D5.3) Analysis of potential regions for mentoring in diffuse load monitoring

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"Monitoring and management of flowing rain water in Baltic Sea catchment areas"

Executive summary

This interim report identifies and analyses the smart specialization potential the Baltic Flows project countries of Finland, Sweden, Estonia, Germany and Latvia have in water quality (WQ) monitoring. The report describes the kind of expertise this region could offer both globally and at the European level. The main focus is on analysing the mentoring potential the region has in the field of diffuse load monitoring. The report will also describe the current needs, global demand and identify potential bottlenecks in WQ monitoring with a special focus on diffuse load monitoring. This report is based on the D5.2. –interim report on new knowledge on diffuse load monitoring.

Introduction

The D5.2. –interim report concludes that the project region has a lot of potential in diffuse load monitoring methods and technologies, as well as in water management in general. The research and development is active in these fields and there is a lot of expertise, which can benefit other countries struggling with different kinds of water management issues. Prerequisites for smart specialization in WQ management and diffuse load monitoring can clearly be found and efforts should now be aimed at creating a clear smart specialization strategy for the region with regards to water management and diffuse load monitoring.

The D5.2. –interim report identifies mentoring potential especially in the following areas:

1. Design and implementation of long term water management and monitoring programs
2. Open monitoring data and water quality databases
3. High-education in water quality and sensor development
4. Interaction between authorities, companies and research institutions (triple helix -model)
5. Expertise in technologies suitable for cold climate conditions

Mentoring potential 1. Long term water management and monitoring programs

According to the D.5.2. –interim report, the research organizations and authorities in the region have well established programs for water quality (WQ) monitoring and water management. Consequently, the region has accumulated a lot of experience in R&D linked with WQ monitoring methods and technologies including continuous water monitoring. The used methods and practices are precise and data gathering is comprehensive. The water management and WQ monitoring practices have resulted in long data series that are needed for understanding the links between human activities, natural factors and water quality. Especially Sweden, Finland and Germany have long term monitoring experience in both diffuse loading and monitoring of point sources. The main sources for diffuse loading are agriculture and settlements in sparsely populated areas. Point sources are usually situated near industrial areas, bigger settlements or water treatment plants. Both types of loading result in eutrophication, water pollution and in general deterioration of water quality.

The expertise in water management strategies, methods and monitoring practices can benefit especially areas just in the process of building up water management systems and monitoring networks. The expertise can also benefit regions with established water management strategies by providing modern, cost-effective and precisely tailored high-end solutions and technical know-how. Many Eastern European countries are potential regions for mentoring at the European level. For example Poland is one of the major contributors of nutrients into the Baltic Sea due to its intensive agriculture and it would benefit from the diffuse load management and monitoring expertise the region has to offer. In a more global scale the long expertise linked with long term water management and monitoring programs could potentially benefit all developing countries struggling with water management issues. As is stated in the D5.2.-interim report, long term WQ data and monitoring programs provide the authorities and researchers the data needed for analysing long term changes in the environment and the role of human impact in these changes. This type of data is also vital for future water management programs.

There is also potential in turning the regional expertise in water management and monitoring programs into an export product. Formulation of functional business plans would require co-operation of different actors, such as monitoring and consulting companies, research organisations, regional marketing experts and funding organisations.

Mentoring potential 2. Open databases for water quality

The region has a lot expertise in data handling, storage and especially in open water quality databases. According to the analysis made in the D5.2. -interim report many of the databases administrated by the environmental authorities are at least partly open and offer restricted or open access to companies, research organizations and NGO's involved WQ management. Some WQ databases can also be accessed openly by the public. Some of these databases have interactive features and offer a possibility for all interested parties to contribute to water quality monitoring with WQ observations. Public awareness on WQ issues is increased by offering the public new accessible platforms for submitting citizen observations.

According to the D5.2. –interim report, the region could offer mentoring to other regions in need of expertise in data handling and storage as well as building up open databases. For example the partly open Finnish OIVA-database includes WQ –related data from different environmental authorities and it can be accessed by professionals working with water management issues. There is also a lot of underutilized potential in solutions that increase data availability and interaction with the public and offer new ways for public involvement e.g. through development of small-scale WQ monitoring devices. The public access Finnish Lakewiki-database is aimed at anyone interested in lakes and WQ-issues. It has interactive features and it encourages people to take an interest in their local waterways. In many countries water quality data is not public and the citizens' activity on water quality issues is seen rather as a threat than an opportunity. Such countries would benefit from hearing positive examples on how citizen involvement results in new opportunities, and important benefits such as improved water quality, reduced costs in water management and increased credibility of environmental authorities.

The region has also mentoring potential in IT-expertise, such as tailored WQ data solutions including data viewing, remote maintenance and continuous WQ monitoring.

Mentoring potential 3. High-education in WQ and sensor development

There are numerous universities and research organizations in the region offering high-level education in water quality monitoring, water protection strategies, IT-solutions and sensor technologies. Many educational programs offer courses also in English. The education is linked with research activities carried out in the universities and companies and thus provide students with good know-how in field realities and practical R&D work. For example, in Finland, Turku University

of Applied Sciences has developed the Innopeda® learning approach, which combines learning with RDI activities and the working life in a cross-disciplinary and social learning environment, emphasising flexible curricula, internationalisation and entrepreneurship. As a result, graduating students are more capable to act in the rapidly changing working life and to produce innovations.

Mentoring in teaching practices that increase students' creativity and practical know-how would be especially beneficial to regions, where university education is mainly focused on accumulating theoretical knowledge. Such regions can be found in the Eastern Europe, as well as in Africa, Asia and South America. In some cases the language skills of students may present a barrier and thus it may be more effective to target the mentoring to the teacher level.

Mentoring potential 4. Triple helix –model

In the Baltic Flows project region, functional and open co-operation between regional research organizations, private companies and authorities is a common way of working. This so-called triple helix co-operation has been supported by the European Union through projects, such as Baltic Flows, and thus has become a well-established working model in Europe. However, direct everyday co-operation at the triple helix –level is not that common globally.

In the Baltic Flows project region here are many examples of combined business and research networks, which collaborate closely with water management authorities and assist in implementing WQ directives, strategies and policies. The triple helix –model can be an excellent platform for new innovations as well, because it allows direct communication of authorities' needs and realities to experts in public and private R&D organisations. Further, triple helix collaboration provides students a platform through which they may establish a professional network already during their studies.

The region could offer mentoring in building up networks involving authorities, private companies and research organizations. Providing good examples of the benefits of the culture of open exchange might encourage many developing countries in Asia and Africa in building healthier co-operation between water monitoring authorities, businesses and research organisations. The triple helix –model is also a good way to increase innovation potential by opening up new collaborations between different actors.

Mentoring potential 5. Cold climate technologies

Due to its northerly position and seasonal variations, the region has accumulated a lot of expertise in operating at cold climates. Winter conditions are demanding with regards to WQ monitoring and water management, and require tailored technical solutions. There are a lot of ongoing R&D activities focusing in cold climate WQ technologies. The Baltic Flows project region could offer mentoring to other regions situated or operating in colder climates, including mountainous regions in the European Union. On the other hand, the Northern parts of United States and Canada have also developed strong expertise in this area. In the future, both North America and the Baltic Sea region would benefit from increased exchange of expertise on cold climate water monitoring technologies.