

**Project no. 4CE439P3**

**URBAN\_WFTP**

**“Introduction of Water Footprint (WFTP) Approach in Urban Area  
to Monitor, Evaluate and Improve the Water Use”**

**WP6.1.2 Sustainability analysis report**

**Lead contractor for deliverable *WP 6.1.2: Veneto Productivity Center Foundation***

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## **1. Scope**

After the implementation of the 3 URBAN WATER FOOTPRINT LABs (UWFLabs), it is very important to have a sustainability analysis referring to the sustainable use of the water footprint approach within the UWFLabs. From each UWFLab, a report pointing out the strengths and weaknesses of the water footprint methodology, based on work done so far in the project, was laid down. This kind of activity resulted to be very useful for the three Municipalities of the UWFLabs or other organization, involved in the UWFLab's start off. They will have the possibility to better understand and evaluate the necessary improvement actions required and which actions have to be changed in order to achieve the expected results. Universities also have the possibility to evaluate if the approach applied works properly or if it could be improved or changed in order to fit better the actual situation in the urban area of each UWFP-LAB.

Proposals concerning better technological devices or integrated solutions for a better water management at urban level by companies, dealing with water technology, can also be highlighted in the analysis.

Finally, citizens' main behaviours and their evaluations about UWFLabs activities can be taken into account within this analysis.

## 2. Innsbruck UWFLab

### a) Analysis

#### UWFLab

With the project end also the budget will be finished. This will leave little possibilities to further pursue the project aims intensively. However, the UWF Lab Innsbruck will try to carry on with its educational programme.

For this it is planned to apply for further project funds. These funds will help to further develop, gather additional data on the citizens' behaviour and level of awareness and adapt and spread the existing education programme. This will help to foster the Urban Water approach and its implementation in other municipalities. Possible funds are:

*Neptun Water award:* is an environment and innovation prize on various topics of water, awarded by the Austrian government every other year. In the category "WasserForscht" (Water Research), the Urban\_WFTP Project fulfils several requirements. It has a high level of innovation in terms of scientific modelling of the water footprint for an urban region, which has never existed before. Due to missing data, innovative tools of calculation had to be developed. Additionally, pioneering tools for the awareness building approach have been developed, too. Together, these tools cover both the quantitative and qualitative scientific spectrum. The project aims at all socio-economic groups including all ages, which creates a high level of social inclusion and satisfies the highest demands for a holistic sustainable understanding.

*FFG Talente regional:* is an Austrian funding scheme focusing on projects which enable children and adolescents to work on a subject in natural sciences. The aim is to spark their interest in science and to motivate them to carry out their own research. Cooperation with 5 tyrolean schools in is planned. This opens up opportunities to spread the U\_WFTP approach to new age groups and to a permanently growing number of addressees. In addition, enhancements of the data gathering methods will be carried out in order to adapt and improve calculation methods.

*Euregio Umweltpreis:* is a fund for environmental-related projects in Tyrol, South Tyrol and Trentino. It especially rewards projects, that integrate children and citizens in order to give them opportunities to participate and formulate own proposals concerning protecting the environment. We applied for both possible categories: "Projects and Ideas" and "Measures and Activities", as both are perfectly represented within our lab's work.

In case either of these funds is won, the UWF Lab Innsbruck will focus on adapting the UWF Lab education programme. The aim here is to also address other age groups, from kindergarten to adults.

Another possible future focus could be on the awareness of people and their connection of water consumption with the water footprint. This could be combined with analysis on virtual water flows.

However, all this future work depends on additional funding of approx. 60,000€ to 70,000€ per year (1.5 full time project staff).

Our vision is that concept and methods of the U\_WFTP will become a fixed part of the curriculum of every school, so that every pupil internalises a reasonable and foresighted habit of consuming food and goods.

#### Institutional stakeholder

The UWF Lab Innsbruck was supported by the local water supplier and thus by the municipality. Their support mainly focused on promotional purposes, for example by providing data, promotional material, and promotional infrastructure. Also they organised field trips to the wastewater treatment plant and the Mühlauer spring.

The Unit of Environmental Engineering of the University of Innsbruck did close collaboration in terms of modelling and gave a major contribution for the SWOT analysis.

The Reithmann Gymnasium gave opportunities for a fruitful cooperation in order to realize the school workshops within the regular geography lessons and a concluding water week.

The cooperation with all stakeholders involved was working very well. Any future project could be built upon this project partnership.

#### Citizens

Citizens and their behaviour play the key role in the work of the UWF Lab Innsbruck. To change the individual water footprint of a person, communication and awareness-raising measures are needed to change behavioural pattern. Awareness creation within a preferably large number of citizens leads to an increasing effectiveness in terms of water footprint reduction measures. In this context it is best to start at young age, as certain patterns can still easily be changed. Here, pupils are the best group to address, as they are highly interested and motivated to change some of their consumption habits while still having a long lifespan in front of them. Pupils influence their families and friends in order to spread the Urban WFTP approach to a larger

number of addressees. Beforehand, it is important for them to create their own interest for improvement. This will increase their motivation to carry out any improvement measures and to change their behaviour. Pupils will also be the decision makers of the future. So influencing them at an early age in a constructive way has the highest sustainable value. Using a Peer Tutoring approach to teach friends and other pupils of the school creates a high level of credibility and thus a distinct willingness for adaptation.

