



## **Implementation plan**

Based on good practices, policies and lessons learned during participation in the INTERREG IVC project Aqua-add from January 2012 to December 2014.

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**Aqua-Add project**  
December 2014

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# 1. Introduction

## 1.1 About the Aqua Add project

Aqua-Add is a 3-year co-operation project of 11 partners from 8 EU regions, in the period 2012-2014. The project aims to share knowledge and experience between the project partners, to better deploy the potential of 'water' (economically, socially and environmentally) in urbanised landscapes and to improve the implementation of water measures in local and regional spatial development. The project is co-financed by the European Regional Development Fund (ERDF) along with each of the 11 partners and made possible by the INTERREG IVC programme. The Interregional Cooperation Programme INTERREG IVC helps Regions of Europe work together to share experience and good practice in the areas of innovation, the knowledge economy, the environment and risk prevention.

The core of the project is the development and exchange of knowledge. During the project, 8 international meetings have been organised – one in every country. During these meetings, partners were able to exchange good and bad practices on the integration of the added value of green and blue spaces in urban spatial planning. Each meeting consisted of thematic meetings and an Aqua-Forum (comprising study visits by members, consults/advice by participating partners to the hosting partner, presentation of best practices, also by representatives of other cooperation projects, networking). The thematic meetings focused on:

- Business models: development, descriptions and test of new financial business models, based on alternative source of finance e.g. shared public and private finance of specific green and blue projects in the partnering cities
- Added value: Economic studies and case study descriptions on added value due to the integration of water in urban spatial planning done in the partnering cities
- Stakeholder engagement: test and development of methods to inform and engage public and private sectors in the resilience building and development of the city in general. Factsheets on recommended methods and tools, used in the case study areas in the partnering cities
- Decision Support Tool (DST), Development, test and piloting of and integrated GIS based economic model, to improve the decision making process, among key stakeholders regarding use of blue and green spaces in urban spatial planning. An output from the model has been made for each city, calculating and visualize the distribution of value related to different development scenarios, regarding establishment of green and blue areas, chosen by the city.

All partners have contributed to the process and the production of materials in each of the four components. Information on the components and the materials made are available at [www.aqua-add.eu](http://www.aqua-add.eu).

## **1.2 Implementation of lessons learned**

The Aqua-add partners were willing to learn from each other and to strengthen their policies with the use of new tools, visions, information and good practices to one (or more) partner, and therefore might inspire other partnering cities to evolve. The project has served as a platform and a gateway to knowledge sharing among peers on technical, organizational, financial and communicative approaches that have been proved to be useful e similar solutions in their region, city or country. During each meeting, good practices, improved policies and reflections on experiences and lessons learned were identified and shared among the partners.

This implementation plan reports how each partner will integrate the lessons learned in their own working processes. The following chapters contain the detailed implementation plans, developed by each partner. In alphabetical order:

- Aveiro Region (Ch. 2)
- Municipality of Bremerhaven (Ch. 3)
- City of Copenhagen (Ch. 4)
- Municipality of Eindhoven (Ch. 5)
- Municipality of Imperia (Ch. 6)
- Greater Lyon (Ch. 7)
- Municipality of Sofia (Ch. 8)
- Trans-Tisza Inspectorate (Ch. 9)

## **2. Aveiro region**

### **2.1 Objectives**

Being the Aveiro Region Intermunicipal Community an association of eleven municipalities, exercising competences to a supra-municipal level ("regional") and having the Municipalities management autonomy to intervene citywide, CIRA proposed two levels of intervention: one regional, to the responsibility of the Intermunicipal Community and other at local level, to the responsibility of municipalities.

One of the major goals and interests of the Aveiro Region Intermunicipal Community, when integrated the Aqua-add project was to assess the best way to reconcile the construction/preservation of green/blue spaces with the needs of urbanization/development and control flood risks.

From the work done, the experiences shared and lessons learned during the Aqua-add project, the Aveiro Region Intermunicipal Community has established the following objectives for the implementation of some of the results achieved:

- Dissemination of guidelines/good practice cases, with municipal technicians and policymakers, thus contributing to the implementation of some measures to combat climate change and minimizing the flood hazards;
- Identification and involvement of various stakeholders in a more embryonic stage of the planning processes and preparation of plans, especially PMOT's - Municipal Spatial Plans;
- Study and implement new models of financing and sustainability of projects and interventions in green / blue spaces, in the Aveiro region, with particular focus on maintenance costs.

## **2.2 Implementation plan**

### **2.2.1 Booklet/Manual**

Until the end of 2014, prepare a small publication ("Booklet") with synthetic guidelines and measures of good practice resulting from the project Aqua-add for dissemination and consultation by municipal technicians and policymakers. Also, promoting its publication in the institutional site of the Intermunicipal Community (<http://www.regiaodeaveiro.pt/aqua-add>), to be accessible to the general population. The objectives and results of the project Aqua-add will be addressed and disclosed by the University of Aveiro, framed within the academic training especially designed for urban planning and urban management.

### **2.2.2 Congress Aveiro Region 2015**

During the 1st half of 2015, publicly present the results of the project Aqua-add within Congress Aveiro Region 2015 or ahead of the production of posters (with the collaboration of University of Aveiro), inserted either through oral exposure in the programming of the event.

The Congress Aveiro Region 2015 is an excellent forum for information and dissemination, it relies on the participation of a broad range of participants from various organizations, and public and private entities, either regionally or nationally, and media.

### **2.2.3 Intermunicipal plans**

Under article 90 of Law No. 75/2013 of September 12, competes at Intermunicipal Communities for approval of plans, programs, and investment and development of intermunicipal interest projects, including:

- Intermunicipal planning plan;
- Intermunicipal civil protection plan;
- Intermunicipal environmental management plan.

Knowing that the Intermunicipal Communitie was already a pioneer in the implementation of an water efficiency project in the Aveiro Region

(Water efficiency;

[http://www.regiaodeaveiro.pt/PageGen.aspx?WMCM\\_PaginaId=29289&projectId=13](http://www.regiaodeaveiro.pt/PageGen.aspx?WMCM_PaginaId=29289&projectId=13)),

awareness provided by the project for Aqua-add the question of harnessing the potential of water for local and regional development, allow, when reviewing / drafting of the above plans provide for the implementation of some of the measures recommended and tested by other partners, including those regarding the prevention of risks of floods and economic sustainability of some urban interventions.

### **2.2.4 Workshop on financing models**

In Portugal it is frequent that the costs associated with the implementation and maintenance of projects and equipment in green/blue spaces, are borne by municipalities. Aiming to find measures to counter this practice, during the first half of 2015 will promote a workshop with technical and policy makers of the eleven municipalities of Aveiro Region, which will be presented and discussed the various funding models (without the use of EU funds) addressed in the course of the project Aqua-add. The objective for the workshop is also to find ways to implement some of these models, so we get a fairer distribution of the costs and benefits of projects by stakeholders, minimizing maintenance charges.

From this workshop may arise proposals to implement new measures to encourage the submission of more financially sustainable projects in the region of Aveiro, or proposals of change processes and work procedures at the planning level.

