



Horizon 2020 Societal challenge 5:
 Climate action, environment, resource
 efficiency and raw materials

BINGO

Bringing INnovation to onGOing water management – a better future under climate change

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Changes with respect to the DoA

The DoA only requires to compile the reports from the initial workshop, but since this is also done in MS24, it was decided to also include the M15 workshop in this deliverable.

Dissemination and uptake

Who will/could use this deliverable, within the project or outside the project

Short Summary of results (<250 words)

This report gives a summary of the reports of the first two series workshops of the BINGO project. The workshops were held at the six research sites in month 8 and month 15 of the BINGO project. The first series of workshops focused in risk identification, while the second series had preparedness at the heart of the debate.

Although the research sites are very different, they face, in the perception of the participants, very similar challenges as a result of climate change. What also becomes apparent from the workshop participants is the inherent complexity of the issues and the multiple reinforcing stresses from the same cause. Similar causes may lead to very different effects for different stakeholders in different circumstances. The effects are complex in nature and thus require solutions that are sensitive to complexity and uncertainty.

The fact that research sites deal with different issues in different constellations of stakeholders, with different future horizons in different policy and governance situations, makes a comparison between the research sites both challenging and interesting. In some cases, similar problems lead to different measures, because of different conditions. In other cases, similar measures are considered for different reasons or to solve different problems. Both similarity and difference allow for a great deal of learning from each other.

Evidence of accomplishment

Report

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1. INTRODUCTION

The Communities of Practice (CoPs) at the six research sites play a central part in the BINGO-project. Through the CoPs stakeholders are involved in the adaptation process, both contributing to the BINGO research and benefitting from the knowledge developed in the project.

The primary mode of interaction of the CoP members are the five workshops that take place throughout the BINGO-project. These workshops are planned for the BINGO project in order to create a strong and active local network for each of the research sites. The series of workshops were planned and agreed upon by the project partners at a meeting in Amsterdam 13-14th of October 2015.

The general purpose of the workshops is to keep the CoP informed about the project and to allow the CoP to reflect on, and contribute to the project outcomes. Building strong CoPs is also essential for the adaptation process beyond the duration of the BINGO-project. The workshops are instrumental to that purpose.

Each of the workshop also has a specific goal, which is reflected by the titles of the workshop:

List of workshops
M8 – “Setting the scene”
M15- “Are we prepared?”
M22 – “Yes we are!”
M28 – “ Solving the unsolvable”
M40 – “Wrap up national meeting”

This is a summary compilation report of the month 8 and month 15 workshops held at each of the research sites. In the chapters 2 and 3 a summary of the results of each of the workshops is given based on the workshop reports and Milestone 24. For WP5, to where this deliverable is assigned, the workshops are an important tool for the collaborative research on adaptation that takes place in the work package. Therefore, this reports focuses primarily on the substantial outcomes of the workshops. For more details on how the workshops were conducted, the full reports have been attached to this reports as annexes.

2. M8 WORKSHOP

2.1 Introduction

The M8 workshop is the first in the series and was labeled “Setting the Scene”. This workshop relates primarily to the work in WP6 and WP4 as it is the first establishment of the CoPs (WP6) and starts the discussion within the CoP on risk identification (WP4). The purpose of this workshop was threefold:

- Establish the Community of Practice and its expectations towards the project
- Establish a common understanding of climate change at the research sites
- Establish a common understanding of resulting risks at the research sites

A guiding powerpoint was sent out to all research sites with suggestions for the program and the group sessions, but the research sites were free to choose their own ways of achieving the workshop’s goals.

2.2 Participation

The six research sites had a total of 183 participants for the six M8 workshops that were held to introduce the Community of Practice for each research site. There were 75 women and 108 men, with a clear majority of men at three of the sites (Cyprus, Veluwe, and Wuppertal), and a more even distribution at the rest of the sites. Figure 1 shows the gender distribution per research site.