*The Urban WFTP Approach* gives the citizens an insight into the consequences, which their consumption causes regarding the water footprint. Most of the citizens gave positive, interested and motivated feedback during and after the workshops.

As Tyrolean citizens tend to be above-average interested in environmental matters, we assume they will adapt some of the improvement measures into their everyday life and will further spread the Urban WFTP Approach within their families and friends.

#### b) Strengths and weakness

Strengths	Weakness
<ul style="list-style-type: none"> <li>• water supply of the region</li> <li>• low impact of industries with higher water consumption in terms of decrease of immigration</li> <li>• low impact of industries with higher water consumption in terms of decrease of emigration</li> <li>• capacity of own emergency backup systems for water supply and waste water</li> <li>• high interconnectivity of the water network with those of neighbouring regions</li> <li>• measuring system for water distribution</li> <li>• evaluation system for water distribution</li> <li>• evaluation system for the blue water footprint</li> <li>• evaluation system for the green water footprint</li> <li>• evaluation system for the grey water footprint</li> <li>• evaluation system for the virtual (indirect) water footprint</li> <li>• monitoring system for water distribution</li> <li>• lab's specific expertise</li> </ul>	<ul style="list-style-type: none"> <li>• balance/handling of conflicts of interest</li> <li>• lab's low knowledge of the real (direct) water consumption profile of inhabitants and organizations</li> <li>• lab's low knowledge of the virtual (indirect) water consumption profile of inhabitants and organizations</li> <li>• lab's low knowledge of the sewage water generation profile of inhabitants and organizations</li> <li>• low awareness of inhabitants and organizations of their own real (direct) water consumption profile</li> <li>• low awareness of inhabitants and organizations of their own virtual (indirect) water consumption profile</li> <li>• low awareness of inhabitants and organizations of their own sewage water generation profile</li> <li>• low competence of inhabitants and organizations in terms of reducing their own real (direct) water footprint</li> <li>• low competence of inhabitants and organizations in terms of reducing their own virtual (indirect) water footprint</li> <li>• low competence of inhabitants and organizations in terms of reducing their own generation of</li> </ul>

	<p>sewage water</p> <ul style="list-style-type: none"> <li>• measuring system for the virtual (indirect) water footprint</li> <li>• monitoring system for the virtual (indirect) water footprint</li> <li>• lab's awareness of the decisive target groups and stakeholders</li> <li>• lab's knowledge of the impact of the decisive target groups and stakeholders on the overall water footprint</li> <li>• lab's knowledge of addressing and influencing the decisive target groups and stakeholders</li> <li>• lab's financial resources</li> <li>• lab's data resources</li> </ul>
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### c) Comments

In general, the lab's region possesses a lot of strengths regarding water supply, water quality, real water consumption and water infrastructure. Although water is a very valuable resource in public perception, the main weakness is related to awareness and virtual water consumption. Measures and actions for awareness creation should thus consider this specific situation. More support and resources for such measures would be desirable. Then, further data investigation on how the improvement measures are really adapted into everyday life can be realized. A possible strategy to do so can be additional questionnaires that are provided a few months afterwards in order to check, how many and which measures have actually been implemented. A better assessment of virtual water use would require better statistical data on production and consumption of goods on the regional or local level. It would be desirable, if the municipality, the water service providers and private companies such as SMEs develop serious interest on collecting this data. But to gather this data, additional research is necessary, which only can be realized with granting more support in terms of financial budget, additional staff and access to sensible data such as the complaints of costumers regarding the water service providers. But from this state, the service providers are not willing to give any information on the existence or matters of customers' complaints.

Conflicts of interest between different water users should be balanced carefully. This should be supported by adequate legal frameworks. Furthermore water issues should be discussed and

considered exhaustively in politics, administration and legislation. The latter should provide a clear and distinct framework for all activities affecting water resources. All kinds of conflicts, which could endanger a future support of the UWFLab should be avoided.

It is important, that the citizens get in touch with the concept regularly- the more often they are confronted with it, the more used they get to it and the higher is the possibility that they build up an intrinsic-motivated awareness, which leads to a sustainable change in personal consumption behaviours.