### **2.2.5 Dissemination of the decision support tool SULD**

The decision support tool, developed and made available online from the University of Aveiro, will be accessible through a link that will also be published on the site of Intermunicipal Community and publicized in the activities, events and publications referred to in paragraph 1.1.

The model can be applied in Intermunicipal Plans, PDM - Master Plans and Municipal Plan, with the direct support and collaboration of the University of Aveiro in pre-calibration and modeling of the desired scenarios so that each entity can select the spatial analysis that want to perform .

## **2.3 Learning resulting from Aqua-add project**

### **Added Value of Water**

Within the project we learned that there are several forms of integration of water in the urban planning and development, enhancing its use at several levels: economic, spatial, environmental, health, safety and risk prevention.

### **Stakeholders Involvement**

We learned the importance of stakeholder involvement at a very early stage of urban planning, different ways to promote the participation of all interested persons and the importance of the chosen forms of communication and participation processes, taking into account the target audience.

### **Business models**

Learn alternative ways to find funding for the implementation and maintenance of projects, urban infrastructure and equipment, from a clear identification of beneficiaries, so that it is also possible to share the costs more fairly.

### **DST - Decision Support Tool**

The model development DST - "Decision Support Tool" proved to be an important tool for decision support, because it enabled illustrate the spatial, social and economic impacts of different urban settings. We learn to encourage and disseminate the use of the model, and the use of GIS tools in the planning process is an added value in the processes of urban and regional development.

## 3. Municipality of Bremerhaven

### 3.1 Objectives

Starting point for participation in the project "Aqua-Add" was the approach that Bremerhaven wants to use its local and regional strengths. The unifying theme of all mitigation efforts in the city is to achieve a protection objective. The City of Bremerhaven will start a commitment for Co2 saving of 40 percent by 2020. At this climate protection target all measures in the framework will be improved. Our objectives are:

1. Transforming the town into a resilient (robust) city to face climate change. Bremerhaven has decided to become a "climate city" [www.klimastadt-bremerhaven.de](http://www.klimastadt-bremerhaven.de)
2. To create an integrated climate adaptation plan with other stakeholders and expertise, like city planning, green department etc. A climate adaptation plan will be started in 2015.
3. By making this integrated climate adaptation plan the conditions for a good living will improve which will lead to a better health of the citizens.

Aqua-Add offer the opportunity to make a contribution to the sustainable economic development and better environmental and quality of life in Bremerhaven.

Example: Special attention was laid to the open day event 2012, where 7000 local citizens were informed and rise enthusiasm for the redevelopment of the case study area. Activities include creative solutions to attract citizens, like craning them up into the air to experience a good overview of the area.

### 3.2 Lessons learned from Aqua-add

#### **Integrated approach**

The exchange of expertise and "best practice" with the European partner regions offers interesting chances for all participating offices -. The partner regions involved have their own extensive experience in the incorporation of water as a separate component in the urban planning and the marketing of locations on the water.

#### **Bremerhaven benefits from the exchange with the "Aqua-Add"-network and the new interdisciplinary approaches.**

The master plan „Geestemünde heads for water" was created in cooperation with the City Planning Office, the Environmental Protection Authority, and the Parks Department, supported by the land surveying and land registry department. In the planning process also important stakeholders (e.g. BIS, bremenports, Weser Yacht Club and district conference) were involved.

**This integrated approach is new and has proven itself for further projects.**

## **Funding/ raising awareness by Complementing ERDF with Interreg IVC**

The city council of Bremerhaven developed a master plan for the district of Geestemünde. The plan is called "Geestemünde geht zum Wasser" ("Geestemünde heads for water"). It focuses on the improvement of infrastructure connections from the district center to the waterfront in order to open up towards the waterfront and connect significant blue spaces in the area. The project is funded by regional ERDF means.

As Aqua-Add partner, we top up this infrastructure project by initiating new strategies to improve the integration of water in our spatial development processes. Due to the complex task and the number of affected users, the stakeholder engagement became an important part of the planning process. The new forms of stakeholder involvement and publicity work allowed Aqua-Add to strongly support the overall aim of the ERDF project in Geestemünde, which is to make visible and accessible significant waterplaces in order to increase the living conditions and the quality of housing and working in the district. By exchanging experience and expertise with the other partners we were able to develop a methodology based on best practice, using the district of Geestemünde as an example to show: the success of measures for a district, the situation before and after regarding the level of resident satisfaction, the success of the communication of the actions within a district and in the political arena (stakeholder engagement), the transferability of the methodology and results to other partner projects

Result:

**better understanding and public acceptance of local infrastructure measures, higher awareness of water issues and changes in the district, higher awareness of European funding measures in the city.**

## **Stakeholder involvement**

In the context of "Aqua-Add" (Interreg IVC) new models for citizen participation and financing are tested. Planners, residents, businesses and universities are involved locally in the project.

The thorough, constructive and structured way of recognizing roles and influences of stakeholders, followed by an appropriate way of involving them within the case study, was considered as a good example of dealing with stakeholders.

We are currently finishing an acceptance study by external experts; to allow reliable conclusions to what extent the current and planned actions actually contribute to a more attractive.

## **3.3 Implementation plan**

### **3.3.1 Reinkenheider Forst II**

For the short term Bremerhaven will implement lessons learned in projects which are in progress. One of these projects is "Reinkenheider Forst II". Elements from the Aqua-Add project which contributed:

- Interdisciplinary approach and stakeholder involvement; the "Aqua-Add" team Bremerhaven supported the master plan with external expertise.
- Business models; we funded the master plan with support by "Klimastadt Bremerhaven"

### **3.3.2 Long term Strategy for Bremerhaven**

The "Aqua-Add"-project aims to create a greater awareness of the value of water and explore strategies for the integration of "water" in the local and regional planning and policy. These strategies should be politically anchored by the project partners.

**We made a Decision by the Bremerhaven town Council from 13-8-2014:**

*"Based on the experience of "Aqua-Add" and "Geestemünde goes to the water," the high relevance of water is recognized as a planning component in the urban space. In forthcoming urban planning an integration of "water" in the local and regional planning and policy must be ensured."*

This resolution has been signed by the Lord Mayor and all departments involved in "Aqua-Add" – a novum in Bremerhaven!