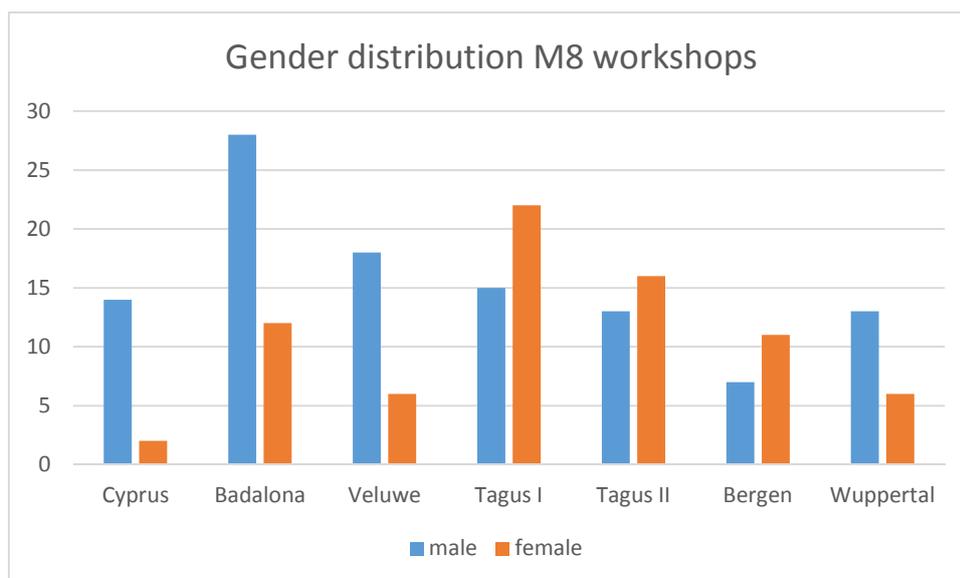


Figure 1: Gender distribution per research site for the M8 workshops

The workshop attracted a broad range of stakeholders from different institutions, sectors and type of organisations. Most participants were from policy bodies and authorities (government), followed by public and private research organisations (mostly BINGO partners). Different sectors such as tourism and agriculture were represented by corresponding associations. The ‘Other’ category consists of educational partners, an energy utility and a humanitarian organization.

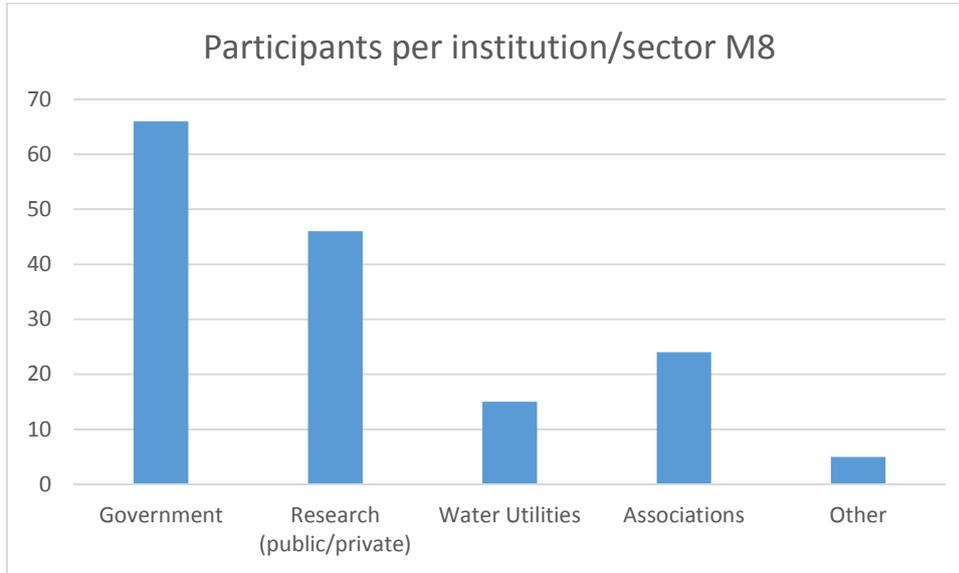


Figure 2: Participants per institution for the M8 workshops

One of the purposes of the Communities of Practice is to involve a broad number of economic and societal sectors. Table 1 shows the different sectors that were represented at the M8 workshops.

Table 1: Sectors represented at M8 workshops

Sectors represented at M8 Workshop
Agriculture
Environmental
Energy Supply
Estate Owners
Fishery
Government
Humanitarian
Irrigation
Research/Education
Tourism
Water Supply

2.3 Summary of outcomes

A central goal of the M8 workshop was to identify the key issues with regard to climate change (CC) risks among participants. Although the research sites are different in many respects, interesting links can be found among the key issues. The following paragraphs first outline the key issues based on the workshop reports and then provides a comparison of the different sites. Since the research sites were free to choose their own approach within the boundaries set by BINGO, the nature of the issues are somewhat different for each research site, but a relevant comparison can still be made.