### 3. Vicenza UWFLab

#### a) Analysis

##### UWFLab

Vicenza UWFLab counts nine members belonging to three different bodies:

- Six members from Vicenza Municipality: three are from Environment Department, Energy and Territory Conservation; one from EU Community Policy Office, and two from territorial information systems (Ufficio Sistemi Informativi- Territoriali SIT);
- Two experts of the Water Service management company, Acque Vicentine S.P.A.
- One expert from Novoledo Water Service

The laboratory is well-staffed in terms of human resources and competences required for the project. Furthermore it can also take advantage of the collaboration of :

- Danilo Guarti, who is UWF Lab Manager, is Head of the Department of Town Planning and Environment, Energy and Land Protection department, with Technical and administrative skills
- Roberto Scalco, Head Office of Environment, Energy and Land Protection Department, is an expert in urban planning and environment.
- Annarosa Muffarotto Monteverdi, from Environment, Energy and Land Protection Department has administrative competences.
- Federica Fontana, from European Community Office of Vicenza Municipality, is an expert on European project management.
- Lorenzo Beggiato, Head Office of Territorial Information Office (SIT) of Vicenza Municipality, has competences in the fields of statistics and computer science.
- Rosario Ardini, from Territorial Information Office (SIT) of Vicenza Municipality, has competences in the fields of statistics and urban planning.
- Fabio Trolese, is the Manager of “Acque Vicentine S.P.A”, an in-house company of Vicenza and other Municipalities of the province which manages the integrated water cycle.
- Raffaella Pettinà, from “Acque Vicentine S.P.A”, a technician specialized in the company water cycle management and on its referential rules.
- Lorenzo Altissimo, Manager of Novoledo Water Center, the laboratory where all the water potability tests and the monitoring of groundwater are carried out from the quantity

point of view. Dott. Altissimo is a chemical expert well known and appreciated both in institutional and academic environments.

In this context we want to evaluate the challenging pathway which has been done up to now, in a very short time, and how it was lived and perceived by the team, to the ambitious aim of improving the city water footprint by applying several actions.

This year of work experience in the laboratory, create a situation in which people that have never communicated before, could come finally in touch. These occasions for exchanging views are always moments in which the people involved experience both a professional and a working growth.

Another positive aspect has been the implementation, in a municipal body and its related companies - like the Water Service management company - of actions that are not strictly institutional. That was not easy at all. As far as Vicenza Municipality is concerned, the project Central Europe U\_WFTP has allowed for the first time to face, in the form of a study, the problems concerning the water use, in a micro (individual or family consumptions) and macro (buildings, quarters, whole city) water saving perspective.

Under the pressure of the project deadlines it was possible to implement a widespread dissemination of different targeted actions, hopefully successful ones, towards the citizens on various levels and in a great variety of ways. (questionnaires, workshop, local meetings, individual contacts, publications on newspapers/web and meetings with students)

For a local authority as the Municipality, to establish contacts outside their own context, in this case with foreign partners, is undoubtedly a unique opportunity to open up to new perspectives for discussion and enriching exchange. The same applies to a company whose action is rooted in a specific territory.

The educational contribution that the WFTP Lab addressed to schools is something in which we have strongly believed and will remain one of our priorities. The debate on sustainability and environmental care must have as partners (stakeholders) the younger generations and their teachers.

Thanks to the Lab's actions, it has been possible to reach a large number of citizens either directly or via e-mail or web. So, they have been involved in the project. More than 800 people have filled in two questionnaires prepared by the Lab. In several meetings held during public events, hundreds more people got to know the Lab, its goals, its actions and, more generally the European Project U\_WFTP. Furthermore, thousands of citizens can consult the web pages

dedicated to the projects in the institutional sites of the Municipality of Vicenza and the Water Service management company, Acque Vicentine S.P.A.

Considering the fact that the Lab is mainly composed of employees of the Municipality of Vicenza, it has been easy to establish contacts with public officials to let them share the work that we were carrying out. The contact with politicians were considered from the beginning crucial to share the objective identifies in the Improvement Plan, especially related to those actions which require the administrators' awareness of a sustainable water consumption on a urban level in both private and public sectors.

The Lab longs for the great and ambitious result to define a concrete regulatory proposal to be included in the Intervention Plan and on the Building Regulations. It is intended in fact, have contacts, by the end of the project, with the special committee chaired by the Private Building Construction Townconcillor and composed by public administrators, as well from representatives of professional bodies and external technicians to the City that is currently processing the new municipal Building Regulations. The intent is to provide, in the form of articles jurisdictions, mandatory adoption of structural devices that can allow water savings (ie. Reducing the faucets, storage tanks for irrigation of the gardens, etc.) and possibly the reuse of part of the water, compatibly with the cost / benefit ratio. This provision would cover new buildings but also in restructuring. Similarly, in the review and updating of the Interventions Plan scheduled for 2015, will be included similar provisions in the direction of better management in the use and possibly reuse of water in case of construction of new urban plans. As mentioned above, in order to refine these challenging and important proposals, the UWFP Lab retains necessary to establish a comparison with the Commission for Building Rules and professional associations.

As for the difficulties emerged during the Lab experience, there is to point out the fact that the members are all engaged in well defined areas with specific tasks. The most involved ones perceived that all concerned with administrative requirements of documents linked to the project Work Package – like reports, records, studies, press conferences, video making, web site update and so on, were too demanding because were added to heavy daily work commitments.

If the continuation of the project requires as much energies as it has up to now, it is likely that we wouldn't be able to carry on the experience with the current human resources. It should be noted indeed, that not all the members are equally involved in the project, due to their roles and specializations. If the request for administrative productions remained so high, the Lab should certainly be boosted with new administrative staff in order to follow through the project.