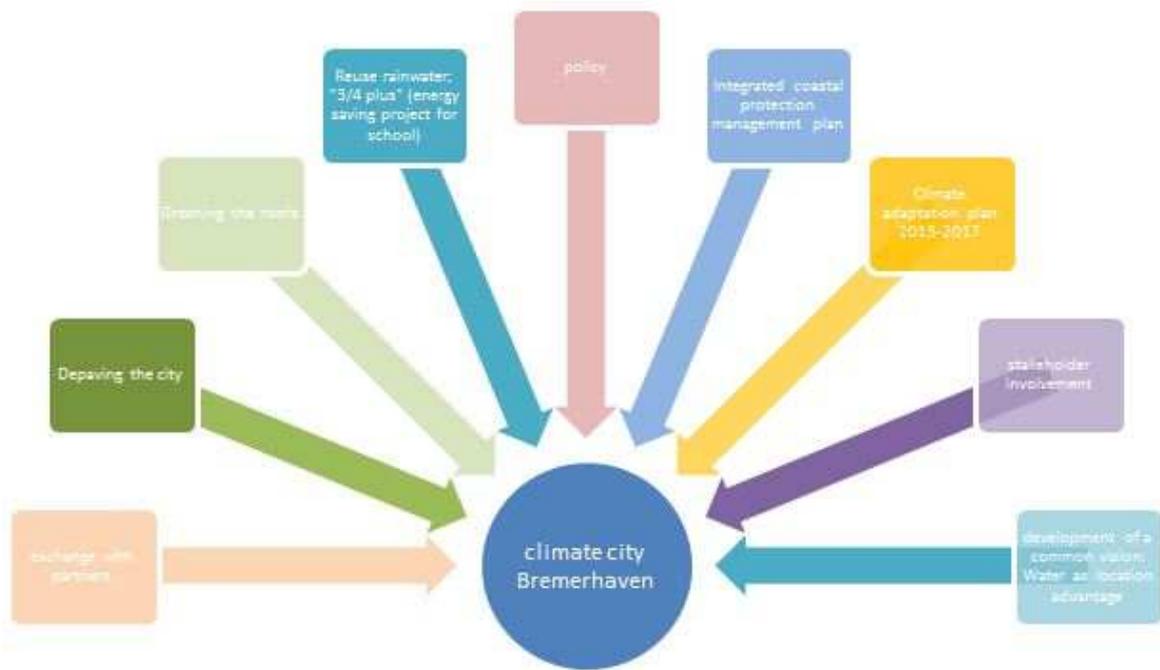
- Lord Mayor of City Bremerhaven
- Head of the building department
- Head of the environmental department
- Head of the garden and parks department

Basing on this decision we are now creating a long term strategy.

- The strategies elaborated by the European project will be improved for Bremerhaven. The implementation of the project results „Geestemünde heads to water" and "Aqua-Add" are good examples to achieve climate protection goals for other parties.
- Based on the Aqua add experiences Bremerhaven will ensure synergies between resource protection and requirements for sustainable living conditions in the city by the inclusion of water in urban planning
- Bremerhaven set the goal to develop an integrated climate adaptation plan. The implementation of the plan will start in 2015.

The main issues are:

- Exchange with partners
- Depaving the city
- Greening the roofs
- Reuse rainwater; "3/4 plus" (energy saving project for school)
- Policy
- Integrated coastal protection management plan
- Climate adaptation plan 2015-2017
- Stakeholder involvement
- Development of a common vision: Water as location advantage



## **4. City of Copenhagen**

### **4.1 Objectives**

This implementation plan is an outline and overall timeframe on the future use of the products made, and the implementation of the lessons learned, good practices and policy improvements identified during the Aqua Add project, relevant to implementation of the Copenhagen Climate Adaptation Plan, the Cloudburst management plan, as well as other activities developed during the project period related to the resilience building and establishing of blue and green infrastructure in the case study area and the city in general such as the water management plan and the realization of the vision in the harbor development strategy.

### **4.2 Lessons Learned during the Aqua Add project**

It is difficult to point out one single experience, or method, that can be directly traced to a single partner, method or policy. Rather the lessons learned during the project consist in a general perspective or mindset that can be deduced from the experiences done in the project. These can be grouped into following statements

- Establishing of green and blue structures on the cities' surface is essential to climate adaptation, which is the major need and objective for the City of Copenhagen
- Climate adaptation is a new discipline in urban spatial planning and a new term and condition to many of the necessary actors central to implement and respond to climate adaptation in general and in the "Climate adaptation plan" in particular.
- Climate change and climate adaptation is complex and multi-structured. No single existing structure, actor or stakeholder can adapt to climate change on its own. Adaptation needs to be done in collaboration among various stakeholders
- Existing legal barriers has to be confronted, financial models has to be developed, procedures and habits has to be changed, public and individual stakeholders has to be engaged, Decisions models has to be distributed, communication has to ... etc.
- New structures have to emerge and new systems have to be constructed physically as well as mentally.
- New possibilities, such as activating new financial resources and synergies with other public areas of interest, have to be assessed and made measurable to gain attendance and acceptance among central stakeholders.
- Public authorities have to engage stakeholder on local level as well as on the national agenda
- Implementing the climate adaptation plan is an interdisciplinary and cross sectoral task. Coordination, communication and access to a variety of different people and stakeholders are crucial to the process.

The lessons learned already are, and continues to be, implemented in the work planned in Copenhagen now and in the future years.

Since the Aqua Add project started in 2012, the City of Copenhagen sharpened its focus on the development of a city wide blue and green infrastructure, inspired from other partnering cities. A lot of resources have been put into the implementation of the Copenhagen Climate Adaptation plan, in term of the development of comprehensive storm water management system, that is about to be implemented during the next 10 – 20 years. The storm water management system consists of a combination of blue and green structures, reducing the pressure on the sewage system, in case of heavy rain. Due to these priorities and resources, lots of different ideas and specific models, that Copenhagen got from other partners during the project period, has already been implied in the work done in Sankt Kjelds and other parts of the city, such as the surface solutions and communication done in Lyon, and the policy improvement regarding co-financing, and stakeholder engaging activities that are currently tried out in the case study area, inspired from Eindhoven as well as stakeholder engaging activities and the process of facilitating public access to water inspired from Bremerhaven and Lyon resulting in a new vision for the harbor of Copenhagen and inspirational guide on how to access water (the water front catalog), translated to English and accessible to all. And from the Aqua Add partners in the cities of Sofia, Aviero and Imperia, we learned that there are huge potentials in food production and eco tourism, related to water and green areas which is tried out by introducing new services to the citizens and tourist such as facilities for swimming in the harbor at winter time.

Another central practice in the discipline of adaptation is about calculating the cost and benefits related to establishing of new green and blue infrastructure in urban planning. Several activities have been carried out concerning this issue; most significant a study on the effect on real estate value when making and urban park. And the development of an economic, GIS based model, to support decision making which was a significant component of the aqua add program. The lessons learned and experiences done in these activities regarding the development of the decision support tool, and other related activities will be used by the city administration and other stakeholders in various future contexts. One major observation related to estimation of the value of blue and green infrastructure, is not to argue that the spaces are limited, attractive and highly valuable. But to distribute the cost related to the structures that follows the streams of benefit, to the different stakeholders. The DST model directly inspired an economic study done in Copenhagen 2012 on the value of green areas reflected in real estate values. And again in 2014, where element from the DST tool was included in the calculations and communications done in the political process of approval of the specific project in the climate adaptation and cloudburst management plans.

### **4.3 Implementation plan**

Keeping the policy change, lessons learned and practices transferred in the Aqua-add project in mind, the main concern to the city is to implement the CCAP and CCMP, as fast as possible. The city has experienced three heavy and severely damaging cloudbursts exceeding a statically 100 year rain, within the last 4 years, most recent in June 2011 and august 2014. Based on the climate adaptation plan, which was decided upon in 2011, the major focus is to developing a flexible system that can handle rainwater in huge quantity. – And to make the system valuable beyond the effect of reduced risk of flooding. The bullets below outline major activities planned in the near future.