2.4 Key issues identified by the CoPs

This paragraph provides a short summary of the key issues identified by the different CoPs, as an introduction to the individual research site descriptions.

The Cyprus case focuses on droughts, which affects both domestic water supply and irrigation. The CoP proved a valuable platform to exchange insights into the working of the irrigation associations.

The Wuppertal case deals with a broad range of issues as a result of both droughts and floods. This include flood prevention, the economic impact of climate change, the impact on agriculture and forestry, the impact on drinking water supply and the impact on leisure and tourism. Furthermore, the workshops focused on governance issues with regard to data and knowlegde gaps, information exchange and transfer and options for action.

The Badalona case considered the impact of flooding on buildings and infrastructure, leisure and tourism and urban drainage. The discussion on governance also identified issues outside the Badalona urban area.

In Bergen climate change will cause sea level rise, flooding, and variations in ground water level. This has, among others, an impact on tourism and waste water systems.

At the Veluwe, drought is the main issues, with short term drought affecting natural vegetation and long term drought potentially causing a decrease of ground water supply. More knowledge about the impact of climate change and about the Veluwe hydrological system is key to successful adaptation.

Tagus also represents a broad range of issues. They include saline intrusion, water scarcity, risks to water infrastructure services, risks to ecosystems. The affected sectors include tourism, agriculture and water infrastructure systems.

2.5 Cyprus: Peristerona Watershed

The Cyprus participants focused primarily on drought and drought management. The central issue is allocation of water resources under scarcity. This impacts commercial sectors, agriculture and drinking water supply. These issues are indirectly caused by climate change, and climate change makes the issues all the more pressing. The issues are an interaction between climate change and behavioral changes.

Climate change risks for domestic water supply

- Prolonged periods of drought (> 3 years) have put an increased risk on water quality and water supply.
- The increased water demand due to prolonged periods of high temperatures and the absence of alternative domestic water resources further increase the risk in terms of domestic water security.
- The reduction in water supply is mainly attributed to a reduction in surface water flows of the Peristerona River, which recharges the aquifers from which the communities pump groundwater; in Agia Marina the groundwater resources are not directly affected.
- Prolonged periods of drought will also have a significant effect on the Peristerona water supply borehole performance, e.g. for wet years: 17 m³/hour; for average years: 7-10 m³/hour, for drought years such as 2008: 0.7 m³/hour.
- Additionally, the high fluctuations in water supply create major pressure changes in the piped system, thus creating problems such as broken pipes and leakage losses, all leading to higher maintenance cost.

Climate change risks for irrigation

- Significant reduction in groundwater resources replenishment and performance of boreholes.
- Overexploitation of groundwater resources.
- Salinization of groundwater resources.
- Increase of water pollution due to reduced water flows (increased concentration of pollutants due to less dilution capacity).
- Reduction of irrigation water supply from river diversions
- Higher water demand for irrigation and livestock.
- Increased irrigation water demand for fodder crops due to lower precipitation and higher temperatures, which result in the reduction of natural (pasture) vegetation
- Higher temperatures result in more crop pests and diseases, which leads to increased use of pesticides affecting thus the quality of crop products and food safety.

- Climate change necessitates the use of recycled water with potential negative repercussions on the quality of soils and groundwater resources.

Additionally, stakeholders provided valuable insights in the structure and operation of irrigation associations including:

- successful examples in the area
- how they adapt to climate change
- economic viability
- technological level
- monitoring of water resources management (e.g. water metering, Water Development Department controls etc.).

2.6 Wuppertal

The participants at the Wuppertal workshop identified a broad range of key issues from flood protection to climate change, having both potential positive and negative effects. Impacts to both commercial, agricultural and drinking water supply were discussed.

2.6.1 Governance issues

Data base and knowledge gaps

- In current prognosis models, the influence of climate change (i.e. higher chances that weather extremes occur) is not sufficiently taken into account. Tools and prognosis models developed within BINGO should not only be as accurate as possible, but also transferable into existing systems. Beside forecasts on water quantity, also water quality and temperature should be taken into account.
- Knowledge gaps with regard to consequences of climate change are seen in the following areas: ecology, biodiversity, changes in soils and soil moisture, limnology, hydrological balance.