The continuation of the lab has been scheduled in the activity plan up to 2017. This has been considered as a minimum necessary time to assess the undertaken action results from the practical point of view and for the estimated time for its dissemination. This period has been considered as a time to monitor and to keep a certain dissemination activity in schools and towards citizens in general. Obviously these constitute minimal actions which involves minimal costs.

Obviously if we wanted to continue the work undertaken by the Lab and implement intensified actions in line with the improvement goals identified, we should be given the necessary financial resources.

During 2015 it will be evaluate what kind of support ACQUE VICENTINE will be able to give to future UWFP\_Lab activities.

The major actions undertaken by the Lab in 2014 were the dissemination of the U WFTP project contents, the Improvement Plan, the Good Practises plan towards various target groups such as citizens, professionals, public administrators, local authority employees, and students. The main criticalities in achieving these actions had been setting meetings within the already set Plan of Studies (POF) of the different schools. The actions planned for 2015 are continuing to monitor the sample of citizens which have joined the campaign started with the two questionnaire submitted in 2014, and participating to the 2015 edition of Festambiente.

As already mentioned above the nine Lab members are not really enough to carry on the project, condidering the high academic nature of the project itself and the aboundand administrative documentation required.

There were no other people or resourses devoted to the Lab in addition to those listed above. There were no other sponsor for the activity of the Lab.

The objectives of the Lab set out to be achieved by the end of the project, are all financially covered. However it is clear that if the structural measures for improvement relating to adjustments or interventions in urban areas (eg. Jet-apposition to the taps of public buildings or water reuse systems, implementation of road drainage systems, green areas with water recovery rain, etc.) should be approved by the local government, it would be necessary to find new resources to implement them. Anyhow it remains valid that all the positive actions for their identification and evaluation has been prepared for the project. During the year 2015, the UWFTP Lab will allow the inclusion in the Interventions Plan of the objective indicators for the reduction of the water footprint, at no cost for the municipality.

The life of the Lab depends both on the political will of the local administrator to carry on the experience and on the availability of other components and expert out the Municipality and finally by the resources that are available.

### Institutional stakeholder

For Vicenza's Lab has been crucial the Local Administration willingness to start the project.

To achieve the required actions and results has been determinant the expert's contributions, that is Acque Vicentine S.P.A and Novoledo Water Center. The University of Padua, as project leader and the CPV foundation gave their scientific contribution and support for the right implementation of the European project. The environmental associations which organize Festambiente, hosted and gave room for the Lab initiatives. The schools showed their interest in the project.

Some meetings in the schools and with local administrators and professionals to discuss the rules for water conservation to include in the Plan of Interventions and in the Building regulations, are planned by the end of the Project.

Professionals and other municipalities that are careful of water footprint would be able to take advantage of the contact with the UWFTP Lab. The interest that the project and the objective of improving the management of water at city level is causing around the Lab, suggests that in the near future there will be constructive contacts with these groups.

### Citizens

Citizens have actively participated in the initiatives proposed by the Lab by attending the several events, filling in the questionnaires and with a positive attitude even towards the census of private wells.

The future scheduled events are defined in the Improvement Plan. They concern the commitment of Acque Vicentine to keep monitored the water consumption of the sample of users which participated in the survey of 2014.

This will allow the Lab to verify the medium-term response of the users who has been personally invited to apply to the "Best Practises to reduce the Water footprint in Vicenza City" by an email sent by Acque Vicentine in September 2014.

From what we could witness in the meetings held with citizens and students, the interest showed towards the water saving issues and more generally, environmental sustainability, can be consider satisfactory. The two questionnaires (the first about the consumer behaviour and

knowledge on management of water cycle and on the second about the “Best Practises to reduce the Water footprint in Vicenza City”) were submitted to about 1700 citizens and 580 of which were answered . For a survey address to a general subject a response of 30% can be considered a good result.

### SMEs

Given the fact that the productive craft trade, industrial and agricultural realities were not covered in the project, it can be assumed that the small enterprises had been involved only indirectly in the project as a part of the “citizen” target group on which the Lab focused on. We believe that all the information about the project, concerning the Improvement Plan and the proposed adoption of “the best practises” which were disseminated through different means on the territory, reached these economic subjects too. For this purpose we found particularly effective the workshop organized from Partner PP2, CPV foundation in Schio as it was address to such stakeholders too.

No Lab actions directed to SMEs has been taken into account.