## January - December 2015

- Implementation of the CCAP and the CCMP: Results from the Aqua Add project will be included in the implementation of the Cloudburst management plan, where the financing model, used in the case study area, will be institutionalized and a time schedule outlined, based on the new legislation enabling co-financing between the utility company and public or private actors, using water fees as primary source of finance. The responsibility of implementing of the plans is based in Technical and Environmental department. The department has formed a team consisting of different professions. The team handles portfolios of projects and heads all projects regarding the implementation of the plan. From January 2015 a revision of the organizational structures has to be made in order to ensure a smooth implementation and project management, through establishing of a common secretariat between the city administration and the utility company, based on the experiences done in the case study area. Furthermore will the department establish an internal unit specialized in tenders and project management regarding physical constrictions in the city related to the implementation of the cloudburst management plan.

Responsible: the Climate adaptation team and international team

- Development and Showcase the climate quarter project and the neighborhood Skt. Kjelds: It is difficult to imagine what a climate proof Copenhagen will look like – and it also has to be acknowledged that not all the solutions are in place. How will the new storm water infrastructure interact with the existing city and how can it be used to improve urban life in the city? This is one of the reasons why Copenhagen has selected a local neighborhood in the city as its 1:1 laboratory. Planned to be finished in 2016 this neighborhoods will demonstrate the ideas behind the adaptation work and serve as an inspiration, a laboratory for new types of solutions. How can Copenhagen use climate adaptation to create a greener and blue city, with higher biodiversity and more recreational space for Copenhageners? The neighborhood selected was Skt. Kjelds, located in the north-eastern part of Copenhagen, and is in population, flooding risk and structure very much a typical city district. It is part of the neighborhood regeneration area, but it also houses the current prime minister of Denmark. The entire neighborhood has 24,000 residents and 10,500 workplaces, but only a section of the neighborhood will be subject to the climate proof measures. Over the next years, local stakeholders, citizens and the city will work on implementing a number of projects, such as local water boulevards and water squares that will demonstrate the ideas and possibilities of the climate adaptation plan. It is also intended that the projects will explore new types of solutions, and identify and develop new products for storing and managing water that need to be undertaken by consultants and manufacturers in order to meet the challenges of a changing climate. A detailed plan for the neighborhood has been prepared and the first construction work on a water square at Tåsinge Plads will be finished in late 2014. An important part of the future work is to involve by local residents in workshops where they have the opportunity to influence the future projects.

When the work is done in 2016 the neighborhood will be a showcase for other Copenhagen neighborhoods, and an international exhibition for how Copenhagen tackles the challenge of climate change. And Copenhagen will have valuable information on how to proceed with other neighborhoods. Knowledge and information that is acquired in Copenhagen can be transferred to other cities in the Aqua Add network through partnerships, seminars etc.

Responsible: the Climate adaptation team and international team

- International cooperation: One of the major learning from the Aqua Add project was that international cooperation and knowledge sharing improve the work done locally. The city of Copenhagen has long time experience in international cooperation on environmental, mobility and energy issues. The city's planning regarding mitigation and adaptation to climate change has been rewarded in several occasions latest in when the city's climate adaptation plan won the prestigious Index Award in 2013 and the C40 prize that the city received in Vancouver at the entrance to 2014, based on the 2025 mitigation plan. This year, the city has been appointed by the European Union, European Green Capital 2014. The theme of the green capital has been sharing Copenhagen, a lot of international relations has been made during the year. The city has hosted more than 100 international events. The city also participates in the C40 network, leading the working group on green growth. A main priority for 2015 is to improve and structure international cooperation. The participation in the Aqua Add project has been an eye opener to the city towards cooperation within the European Union on the subject of water management and climate change adaptation response.

Responsible: the Climate adaptation team and international team

- Advocacy to policy change: Even though major legal barriers have been changed, some problems are still to be solved before the legislative regime in the water sector supports existing policies and ambition of the public administration. Advocacy towards state agencies that regulate the water and planning sector, will be a major issue in the coming years. On the short term advocacy has to be made by the city towards on the state agencies and governmental departments to keep the policy improvements and prolong the current financing system or make it permanent.

Responsible: the Climate adaptation team

- Actual constructions; Parallel to the analysis, economics, hydraulics and political processes, actual constructions have to begin, and stakeholders involved on local project level, using the method developed since 2012. This process continues over the next 10 – 20 years and further.

Responsible: the construction unit

## **January - December 2016**

- Revision of the Climate adaptation plan; Result from the Aqua Add project will be incorporated in the next revision of the climate adaptation plan, which is expected to begin start 2016. Especially the paradigm and specific algorithms that underlying the DST model, will be an inspiration when cost benefit analysis related to integration of blue and green structures has to be made in the future

Responsible: the Climate adaptation team

- Revision of the water management plan, ensuring that the CCMP correspond with the regulations made in the legally binding water management plan, enabling the municipality to regulate access to the sewage system and natural and artificial water bodies.

Responsible: the Climate adaptation team

- Actual constructions

Responsible: the construction unit

### **January – December 2016**

- Revision of the implementation plan

Responsible: the Climate adaptation team

### **January 2016 – December 2026**

- Actual constructions

Responsible: the construction unit

## 5. Municipality of Eindhoven

### 5.1 Objectives

Keeping the lessons learned in mind, we formulated three objectives for the implementation of the lessons we've drawn during the Aqua-add project:

1. Transforming the town into a resilient (robust) city to face climate change (heat islands and flood runoff risks). Both with long term as well as short term measures (quick wins)
2. To create an integrated climate adaptation plan with other stakeholders and expertise, like city planning, green department etc.
3. By making this integrated climate adaptation plan the conditions for a good living will improve which will lead to a better health of the citizens.

Transforming Eindhoven into a (more) resilient city takes a lot of investments and effort. Therefore Eindhoven will make long term and short term plans, inspired by projects of our Aqua-add partners. These short term plans will be mostly quick wins. Public space which need to be changed (e.g. renovated) anyhow or which can be changed easily. The long term plans are inspired by international and national projects dealing with climate change and adaptation. A longer period of time is needed to improve the integration between different expertises and to raise the awareness that measures are necessary to keep the natural system in track with urban developments.

### 5.2 Implementation plan

#### 5.2.1 Implementation of "De Gender"

For the short term Eindhoven will implement lessons learned in projects which are in progress. One of these projects is "De Gender". Due to the Aqua-Add project "De Gender" did get exposure and renewed attention which did and will help to implement "De Gender" in Eindhoven. Elements from the Aqua-Add project which contributed:

- Business models. These models did help Eindhoven to look at "De Gender" in a different way. To look at stakeholders and try to find out what's in de project for them. Also try to find new stakeholders, e.g. stakeholders who will participate in the maintenance or who can use "De Gender" for different purposes, like exposition. But also try to solve challenges like loss of parking space. We had already an offer of one stakeholder who had empty parking places.
- The presentation of the results of the calculations with the DST was a reason to invite different stakeholder for a meeting and to explain the effect of the introduction of "De Gender". This meeting was a good change to exchange ideas for the realization of "De Gender"
- The development of the different business models made sure that the ideas of the experts in Eindhoven exchange their knowledge and the change which will be introduced by "De Gender".

