerabilities and develop innovative cost-effective adaptation and risk prevention measures: About in the middle
Emphasis will be placed on the most valuable natural ecosystems and built environments, as well as key societal, cultural and economic sectors across Europe.
Argument: the word “natural” causes confusion. It is impossible to define.

5.1.2. in our opinion missing “keywords”
- Governance, participatory approaches, decision making
- Research into developing adaptation strategies, adaptation pathways, tipping points

5.2. Sustainably managing natural resources and ecosystems
Environmental resources, including water, air, biomass, fertile soils, biodiversity, ecosystems and the services they provide, such as raw materials like minerals, biomass and biological resources; environmental media such as air, water and soil; flow resources such as wind, geothermal, tidal and solar energy; and space (land area)underpin the functioning of the European and global economy and quality of life.
| Argument 1: the proposal makes it consistent with: The **EU thematic strategy on the sustainable use of natural resources** defines natural resources as “raw materials such as minerals, biomass and biological resources; environmental media such as air, water and soil; flow resources such as wind, geothermal, tidal and solar energy; and space (land area).”

Argument 2: In many ways it is important to see flows, groundwater, sediment and space a natural resource.

| 5.2. The aim of this activity is therefore to provide knowledge for the **equitable, multi-sectoral** management of natural resources that achieves a sustainable balance between limited resources and the needs of society and the economy.

Argument: The aspect of considering interests is not very clear in the current document.

| 5.2..Line 3 Emphasis will be put on critical policy relevant ecosystems and ecosystem services, such as fresh water, seas and oceans, air quality, biodiversity, land use and soil.

Argument: This is not a clear summary of services or systems, for example, the service supply of fresh water versus freshwater ecosystem. For the Netherlands it is, in our opinion, the service "protection against flooding and other natural disasters," It is also not clear in this section how subsidence, compaction, are discussed. Finally, the coastal zone can be added explicitly.

| The resilience of societies and ecosystems to catastrophic events, including natural hazards, will be supported through improving capacities for forecasting, early warning, emergency response and recovery, and assessing vulnerabilities and impacts, including the multi-risk dimension.

Argument: Emergency response and recovery are nowadays directly linked in schemes concerning catastrophic events, including natural hazards.

| 5.3.2. Promote the sustainable supply and use of raw materials, covering exploration, extraction, processing, recycling and recovery

Research and innovation is needed over the entire life cycle of materials, in order to secure an affordable, reliable, and sustainable supply and management of raw materials (including (ground-) water) essential for European industries. Developing and deploying economically viable, socially acceptable and environmentally friendly exploration, extraction and processing technologies will boost the efficient use of resources.

Argument: Due to the special character of (ground)water, including the implications of extracting it make it important to provide specific attention. Also, use of other resources frequently implies increased (industrial) use of water.

| 5.3.2., last sentence

A full life-cycle approach will be taken, from the supply of available raw materials to end of life, with minimum energy, water and resources requirements.

Argument: See the previous comment.

| 5.5. Developing comprehensive and sustained global environmental observation and information systems

These systems will be used to assess and predict the condition, status and trends of the climate, natural resources including raw materials (including water), land (including elevation and land subsidence), ecosystems and ecosystem services, as well as to evaluate low-carbon and climate mitigation and adaptation policies and options across all sectors of the economy.

Argument: See the previous comment.

| 6.3.1. Fighting crime and terrorism.

for the support to health, food, water and environmental security which are essential for the good functioning of society and economy. New technologies and dedicated
capabilities will help to protect critical infrastructures, systems and services (including communications, transport, health, food, water supply, flood defences, energy, logistic and supply chain, and environment).

**Argument:** For example, during a flood a dike is an object of risk.

**Note:** The two summaries (1: health, food, water and environmental security and 2: (including communications, transport, health, food, water supply, flood defences, energy, logistic and supply chain, and environment) are not consistent. What is ‘environmental security’?

6.3.4. Increasing Europe’s resilience to crises and disasters

The topic is very broadly written: “Research will cover the whole crisis management chain and societal resilience, and support the establishment of a European emergency response capacity.”

EurAqua wonders whether following topics will also include:

- Awareness raising / risk perception
- Role of ‘Self help’
- Evacuation planning
- Vulnerability and risk assessments, including scenario analyses
- Governance aspects