### **b) Strengths and weakness**

Strengths	Weakness
<ul style="list-style-type: none"> <li>• the political will to delve into the issue of sustainable development</li> <li>• the competences and skills of Acque Vicentine and Novoledo Water Center’s experts .</li> <li>• the fact that the Lab consists of a local authority and two public entities operating in the water cycle management, allowed an easier access to the information concerning the management and the domestic consumption.</li> <li>• at the same time, just because the public bodies involved in the project represent the local authority we believe that this has fostered the credibility of the project and increased the tendency of the target group to listening , participating and transposing the information received.</li> </ul>	<ul style="list-style-type: none"> <li>• the difficulties to devote time to the meetings and exchange of views within the Lab. For this reason almost always the contacts are taken by email. Each member has clearly defined, and sometimes mandatory, tasks within the institution they belong to, and it is difficult for them to find the necessary time to expand the many issues raised by the project.</li> <li>• the possibility to reach in an effective way the target group is unfortunately thwarted by a general over-production of information. Interesting things are very often set aside by the most attentive people for a lack of time.</li> <li>• the awareness of being in a territory rich in water causes a certain underestimation of the issues on water saving.</li> <li>• the effective implementation of structural interventions in private houses or the planning of future actions designed to water saving or water reuse, are outside of the effective power of the Lab as they will be the outcome of a political will and the technical possibility to realized them.</li> </ul>

### c) Comments

The UWFTP Lab experience started in the town of Vicenza has certainly represented an important opportunity to study the various issues concerning water and its management. The proposed approach has allowed a broader view compared with the one strictly related to the municipal territory. The comparison implemented with the partners involved in the project has brought added value to the research of the actions and proposals that were included in the Improvement Plan in order to reduce the water footprint of the city.

Now that the project is ending, we can certainly say that the path has been fruitful, full of action and commitment.

It is more difficult, of course, to assess the results of all this effort. It is not possible to think that what depends on individual habits, on specific urban structures already set up, eventually in historical centres, such as Vicenza, or on more or less modern plants, can improve the indicators of the water footprint in a short time.

Of course, the began phase is only a start. The road will be long and uphill.

#### 4. Wroclaw UWFLab

##### a) Analysis

###### UWFLab

Wroclaw UWFLab counts ten members belonging to four different bodies:

- Four members and one member/expert from Municipal Water and Sewage Company in Wroclaw, from New Technologies Center;
- Two members/experts from Wroclaw University of Environmental and Life Sciences, Faculty of Environmental Engineering and Geodesy;
- One expert from Adam Mickiewicz University in Poznan, Faculty of Geographical and Geological Sciences;
- Two experts from Warsaw University of Life Sciences, Faculty of Civil and Environmental Engineering, Department of Environmental Improvement.

The lab is well-staffed in terms of human resources and competences required for the project. Furthermore it can also take advantage of the collaboration with the Municipal Office of Wroclaw. The Letter of Intent was signed between Municipal Water and Sewage Company and Department of Urban Engineering.

The task of the lab is to enable a cooperation between different stakeholders and decision makers such as municipality representatives responsible for water, waste water and rainwater management and people responsible for city special planning, companies and architects having an impact on the technological and constructional solutions and design of investments, as well as scientific work.

Therefore we have informed about and promoted the project in different places such as conferences, trade fairs, internet, TV and radio. We have also written publications on the project on the web and in the magazines. These actions enabled to communicate the project idea and methodology to different groups of stakeholders.

Whereas, most workshops and trainings we have organized were addressed to specific groups of stakeholders. One workshop was dedicated to Municipal Water and Sewage Companies from Lower Silesia Region. The data for their cities were applied to calculate UWFTP using Model A. They were informed about UWFTP methodology and technological solutions for reducing water footprint.

The workshop at Wroclaw University of Environmental and Life Sciences was dedicated to students, who have learned to calculate their footprint using WFTP calculator. They were also asked to measure their water usage for different purposes, for two weeks. The ways of saving water resulting in saving money were discussed. The questionnaire on behaviours related to individual water and sewage management was also carried out among citizens, from which most were from the environmental sector.

There was organized a training for municipality representatives responsible for storm water system management and spatial development of Wroclaw. The participants were familiarized with the project methodology and water regulations in Europe and Poland. Further, the example country and city policies favouring implementation of the technologies for local rainwater management, especially by subsidies, were introduced. The project was also promoted during the World Water Day at Wroclaw University of Technology.

During an open day organized at Municipal Water and Sewage Company there was a meeting with architects and Municipal Water and Sewage Company workers not involved into the project, which negotiate the agreements for water supply and waste water collection with the citizens and investors. The aim was to make them aware of the need for local rainwater management to reduce the load discharged to the sewage system, waste water treatment plant and finally – the receiving water body.

All these events and experiences have shown that there is a general interest in improving the water and waste water management in Wroclaw. However, it would be good to compel implementation of relevant technologies by appropriate agreements and regulations. The lab can serve as a communication platform among involved stakeholders. The knowledge and experience of experts on technical and technological issues, the recognition of the need for modifying and specifying some regulations by the municipality workers, the observations and experiences of the architects in cooperation with the investors and municipality representatives, can all be exchanged in order to work out the possible guidelines, which will ensure improvement of water and waste water management within the city. The exchange of knowledge and experiences contribute also to a professional and working growth. In order to implement any changes lots of effort and involvement of all parties is required. The further actions to undertake need to be identified.