The project will be continued and the following actions will be taken:

- The biggest challenge is to create “De Gender” in the “Emmasingelkwadrant” which isn’t owned by the municipality. Because of this the municipality depends on the owners to realize “De Gender”. Continuous communication to connect our vision with the owners interests.
- Another part of “De Gender” (Stationsweg) will be constructed in 2016/2017. This will be on the property of the municipality. With this project we’ll hope to give a good example for other parties.

Planning Implementation of "De Gender"	2015				2016	2017	2018	2019	2020
	Q1	Q2	Q3	Q4					
<i>Emmasingelkwadrant:</i>									
Developing contracts with private partner									
Design of future Gender park									
Construction works									
<i>Stationsweg</i>									
Design									
Construction works									

## 5.2.2 Climate adaptation plan

Based on the Aqua add experiences, Eindhoven set the goal to develop an integrated climate adaptation plan. This ambition will be laid down in the Municipal Waterplan (GRP). The GRP is a plan in which measures are described which are necessary for the maintenance and improvement of the sewerage system as well as the financial consequences. This GRP is very suitable to ensure the making of plans for a resilient city, it provides the financial and technical bases for the realisation of these plans. The GRP is an official document which will be approved in by the end of 2014 by our Council.

The following projects which (will) contribute to the development of the climate adaptation plan:

- Eindhoven has a runoff risk map. Currently we are investigating the effects of heat stress and drought. The purpose is to assess the seriousness of these developments and to find ways to reduce the negative effects. This investigation is conducted together with the green department and the health department. The best way to reduce heath stress is to make the municipality greener (less pavement). Both on private and public property. To cope with the draught rain water should be infiltrated as much as possible. These two solutions work hand in hand and enforce each other.
- Due to climate change the groundwater table may rise. In the climate adaptation plan actions will be described how the municipality will cope with this challenge. With new buildings extra attention should be paid to preventing groundwater problems.
- Cooperation with other departments and with external partners is essential to be successful in climate adaptation. Development of strategies to involve our partners.

Planning: 2015-2018

Planning Climate Adaptation Plan	2015				2016	2017	2018	2019	2020
	Q1	Q2	Q3	Q4					
Conducting Climate Stress test									
Defining ambitions and opportunities									
Defining and designing measures									
Dissemination and implementation									

### 5.2.3 Roadmap Water

Next to this Climate Adaptation Plan, a Roadmap Water will be developed. This document will be made to point out the direction in which the city should develop (long term policy/vision). In the roadmap Water, the following issues will be addressed:

- Water safety. Due to climate change the functioning of traditional storm water systems will be reduced (Increased number of water on street events). To enlarge the whole system is simply too costly. Other ways have to be found to reduce the risk of flooding like decoupling by changing the sewer system from combined to separate sewers, discharging rainwater from roads and roofs via a new drainage system on surface water.
- Surface water quality has to comply the European standards. Together with the waterboard “De Dommel” plans are and will be made to make sure the water quality will be sufficient. (2015-2020)
- In cooperation with the waterboard, Eindhoven will investigate the possibilities of a better way to collect and process sewage- and rain water.
- Sewage water is considered to deliver new resources instead of being waste. Alternatively sewage water could be used as a source of energy. The waterboard De Dommel is building a pilot plant to make use of sewage water instead of treating it as waste. This also is an added value of water as well as an alternative business model.
- Integrated design: While making an integrated climate adaptation plan stakeholders (colleague experts will be involved). This will help to explain the challenges which come with the adaptation of climate change. In the ideal situation every project will result into a climate proof design/plan.

Planning: 2014-2017

Planning Roadmap Water	2015				2016	2017	2018	2019	2020
	Q1	Q2	Q3	Q4					
Consultation of multidisciplinary experts									
Exchange with international partnership									
Creating a broader platform									
Development of Roadmap document									
Dissemination and implementation									

### 5.2.4 Green Policy document

We are working on the new Green Policy document (groenbeleidsplan). This document will contain different aspects which will contribute to the value of green space (like water buffering, heat stress, recreation, nature and health), and lessons learned during the Aqua-add project will be incorporated:

- Investigation of the possibilities how new business models could be used to finance part of our green space. Inspired by the business models study Eindhoven will be looking for more situation (locations) where the parties who profit from green and/or blue space can contribute to the realization and maintenance of these spaces.
- In collaboration with other departements working maps will be presented. These maps should be used to facilitate future projects in basic possibilities and conditions.

Planning: the new Green Policy document will be approved by the Council in 2015.

Planning <b>Green Policy document</b>	2015				2016	2017	2018	2019	2020
	Q1	Q2	Q3	Q4					
Investigation of new business models									
Working maps									
Green Policy document									
Dissemination and implementation									

## 5.3 Inspiration and ideas from the Aqua-Add project

In the Aqua-Add project we've learned a lot which can't be linked to a project directly. One of the most important challenges is the funding of our projects. In the Netherlands, the maintenance of the sewer system is funded by a "sewage charge". All property owners with a connection to the municipal sewer system are charged for this, as part of the municipal taxes. In change, the municipality ensures that the sewer system works properly and is well maintained. Also alternative techniques to deal with rainwater can be funded by this budget. In the Aqua-add project we've seen that new business models could be used to create funds for water measures. For example: the recreational exploitation of salt pans, or the attempt to create a Business Improvement District.

What we've learned is that it is useful and necessary to determine what the benefits are of "green and blue" and who benefits most. This way of thinking creates new possibilities for water as a business model. This way of thinking is useful for governmental organizations as well as for private enterprises!

In a practical way, we've seen that Aqua-add was a new starting point for the development of the Gender. Stakeholders were involved to discuss the results of the Decision Support Tool, and new enthusiasm is created to reopen the Gender. The DST could be of value in the future, especially when attention is paid to the presentation of the results: not only is the final output important, but the underlying algorithms and assumptions as well. This creates a better understanding of the value of "green and blue": why is a certain neighbourhood more attractive than another?

Another lesson learned relates to the importance of Communication. We're working on this already, by involving stakeholders in our planning processes. But we can certainly improve this: putting water on the agenda by joining big events for citizens (Bremerhaven) or professionals (Copenhagen). We can improve our skills by organizing 'master classes' (such as the concert' express in Lyon). These activities help to create support for the measures we need to take. It can even make people proud of their city: water as part of the city's identity! We've seen great examples in Copenhagen, where water is made accessible, visible and enjoyable. A swimming pool in the open water, many quays to use as a promenade or to sit down and enjoy the water side.

## **6. Municipality of Imperia**

### **6.1 Objectives**

The importance of a sustainable use of water is shared worldwide, both for environmental safeguard and social reasons. Italian environmental law has a strong connotation in the preservation of water resources, stating strict rules about the protection of water bodies and the sewage regulation. Water saving has a great importance in our lifestyle and moreover in urban planning. Technology allows us to create an integrated water cycle in which the quantity and the quality of spring water are linked to those both of stormwater and depurated ones, but often the lack of fundings is an impediment to this goal so that technicians, politicians and investors have to cooperate in order to find the better solution together with a sustainable cost. In this view, from Aqua-add we have learned the importance of stakeholder involvement, but also the effectiveness of integrating stormwater opportunities with urban planning e.g. with local rainwater drainage seen in Copenhagen.