Information exchange and transfer

1. Role of institutions/stakeholders

- Data and information collected by different stakeholders/institutions should be shared as „open data“ (e.g. agricultural data regarding the application of pesticides and soil erosion could be used for forecasts of water quality). It has to be clarified how such data exchanges can be realized under compliance with data protection. Furthermore, responsibilities and realization of data treatment/polishing/provision have to be taken into account.
- To create a valuable basis for the coordination of different interests, available data could be prepared for different scenarios (i.e. more/less precipitation), naming responsibilities and roles of relevant stakeholders to find approaches regarding process, prioritization, impact, burden sharing.

2. Participation and information of the public

The public is generally very interested in topics related to water, a lack, however, is seen regarding proper information for the public. It was suggested to bundle public information to inform and increase the awareness of individual responsibility, whereas the following issues have to be clarified:

- Data treatment/presentation/bundling: available data (from different institutions/stakeholders etc.) should be summed and bundled, whereas data and

information should be treated and presented in a way that they are easy to understand even for non-technically educated citizens.

- Data availability and provision: it has to be clarified where data can be bundled by whom and how public access can be realized.

Needs and options for action

- Options for action should be based on the understanding that decisions regarding climate change and extreme weather events have to be made hand in hand by different stakeholders on different levels at different institutions. The following stakeholders were mentioned: urban development/planning, water management, legislative and regulating authorities, water boards, municipalities/cities/districts, agriculture, conservationist and the general public.
- It was emphasized that the legal framework (i.e. approval procedures) needs to be more flexible as such procedures are time intensive and limiting a fast response.
- Responsibilities within different stakeholder groups and institutions were found to be not optimal (e.g. drainage infrastructure as an asset of municipality not operated by Wupper Association).
- Options for action could be also adjustment/reassessment of target objectives (e. g. Water Framework Directive).

2.6.2 Impacts of climate change within the Wupper region

It was found that the extent of potential losses is assessed in a very subjective way. The issues of “individual responsibility” and “self-provision” should be in everyone’s mind, as for example costs caused by damages or for countermeasures have to be compensated by the general public. The following issues were discussed:

Flood prevention

- Extent of loss is dependent on position and altitude/elevation above ground level
- The runoff from roads in urban areas is not always optimal, additional floodplains are needed in urban area for short-time retention to avoid damages within infrastructures and individual property
- In case of heavy rainfall events: river quality is affected by runoff or storm water overflow discharge

Commercial impacts of CC in the Wupper basin

Water has a commercial relevance within the Wupper region. In case of long-lasting periods with low precipitation, conflicting use (provision of raw water for drinking water, industrial processes, power generation etc.) is seen as a challenge for water management. The following issues were discussed:

- Water temperatures may rise due to climate change and the increase of air temperatures and of precipitation, which leads to changes of ecosystems within the Wupper catchment; river temperatures and in some part river water quality can be “handled” by water management (opening/closing of dewatering conduits of the dams).
- Cooling systems might be affected (e. g. if water temperatures are too high, power stations cannot be run without warming water temperature above a critical limit = shut down)
- Operation of power systems (hydropower systems): decrease of power generation due to low water level

Agriculture and forestry

- Positive effects on agriculture: climate change might lead to higher temperatures and more annual groundwater recharge, and therefore to longer growing seasons.
- Negative effects: Immigration and spreading of new species and plants, increase of damages due to heavy rain and periods with low precipitation;
- Countermeasures might be: agricultural consulting services, crops sown under and alignment of furrows cross to the slope to avoid or decrease runoff from inclined fields in case of heavy rainfall events.
- Forestry is important as there are huge woodland areas in the Wupper river catchment; their positive effects are the avoidance of soil erosion and buffer in case of heavy rainfall events, the negative effect, however, is the additional water need of wooded areas in case of periods with low precipitations.

Drinking water supply

- During long-lasting dry periods: low level in dams and insufficient raw water quantity, problems with algae and algae-borne toxins due to higher temperature

Leisure activities/Tourism

- Prohibition of leisure activities (e.g. canoeing, fishing) in case of low water level due to low discharge periods

2.7 Badalona

The Badalona case displays key issues primarily related to sea level rise, flood risk, changes in groundwater levels and maintenance to sewer system. The impacted sectors are leisure and tourism, fishing, buildings and infrastructure, and urban drainage.