The smaller municipalities from Lower Silesian when possible take an example from Wroclaw, which is the capital city of the region and usually sets the standards. There is a high interest of these smaller companies to be informed about further actions within the project and the

outcomes. However, due to limited resources, facilities and budgets of smaller municipalities, not all the modifications and improvements applied in Wroclaw can be implemented there.

The promotion and education is important not only among decision makers but also among ordinary citizens, especially young citizens. Therefore, there were carried out workshop and presentations for students. In the future, such education will be practiced by implementing the information on water footprint and the sustainable technological solutions into the lectures given by some experts working at the universities. Their recipients are a generation of future stakeholders.

The important aspect of the lab is also the possibility to cooperate and exchange experiences with other foreign labs and cities, which have different geo-legal situation and thus perspective.

Due to the profile of PP10 – Municipal Water and Sewage Company, which is one of the members of Wroclaw Lab, the improvement plan involves also the actions undertaken by the company at the Waste Water Treatment Plant. The aim of the company is to reduce the concentration of Nitrogen in the treated effluent, which will reduce the grey water footprint of Wroclaw. This will be done by implementation of different technological solutions, which will be first tested on a pilot scale. Among the improvement actions are the transformation of the anaerobic reactors into denitrification reactors, improvement of internal recirculation, optimization of aeration conditions in the aerobic reactors and implementation of annamox or nitrification/denitrification process of sludge dewatering liquor. The parties responsible for carrying out the last activity are, beside the Waste Water Treatment Plant representatives, the Wroclaw University of Technology and Wroclaw University of Environmental and Life Sciences representatives. Some of the listed actions will be completed within 2014, while the research phase of the last activity will finish at the end of 2016. If the research proves its effectiveness, the implementation phase at the full scale might take extra three years.

Regarding the operation of Wroclaw Lab, the one year experience has shown that all the members are engaged with specific required tasks. Beside substantial work, the activities involve also the administrative work associated with financial settling and organizational work associated with organizing the events. Therefore, there are required five members from Municipal Water and Sewage Company. Reports, records, studies, press conferences, video making, web site update, etc. are also time consuming and were difficult to incorporate into other heavy daily work commitments.

The continuation of the project and/or just operation of the lab will require further involvement of human resources. The lab members carry out different activities associated with their specializations, therefore their time devoted to the work of the lab varies. If the request for administrative productions remained so high, it might be even required to employ or involve additional administrative staff in order to follow through the project.

The continuation of the lab has been scheduled in the activity plan up to 2017. This has been considered as a minimum necessary time to assess the undertaken action results from the practical point of view and for the estimated time for its dissemination. This period has been considered as a time to organize the meetings with stakeholders, carry out the review studies and produce required documents in order to determine the actions which need to be undertaken to modify the regulations or write additional guidelines. These should contribute to improvement in water and waste water management within the city.

The actions associated with reduction in the Nitrogen concentration in the treated effluent will last until 2016 (the research phase). In order to evaluate these actions and plan possible implementation of the tested technologies one extra year is required.

If we wanted to continue the work undertaken by the lab and implement mentioned actions in line with the improvement plans identified, we should be given the necessary financial resources. The objectives of the lab set out to be achieved by the end of the project, are all financially covered.

The future activity of the lab depends both on the political will of the local authorities to carry on the experience and implement the proposed modifications, the availability of the lab members, and finally on the resources that are available.

#### *Institutional stakeholder*

The lab members from Municipal Water and Sewage Company in Wroclaw have shared their experience in water and waste water management and challenges. The workers of Wroclaw University of Environmental and Life Sciences gave their scientific contributions and support for the implementation of the European project. In the future their knowledge will be complemented with the knowledge of the experts from Adam Mickiewicz University in Poznan and Warsaw University of Life Sciences. Municipal Water and Sewage companies from Lower Silesia region and Wroclaw Municipality showed also their interest in the project and are looking for future cooperation.

Professionals and other municipalities that are concerned for the sustainable water and waste water management would be able to take advantage of the contact with the lab. Their interest in the project up to now suggests that there will be constructive contacts with these groups in the near future.

### Citizens

The students of Wrocław University of Environmental and Life Sciences and Wrocław University of Technology were also interested in the project and the universities allowed for its promotion during the events (World Water Day) organized by them. 73 students took part in the workshop, questionnaire and mini-research (monitoring of their water consumption).

166 citizens, especially those from the environmental engineering area, participated in the questionnaire on their behaviours related to water and waste water management. In the future it would be good to carry out the questionnaire on a larger scale in order to obtain the information on the number of private wells, septic tanks and waste water treatment plants and related water intake and sewage discharge. The Municipal Water and Sewage Company monitors only the water quantity which is distributed through the water system and on the quantity of sewage discharged into the waste water treatment plant, which actually amounts to almost 100% of water usage and over 95% of waste water generation in Wrocław.

The participants of the conferences and other events at which the project was promoted were also highly interested in the project and its methodology.

These experiences have shown that the citizens and professionals are interested in environmental protection and sustainable water and waste water management.