The objectives are:

1. Transforming the town into a resilient (robust) city to reduce flood runoff risks;
2. increasing water saving with a better management of rainwater, both at urban planning level and the building of private houses;
3. improving conditions for good, healthy living in the town centre.

### **6.2 Implementation plan**

To reach the goal of a better management of water the awareness of the local issues and resources is fundamental, as well as the cooperation between stakeholders, experts and public bodies, thus the action plan deals with different aspects: technical, political and legislative. We can individuate three key actions:

1. increasing the knowledge of the territory with focused hydraulic analysis to locate weak points in the actual drainage system;
2. identifying the best integrated solutions for stormwater handling and utilization;
3. improving the consciousness of citizens about the importance of water saving and promoting the added value of water in the urban environment.

#### **6.2.1 Increasing the knowledge of the territory**

The Aqua-add experience has allowed us to carry on and refine the hydrological studies, began by our water management company in 2007, finalized to solve the problem of flooding in the centre of Oneglia during cloudbursts. The availability of accurate data about the amount of rainwater, related to the expected frequency of rainy events, and the capacity of the existent sewer system shown that the amount of water to be drained to the sea or to the nearest river is too large for a “classical” drainage solution (enlarging the sewer system) so that we imagined to create a blue/green space with channels leading large quantities of water to the recipient water body. The same approach could be useful in order to solve similar problems in other urban areas as well as a map of flooding risk related to the capacity of the drainage system, in order to focus the rehabilitation works.

### **6.2.2 Identifying the best integrated solutions**

The added value of water, even stormwater, is a key element to reach smart solutions finalized to better the climate adaptation capacity of heavily built urban areas. An integrated management system of wastewater and rainwater planned at an early stage of the urban developing process can sensitively reduce costs for construction and maintenance. Considering stormwater as a valuable resource, instead of a waste problem or a threat, during planning phase can reduce the costs of climate adaptation and give benefits, improving the city and people's lives. In this view, rainwater can be no longer something to be hidden in underground pipes to be brought far from our space as soon as possible, but a complement of our life with the pleasant function of keeping us in touch with natural events or the changing of the seasons.

### **6.2.3 Improving the consciousness about the importance of water saving**

A recent trend of Italian legislation (stated in 2012) is intended to promote the reuse of rainwater in new houses as well as in restoration works. This general statement has not yet a wide application because of the lack of technical rules, particularly in some regional departments among which Liguria. The base idea is to improve the home reuse of (treated) rainwater for some tasks such as car washing, wc discharges, houseworks, irrigation of gardens and so on: in this way a 30% savings in spring water could be reached (the datum is calculated relating to an average annual rain of ... mm and a per capita consumption of ... l/day). The Municipality of Imperia wants to promote the practical application of this approach, calling the Regional Council to legislate on the matter in order to define all the related technical and administrative aspects.

## 7. Greater Lyon

### 7.1 Objectives

Main objectives of the project

1. A town reconciled with its environment and which offers a pleasant living environment
2. a resilient (robust) city to face climate change (heat islands and flood runoff risks)
3. a city that preserves its water resources and biodiversity

### 7.2 Implementation plan

The actions plan is build to deploy in parallel policy and educational actions. It aims to try to cover several levels of actions in the territory to build tomorrow a different city project.

Implementation plan concern

- buildings and infrastructures current and future
- infrastructures and public buildings, roads and public spaces
- constructions and private facilities (single family homes and condominiums, collective private spaces of gardens course or car parks )

It is structured in 5 actions

- Regulation and runoff risk map: limiting the aggravation of flood risk and preserve water resources by acting on the future construction
- Depaving the City: change the ways of designing roads and public spaces for spaces more permeable and more 'nature' with a global cost approach
- Greener roofs: develop techniques of green roof on public buildings for a better management of water and the nature in dense urban center
- Reuse rain water: encourage individuals to implement rain gardens or other best management practices with ecological engineering
- Smart Climate adaptable City: make available to the public the knowledge and experiences of greater Lyon and its partners and share aspects of design and maintenance on a dedicated internet site 'smart city '.

All this actions will be implemented in the new urban master plan (2016-2017) and in the climate adaptation plan in 2015. In the longer term, the current water management plan will be revised in a new master plan. The objective is to find synergy between water supply, the sewage network and rainwater management in a coherent master plan, aiming at a good quality of water in the territory of Greater Lyon.

#### 7.2.1 Policy and runoff risk plan

##### Runoff risk plan

- Revision of runoff risk map: realization of a map of flood risk by runoff for the whole territory. The objective is to identify areas most at risk in Grand Lyon in the case an exceptional rain (100-year return period) occurs on the territory. This map is inspired

in part from the experience of Copenhagen on the subject and in particular by "cloudburst management plan".

- a complementary zoning map "runoff" is being developed with a reflection to adapt a regulation of compensation of impermeabilised areas.
- Risk Map is being cross-analysis with maps of heat islands and urban projects to identify the urban development projects on which these issues could be studied how to find opportunity to actions and act in anticipation on climate change
- Further analysis must be done with the roads department to identify the main roads at risk and projects to also find opportunities for action.

Planning: Risk map finalized in 2014, further studies in 2015-2016

Driver: water department, Elisabeth SIBEUD

### **Rain Water Policy**

- Drafting of a specific regulation to stormwater management: this regulation will complement collective and non-collective sanitation regulations and will provide principles and rules for best management of flows and pollutant loadings of stormwater to meet the two major objectives of the community
  - Preserve water (quality and quantity)
  - Not to aggravate the flood runoff risks planning
- First draft of the regulation in the form of a guide: internal and external consultation on this regulation for a first implementation at the end of 2014
- Socio-economic and environmental regulation analysis and finalization of the consultation in connection with the development of the "stormwater" policy for the territory of « Sage in Eastern Lyon », with the revision of the PLU and the reflections on the runoff risks.
- Multi-disciplinary work with the urban planner's team to evaluate the contribution of this new regulation to more nature in the city and the improvement of well-being.

Planning: Finalization of the guide in its regulatory form for end of 2016

Driver: water department, Elisabeth SIBEUD

### **7.2.2 Depaving the city**

Act on public utilities and community public spaces to integrate the objectives of desimpermeabilisation and disconnections of rainwater for best and more natural management systems

Planning

- Evaluate experiences, roads and public spaces made and operation of permeable surfaces. 1st half of 2015
- Establish and share missions and the costs of maintenance of these surfaces and reflect on alternative management pooled for these spaces. 2nd semester 2015
- Write and share a guide and tools for an integrated approach to stormwater management in projects of roads and public spaces for end of 2015
- Train technical officers of water, roads, cleanliness and urban project departments (regrouped in 1 delegation in the organization of the future metropolis January 2015)

Planning: 2014-2016

Pilot: The water and road department: Elisabeth SIBEUD and Juliette PECORARO

### **7.2.3 Greening the roofs**

Implement green roofs in public buildings supports source management of stormwater and for biodiversity and coolness in dense urban center. A first guide on green roofs was completed in 2010 between Grand Lyon and the city of Lyon. The city of Lyon has systematized implementing green roof since 2008 with a clear political command. However the direction of the buildings of the Grand Lyon still little developed this technique. Greater Lyon has not either currently posted policy of systematization of these green roofs on publics and technical buildings it has responsibility (pumping station, treatment, tanks etc...). Greater Lyon attends the GEPETO project initiated by the company Le Prieuré and the engineer school « INSA of Lyon » on the understanding of operating water and thermal regulation in green roofs. The project started in June 2014 for 3 years.