This is a compilation of the most important points from round-table discussions:

Effects on urban drainage

- The sea level rise (due to CC) is a factor that needs to be considered in the framework of the project due to its effects is some of the CSOs locations located in the beach.
- The variations in groundwater level is also a factor that can directly affect the urban drainage network.
- Importance of the cleaning tasks performed in the sewer network (currently it is not done as frequent as required due to resources/budget constraints).
- The sediments entering into the sewer network are a problematic issue that directly affects CSOs. The use of sediment traps located in strategic locations upstream in the catchment and also in the beaches is pointed out as a measure to prevent this problem.

Leisure and tourism

- Due to the high use of Badalona's beaches (both by its citizens and tourists) the effects that CC can have on the morphology of beaches (sand reduction, etc.) should be also considered.
- Due to the effects of CC on the coast morphology the legislation concerning the marine-land territory will need to be reviewed.
- The ships anchored in the harbor are also a source of pollution for the beaches.
- Fishery and aquatic life
- The fishermen's association is worried about the increase of marine litter, which has forced the fishermen to fish in farther locations from the coast.
- Importance to economically assess the adaptation strategies needed.
- The decrease of sea water quality (due, among others, to CSOs) directly influences the biodiversity of sea's species.

Buildings and infrastructure

- The increase of sea level and groundwater level also affects the vulnerability of buildings and other infrastructures.
- Factors that directly affect vulnerability: population ageing, increase of flooding areas, increase of groundwater level, etc.

Governance and adaptation

- Necessity to increase water taxes to meet all the requirements derived from current legislation (e.g. the Spanish RD1290/2012) that is starting to force local administrations/water services suppliers to reduce CSOs.
- Importance of the management of the 9 km² of non-urban area (Marine Mountains) that directly influences the city of Badalona in several aspects: production of sediments, biodiversity, etc.
- Important to consider the effects of all these changes in the Badalona's harbor.
- Necessity to educate/raise awareness of citizens on how their habits (e.g. to throw lots of rubbish to the bathroom) has also a direct effect on the sewers condition and finally on CSOs.
- Important to consider both the damages occurring during an emergency and also after that (post-emergency damage assessment).

2.8 Bergen

The key issues in Bergen include sea level rise, flooding, variations in ground water level, maintenance to sewer system. The impacted sectors are tourism, waste water systems. The Bergen report provided a concise overview of the opportunities and risks for both the drinking water and waste water sector (Table 2 & Table 3).

Table 2: Drinking water – opportunities and risks

Drinking water – opportunities and risks	
Opportunities	Risks
Enough water	Poor design values
Possibility to combine drinking water supply and hydropower production	Risk of water shortage
Improved circuit connectivity	
Possibility to interchange source dependent on water quality	

Table 3: Waste water – opportunities and risks

Waste water – opportunities and risks	
Opportunities	Risks
Separate sewers- keep up the level or increase rehabilitation	Urban floods due to rainwater
Holistic planning	Urban green space lost to urbanization
Increased focus on open stormwater solutions (avoid piping)	Not enough focus on increased precipitation volumes in the urban water sector design phase.
	Critical personnel not involved at the right time

2.9 Veluwe

The Veluwe key issues include a potentially vulnerable groundwater system, uncertainty in CC makes adaptation challenging, ground water levels and evapotranspiration rates, forest fire impact on drinking water extraction. The impacted sectors are leisure and tourism, drinking water supply, private land owners, agriculture, nature, residential functions.

Impacts of climate change

- More forest fires are expected, that might hamper the drinking water supply (access to the pumping stations) but also the introduction of foreign firewater.
- Changes in climate do impact on the evaporation in the area and also on groundwater levels and on changes in vegetation.
- Impacts are expected on the various functions of the research site; drinking water supply, agriculture, nature, recreation and residential functions.
- The research site the Veluwe is not capable of fully coping with the impacts of climate change. The system is not robust.
- Do we expect more drought periods or more extreme rainfall events or both?
- Climate change predictions have a high level of uncertainty and it is not clear what to expect for the (near) future. What is certain and what is uncertain.

Governance and adaptation

- There is mention of a maximum scenario 'Global Economy' for 2040 including a 30% increase in drinking water demand nation-wide. It is not clear how this will be realized. Strategic water reserves are presently being determined on a national and provincial scale.
- Insight of short term and long term impacts is needed to be able to manage the area.
- Water allocation and water management need more transparency and communication. Which water is earmarked for which purpose. How to deal with water from extreme events: drain or retain in the area.
- Education and training of future water managers need to address extreme events and the high level of uncertainty.
- A joint vision for the area needs to be developed. In this vision it also needs to be made clear for the non-experts (general public/laymen) what the impacts of climate change are and how these are addressed.
- The ultimate aim is to make the system more robust and resilient.