### **b) Strengths and weakness**

Strengths	Weakness
<ul style="list-style-type: none"> <li>• the will of municipality representatives to improve the water and waste water management in the city.</li> <li>• the competences and skills of the members and experts in the lab.</li> <li>• the fact that the lab consists of a Municipal Water and Sewage Company responsible for water and waste water management allowed an easier access to the information concerning the management and the domestic water consumption.</li> </ul>	<ul style="list-style-type: none"> <li>• the difficulties to devote time to the meetings and exchange of views within the lab. Each member has clearly defined, and sometimes mandatory, tasks within the institution they belong to, and it is difficult for them to find the necessary time to expand the many issues raised by the project. The lack of time is also a reason for limited involvement of people from outside the lab.</li> <li>• the awareness of being in a territory rich in water causes a certain underestimation of the issues on water saving.</li> <li>• the effective implementation of local rainwater</li> </ul>

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| <ul style="list-style-type: none"> <li>• the interest of municipality representatives responsible for storm water system management and spatial development of Wroclaw will give access to data and information on rainwater management and related regulations.</li> <li>• the fact that the lab consist of the representatives from the scientific world, which one of the fields of interest and research is the water and waste water management in the city.</li> </ul> | <p>management technologies and the promotional and political actions to be undertaken by different authorities are outside of the effective power of the lab as they will be the outcome of a political will and the technical possibility to realized them.</p> <ul style="list-style-type: none"> <li>• the lab has a low knowledge on the real (direct) water consumption and waste water generation profiles of inhabitants and organizations and their awareness is also low.</li> <li>• the lab cannot investigate the virtual water issue as there is low knowledge on its consumption (associated especially with products consumption) on the regional level. It might be possible to obtain the data on product consumption on the national level, however some data might be confidential.</li> </ul> |
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### c) Comments

The Wroclaw UWFTP Lab has given an opportunity to study the various issues concerning water and waste water management. The proposed approach has allowed a broader view compared with the conventional one strictly related to the municipal territory. The possibility to exchange and compare the experiences and observations with the partners involved in the project has brought added value to the research of the actions and proposals that were included in the Improvement Plan in order to reduce the water footprint of the city.

The project was very creative and was an inspiration for transforming the approach towards city water and wastewater management and for finding ways of its improvement. In the case of further involvement of the lab members and the municipality representatives, some modifications in the regulations or at least some additional guidelines might be implemented in order to encourage or even force the improvement in water and waste water management in the city. Further awareness building might result in free will implementation of the sustainable solutions. The actions carried out with one year of the lab operation are just a starting point of the journey.

After completion of the implementation of the improvement plan associated with reduction in Nitrogen concentration by the Municipal Water and Sewage Company, the grey water footprint of Wroclaw will hopefully reduce, however these cannot be granted as most actions are currently in the research phase.

## 5. Final considerations

The project is aimed at putting water resources at the centre of the planning and management of urban area by the analysis of the “water footprint”. In fact “water footprint” may become an overall indicator of the management and efficient use of this resource. In the project the calculation of the water footprint was used to push municipalities and managers of water resources to better consider and amplify the factors that affect the value of the indicator and therefore develop processes for additional improvements in terms of water saving. The stage for such a program of verification and improvement was identified in the three laboratories: URBAN\_WFP LAB (UWFLab) in Vicenza (Italy), Innsbruck (Austria), Wroclaw (Poland).

The sustainability analysis by the three URBAN\_WFP LABs (UWFLab) is an opportunity to check and understand qualitatively if, by means of the Urban Water Footprint Labs, it is feasible to create an affordable and lasting service for urban areas regarding the efficacy of water use.

Considered the URBAN\_WFP LAB is not a physical laboratory but a coalition of local persons and experts involved in Water Management, it was important to understand how the LAB can upgrade water use in urban areas, and to see how the achievement of this result could create conditions for LABs operation even after the end of the project.

Even if it is theoretically clear that the activities of the URBAN\_WFP LAB will be more successful as far as it will be a way for reducing the costs necessary for making good water quality available, we all know how this is easy to say but not just easy to do.

First of all, for what concerns the main positive general aspects, regarding the activities of the three UWFLabs, it is to be noted that:

- The project, through the three UWFLabs, has allowed to bring together people belonging to different organizations involved in water management in urban areas with skills and roles that may influence distribution and use of water. These people, at the beginning, had no knowledge on the water footprint approach, however they were able to get confident with the tool and its application pretty fast . In this context, the case of Vicenza UWFLab is emblematic; as a matter of facts the lab could rely on a team made up of nine persons: six from the municipality, two from the company in charge of the public water service and one from the company responsible water quality analysis, some of them with chief responsibility.

- It has been possible to reduce the gap between local government and citizens. In fact municipalities have realized the need to build a stronger awareness of the citizens about the importance of water resources and to act together for an efficient use of water.
- It has been recognized the effectiveness of turning schools into a training ground for the learning of the importance of water resources. At the same school are the perfect places where to test best practices in order to achieve savings targets about the use of the water resource. In this context, the experiences of Vicenza and Innsbruck UWFLabs have been significant.