Planning

- Evaluate the experiences gained by the city of Lyon, brakes still greater Lyon. Starting the action with the presentation of the GEPETO on 3/09/2014 project.
- To establish and share missions and costs of maintenance of these surfaces.
- Revise and share a guide and tools for the integrated design vegetated roofs
- Train technical officers of water and building departments

Responsible: Water and buildings departments: Elisabeth SIBEUD and Laurence TANGUILLE.  
Lyon city associated with the project

### **7.2.4 Reuse rainwater**

Implement an incentive guide to the reuse of rain in the private spaces in the form of rain gardens.

The idea is to rely on the approach to the city of VANCOUVER to offer an alternative to the waste of rainwater to the inhabitants of Grand LYON with individual reuse in gardens and infiltration into groundwater for collective reuse later.

Rather than another guide for best rainwater management to the plot, the approach is to propose it as an accountability of each to reduce the waste of rain water and preserve it as a resource, create new spaces "rain gardens" which contribute to improve the quality of life of the territory and create a healthy environment. As they do it, citizens participate in adaptation to climate change.

This action will take the form of a web tool "smart city" dedicated to citizens.

Planning

- Writing a specification for consultant and consultation: September to December 2014
- Establish a guide and design tools for rain gardens: 2015
- Evaluate the interest of a potential device of grant to launch the approach (costs and earnings),
- Evaluate other possible economic models with the manufacturers of storage and infiltration including materials) 2015
- Establish the specifications for the development of the Web tool provision of knowledge and sharing. End of 2015

Responsible: water and ecology department

### 7.2.5 Smart Climate Adaptable City

Implement a teaching tool for exchanges of knowledge and experiences between the inhabitants of greater LYON and the technicians of the metropolis.

There can be found

- Knowledge about risk flooding, water resources of the metropolitan area, parks and wildlife and the State of our environment
- Rules for the construction and teaching tools to understand the rules
- Calculation to help size and tools advice
- Management boards of publications from the experience acquired by grand LYON.
- A platform of exchange between community and individuals and between individuals and perhaps also with manufacturers of products (?) to better choose, better design, better maintain...



## **8. Municipality of Sofia**

### **8.1 Objectives**

The Aqua-add project is beneficial to the Municipality of Sofia due to the occurring worldwide climate changes and their consequences for the urbanized areas. It allowed it to gain additional know-how and experience of water management good practices.

The formulated objectives by the Aqua-add project are:

1. City which offers pleasant living environment
2. A resilient city to face climate changes related to the flood run off risks
3. A city that preserves its water resources and biodiversity.

Various technical solutions were showcased by the separate partners for the realization of these objectives dependant on the specific conditions of their countries and resource availability.

Undoubtedly for us of interest are the opportunities to learn more from our partners in the European community which have implemented certain technical solutions and which take separate steps for the creation of public partnerships.

### **8.2 Sofia – specific conditions and technical solutions**

Due to the specificity of the terrain conditions and the location of Sofia as well as the open water courses which pass through the municipality area, we have already put in place technical solutions for the proper functioning of the water resources. City characteristics:

- Blue spaces. Another characteristic of the open water courses of the city is that so far their impact is mainly seasonal, however, it does not mean that the attention towards it is low.
- Green spaces. Of substantial consideration as well is the structure of the urbanized area, the availability of large parks and gardens and the direct influence on the city climate of its surrounding mountains – Vitoshka, Ljulin and Stara Planina.

In its sense the efforts of the administrative personnel of Sofia Municipality, which is directly involved in the management of the water spaces, their creation, rehabilitation and maintenance, is the creation of green strips, which will cross the city area and connect with the open water courses. This will allow for the collection of rain waters in a natural way and their conveyance from the Sofia Valley to the sole water way – the Iskar River, a tributary to the Danube River. The creation of those green and blue spaces through the city to a greater extent provides a comprehensive solution for the formation of recreational zones for the citizens.

So far the municipality administration has been focused on the utilization of non-utilized spaces by transforming them into gardens and parks as well as providing opportunities for easy access to them. Due to the high cost of the measures related to the construction of

green areas on buildings roofs, so far that method has been seldom used. It is applied mainly upon the buildings of administrative and administrative-commercial centres.

Due to the fact that as of today the road network of the city is rather centralized therefore the real opportunity for the provision of promenade spaces and bike lanes is sharply minimized. Now in process is the construction of a ring road system that will alleviate the central area, however until its realization the sole natural opportunity for the creation of promenade zones and bike lanes is namely the riverbed realigned open water courses. That would allow for the implementation of alternative transportation which will result in reduction of exhaust emissions.

### **8.3 Aqua Add - good practices**

During the visits under the Aqua-add project to France and Denmark, Bulgarian experts had the opportunity to observe implemented good practices related to open area drainage systems.

Another good practice that in our opinion is possible and applicable in Bulgaria, is the management of the stormwater sewerage in Lyon. Through terracing, soaking blocks, and trenches the waters could be conveyed to the open water courses in the areas outlying Sofia. The concept is not unfamiliar to the Sofia designers and is financially sound.

Very interesting were presented measures related to the control of water flows with reference to flood risks.

#### **Vladaiska riverbed realignment**

As pointed above, the seasonal water activities of the mountain flows and particularly in the outlying city areas in the mountain outskirts distinctly appear during the autumn rains and the spring thawing. Due to that reason it is important to realign the riverbed and secure the basins of the longest city rivers - Vladaiska and Perlovska.

Vladaiska riverbed realignment was the project showcased by the municipality. The technical solution of that task undoubtedly has plenty of versions, however, in its sense it presents the creation of a riverbed which is sized to conduct the water flow through the city area, to collect the free rain water and unimpededly to convey it to the Iskar river course.

So far the main approach has been the construction of concrete riverbeds with berms, minor beds and rapids. Namely due to that reason of particular interest have been the presented methods of drainage of natural courses as well as the depavement aiming to increase the natural infiltration of rain water through the surface ground layers. Undoubtedly these types of technical solutions would facilitate the maintenance of natural balance within the areas of the river courses.

## **8.4 Implementation plan**

### **8.4.1 Short term measures**

In the short term, good practices that could be adopted are those observed in France and Portugal related to stabilization of riverbeds in their various aspects. They are relatively easy to apply and possible to implement through the use of considerably low funds.

In view of the climate changes, another good practice that could be adopted in the short term is the creation of a register of the status of all open water courses, passing through the urbanized area. This would allow for the preservation of the environment by not disturbing its biodiversity balance.

These measures are considered in the Sofia Municipal Plan 2014 – 2020 as the following specific objectives are formulated:

- Construction and renovation of ecological infrastructure networks. The package of measures for the implementation of that objective includes a strategy for the development of water supply and sewerage networks and riverbed realignment of the open water courses for the period of 2008 -2020.

### **8.4.2 Involvement of stakeholders**

From a long-term perspective we consider that it is possible to seek methods and ways to involve stakeholders and create public-private partnerships for the solution of significant tasks for the city such as open-area drainage of the flat terrains in the agglomerations outlying Sofia through which open water courses pass.

### **8.4.3 Greening the roofs**

As a means to solve energy-related issues and to improve energy efficiency, we find attractive the creation of a programme for the sanitation of flat roofs and their transformation into green areas. A characteristic of Sofia that would facilitate the implementation of the programme is the fact that for the past almost fifty years prefabricated buildings within the city have been constructed with flat roofs. In addition, we consider such a programme as entirely possible, although not within a short term since the issue of the energy efficiency is related to the policy of the Bulgarian government and state budget funds are used for financing the performance of thermal isolations and rehabilitation of kindergartens, schools and residential buildings, which as features are analogical. Taking into account the Aqua-add lessons learned, this could be part of the implementation of the objective, as considered in the Sofia Municipal Plan 2014 – 2020:

- Improvement of the living conditions and the quality of the living medium in support of the initiative – Sofia – Green City.

We consider that our participation in the Aqua-add project has been exceptionally useful for the Bulgarian side. Follow-ups and keeping in touch with the other participants are important due to new developments in the area and implementation of new technical solutions to the rapidly changing environment due to climate changes.

## 9. Trans-Tisza Inspectorate

### 9.1 Objectives

Thanks to the Aqua-add project, the development of the Tóció watercourse and its surrounding area has been put on the agenda again considering both the priority issues and developments to be implemented in later periods. Significant steps have been made in the field of stakeholder involvement focusing on the possible widest round of experts, decision makers, urban planners, representatives of numerous relevant professions and residents.

The city of Debrecen lays on the Eastern part of Hungary, in the middle of the Hungarian Great Plain with 250.000 inhabitants. Debrecen is the cultural, educational and economic center of the region. The city and its flat surrounding is poor in watercourse. The Tóció creek runs on the Western side of the city while there is another creek called Kondoros on the Eastern side of the city.

The growth of the city toward West has reached Tóció, at certain areas construction works have started on the other side of the creek. This raised the necessity of an overall plan for the Tóció creek's future role and status. The overall goal of the city is to implement the development of the Tóció area providing a new and valuable blue space.

Concerning the creek itself, the length of the Tóció is 26 km, its catchment area is 147 m<sup>2</sup>. It runs from the North not far from the city of Debrecen through Józsa on the Western side and runs into Kondoros creek.

The problem to be solved concerning Tóció is trifold:

#### **Water quantity issues:**

In permanently dry periods Tóció has no own regular stock of water or just have a very small quantity. Contrarily, in case of showers and heavy rainfalls there are capacity problems in the middle section of Tóció. In the lower section sometimes even agricultural areas are inundated. The aim is to find appropriate solutions to import water from other sources.

#### **Water quality issues:**

This problem is partly connected to water quantity issues as in dry periods the water quality of the middle section is defined by the quality of discharged treated wastewater and leechate. As Tóció is located in an urban environment, the risk of pollution through the discharged rainwater channels and lateral branches is relatively high.

#### **Environmental issues:**

Some parts of the Tóció riverbed are disordered, the maintenance is irregular. Due to this situation, the direct access of Tóció is not solved, citizens cannot use it. Illegal waste disposal is still present in some cases deteriorating water quality and aesthetic appearance.

- According to this, the planned developments are also structured around these problems:

Ensuring regular water stock/runoff

- water transfer
- channel storage
- side storage

Ensuring adequate water quality

- separating sewage water from rainwater at all city areas
- responsible catchment management

## **9.2 Implementation plan**

### **9.2.1 Managing the bed and the shoreline**

Based on the main problem, the most significant challenge is to ensure the regular runoff amending and enhancing its impact and utilization by the establishment of storages.

According to shape and function, two options are considered: channel reservoirs or off-channel reservoirs. Reservoirs are suitable to keep the water quantity of large runoff peaks while during water shortage this solution can provide water demand for ecological or other purposes.

Becoming living water, Tóció can be a great attraction of the neighborhood with its managed riverbed and shoreline.

As a result of the planned developments, the expected results are as follows:

Enhancement of water management conditions

- Utilization of excess water - real solution
- Management of water shortage

Water stock of Tóció is really insufficient in dry periods. Water retention in case of heavy rainfalls can provide multipurpose utilization of limited stored water in later periods while playing a key role in dry periods to ensure the ecological water demand. Applying water storage, the inundation of areas lying deep along Tóció could be avoided - this is an important problem especially in the lower section of Tóció. Transferring water at the beginning of the urban section of Tóció can be a potential solution in the volume of 500-800 l/s.

### **9.2.2 Favourable environmental impacts**

Enhancement of ecological state

- runoff for ecological purposes in appropriate quantity and quality
- more stable semi-natural ecological condition of Tóció
- more diverse flora and fauna of reservoirs

Generation of favourable climatic conditions

The artificially created water surfaces (reservoirs) can provide space for a valuable flora and fauna, a diverse ecological system. The upper section of Tóció became astatic, drying up

more times due to the insufficient water stock. The change of the type of water regime is indicated by the loss of numerous species of flora and fauna or the fact that their population number decreased in a great extent. Ensuring the adequate ecological water demand this process could turn back and the semi-natural original state and biodiversity could be set back.

### **9.2.3 Options of multipurpose use of areas around Tóció**

Direct

- increasing the value of properties
- establishment of significant new building areas

Indirect

- citizens can use the managed shoreline
- recreational opportunities (shoreline of Tóció, sites around reservoirs)
- establishment of service provider businesses (job creation)
- attracting wellness and other recreational activities

In a well-managed, cultivated environment properties are getting more and more valuable than in slightly maintained areas.

A shoreline with parks provides aesthetic experience, recreational opportunities, semi-natural experiments, and places for knowledge dissemination and has positive impact on the quality of life. The well-kept environment inspires for an environmentally responsible attitude.

The planned cycle path, sport site gives the floor for an active life for citizens while contributes to the establishment of businesses providing services for recreational activities.

At the same time, these new businesses create new job opportunities as well.

## **9.3 Lessons learned from Aqua-Add project**

Participating in the Aqua-add project, the Debrecen team had the opportunity to see a wide range of problems and solutions and learn new approaches, methods and urban development plans. Some of them are potentially applicable in Debrecen not only in the near future but in a long term.

Good practices were studied by the Debrecen team, some of them were selected as useful and applicable in Debrecen, one of them was transferred. Practices applied by other Aqua-add partners in the field of stakeholder involvement and rainwater management were the most relevant ones - the good practice of Eindhoven has been successfully transferred and implemented in public events in Debrecen.

The issues concerning the urban rainwater management (good practice of Imperia) also seems to be very useful for similar problems so further discussion and reconciliation is planned with the Imperia partners.