Moreover, the following specific advantages and strengths emerged in the particular context of each UWFLab:

- From Vicenza UWFLab clearly emerged the importance of involving municipal body together with its related companies - like the Water Service management company –, going beyond the actions that are strictly institutional. That was not easy at all. As far as Vicenza Municipality is concerned, the project URBAN\_WFTP has allowed for the first time to face, in the form of a study, the problems concerning the water use, in a micro (individual or family consumptions) and macro (buildings, quarters, whole city) water saving perspective; another very important aspect was the political will to pursue all the ways bringing to a sustainable use of resources. For this reason the UWFLab of Vicenza contributes to the great and ambitious result to define a concrete regulatory proposal on the “urban water” to be included in the Intervention Plan and on the Building Regulations of the city.
- In Innsbruck UWFLab a lot of positive aspect have been highlighted due to the fact that the City of Innsbruck has a strong tradition, which dates back much further in time, in the efficiency of the urban water distribution network and water waste management: -capacity of own emergency backup systems for water supply and waste water - high interconnectivity of the water network with those of neighboring regions - measuring system for water distribution - evaluation system for water distribution – advanced monitoring systems,... With the demographic decline of the last few years the problem has become, paradoxically, the over size of water supply system. As a result water footprint has found fertile ground for development even if there was not so much attention to the project partners activities by the local authorities.

- The Wroclaw UWFTP Lab has given an opportunity to study the various issues concerning water and waste water management. The proposed approach has allowed a broader view compared with the conventional one strictly related to the municipal territory. The possibility to exchange and compare the experiences and observations with the partners involved in the project has brought added value to the research of the actions and proposals that were included in the Improvement Plan in order to reduce the water footprint of the city.

On the other hand, some difficulties encountered in the creation of UWFLabs have also to be mentioned because of their relevance. They can be summarized as follows:

- The lack of empowerment and commitment of the URBAN\_WFP LAB in effective implementation of structural interventions in private houses or the planning of future actions designed to water saving or water reuse, because they require the outcome of a strong political will and the technical and economical possibility to realized them;
- The fatigue in involving public officers with time continuity, always buried by daily problems;
- The awareness of being in a territory rich in water causes a certain underestimation of the commitments on urban water management.

So for those who want to set up a UWFLab, it should be paid particular attention to:

- having to deal with the lack and the unavailability of data about water consumptions and water flows that affect the urban contexts; this is why a close cooperation with the municipality or the company in charge of water public service have to be take into account in order to have a quick access to information;
- having to deal with the difficulty of raising awareness on the importance of water on regions where no scarcity problems have still been detected and the water is not so expensive; in this case the involving of schools is something important in order to instill the concept of sustainability of resources since the early years of growth and prepare the new generations to future worse scenarios in term of water;

In these scenarios of lights and shadows, a positive common factor coming from all involved authorities is evident. As a matter of facts, all of them have agreed on the goodness of URBAN\_WFTP approach and the usefulness of setting a UWFLab.

Considering that quantitative methods for evaluating the sustainability of future activities of UWFLabs were not expected during the project, but only qualitative reasonings that would make

proof of acceptability and perception of the importance of UWFLabs, at the end the sum of the experiences of the UWFLabs can be considered positive.

As a matter of facts, all the organizations involved in the UWFLabs, developed during the project, have expressed their willingness to continue the project experience also after the end of the project.

For instance, in Vicenza the continuation of the UWFLab has been scheduled in the activity plan of the Municipality up to 2017. This is because the years following the end of the project will be relevant to evaluate the long term effects of the undertaken actions from the practical point of view and to enhance the dissemination towards citizens and schools.

Likewise utility for managing water in Wroclaw together with the local university intends to continue the existing experience with the UWFLab, while ALPS intends to seek other funding to continue the experiences with the schools already took place.

## URBAN WATER FOOTPRINT LABS

### Urban Water Footprint Lab Innsbruck

**Christin Haida**

alpS GmbH

Grabenweg 68

A-6020 Innsbruck

Phone: +43-(0) 512-392929-0

Email: [info@alps-gmbh.com](mailto:info@alps-gmbh.com)

[www.alps-gmbh.com](http://www.alps-gmbh.com)

### Urban Water Footprint Vicenza

**Annarosa Muffarotto Monteverdi**

**Municipality of Vicenza**

Corso A. Palladio, 98

36100 Vicenza

Phone +39 0444 221111

Email [ecologia@comune.vicenza.it](mailto:ecologia@comune.vicenza.it)

<http://www.comune.vicenza.it>

### Urban Water Footprint Wrocław

**Anna Kolonko**

**MPWiK SA**

ul. Na Grobli 14/16

50-421 Wrocław

Phone: +48 71 34-09-500

Email [mpwik@mpwik.wroc.pl](mailto:mpwik@mpwik.wroc.pl)

<http://www.mpwik.wroc.pl>

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**Veneto Productivity Center Foundation**

Via Eugenio Montale, 27

36100 Vicenza

Phone +39 0444 994700

[info@cpv.org](mailto:info@cpv.org)

[www.cpv.org](http://www.cpv.org)