Knowledge and research needs

- There was general consensus about the need to share knowledge and expertise amongst the various stakeholders in the research area. This knowledge is required as a basis for proper management of the system to support the various functions the Veluwe has.
- Cooperation of all involved should be high on the agenda.
- Research is needed to fill gaps in knowledge and should focus on landscape scale. The knowledge collected should give insight in the impacts of various functions of the research site and the water system, impacts of extreme events and short term and long term bottle necks.
- Research should focus amongst others on the impact on the water system (including the impact of the urban areas), the water balance in relation to the vegetation and the flora and fauna, the groundwater recharge versus evaporation and potential adaptation measures.

2.10 Tagus

The Tagus Basin represents a broad range of issues as a result of climate change, including saline intrusion, water scarcity, risks to water infrastructure services, risks to ecosystems. The affected sectors are tourism, agriculture and water infrastructure systems.

The main thematic topics to be addressed at Tagus Basin have been identified as follows:

- Extreme events – Climate changes
- Agriculture – saline intrusion; water availability; agriculture efficiency; ecosystem characteristics
- Water Services – infra-structures; system resilience
- People and goods safety – land use; awareness; knowledge, end-users profile
- Policy/collective action – basin shared with Spain; control; competition/cooperation; land planning; management/decision; prevention.

Most “relevant” and “difficult” dimensions to address have been identified as follows:

- “Agriculture” and “People and goods safety” were perceived as the more relevant topics to address (i.e. water availability; new technologies and efficient and smart agriculture; nature based solutions implementation; awareness and communication with end-users and inhabitants).
- The most difficult dimensions identified were the “Water Services” and the “Policy and Collective action” (i.e. Tagus river Basin shared with Spain; saline intrusion; river banks occupation; aged infra-structures and water losses).
- The main concern to overcome has been expressed as the tension between “competition” and “cooperation” by different sectors and stakeholders around water availability, and between the different sustainability dimensions (economic, social, environmental and institutional).

Critical dimensions felt in past events and the foresight of “keeping versus change of impacts” if those events would happen again (based on floods events and use of green solutions) have been identified and discussed:

- In case of extreme events it is important to ensure alternative water provision as to ensure that consumers can take the water to their own houses;
- In case of extreme events, social media tools are crucial to facilitate collective actions (awareness, adaptive behaviors, etc.) but also to prevent alarm disruptive reactions. The use of ICTs (Information and Communication Technologies) is a tool that facilitates awareness and can promote collective organization;

- We can learn from the past with respect to green or nature-based solutions but also with their dependency on critical factors (i.e. political, financial and human resources).

Awareness and perception on specific events and users profiles (drought persona; small farmer; local teenager; policy maker) was built:

- Drought was identified as “silent” and “subtle” in its manifestations, as well as “unsparing” in its consequences. Even if selective at the beginning, it becomes more “in-depth” as it reveals.
- Small scale farmers are more skeptical to technological solutions to address climate change. They experience climate change impacts, even they do not theorize much about it. They are considerably more vulnerable than large-scale farmers mainly in what regards access to insurance and alternative organization protections.
- Teenagers are more environmental sensitive and generally ICT users. They are also more focused on direct impacts of climate change in daily life (i.e. mobility and commuting).
- Policy makers are very sensitive to their public image and to their public opinion and most focused on the immediate results of actions to be taken. Climate change is now a topic in their agenda, even though they don’t know yet what would be the best actions to undertake.

The results of the different exercises allowed to identify:

- A global and systemic understanding of the climate change impacts and its complexity;
- A complex, multidimensional and multiscale impacts chain at the Tagus Research Site;
- There are big challenges to “human capacity” to be addressed regarding adaptation to extreme events;
- Attention should be payed to solutions that create a “false feeling” of safety;
- Domains and sectors where some solutions can be found are different from the ones where the main impacts are expressed;
- Diverse approaches to the topic according to the specificity of stakeholders main activities (focusing differently the same topics);
- Diverse understanding and tensions of crucial concepts (i.e. floods/flooding/inundation; drought/pollution; dimension as causes/consequences/solutions; risk pressure/risk exposure/risk vulnerability/ risk perception);
- If past events that people lived would happen again, some critical points would nowadays be overcome, but certainly others would emerge as new;

- There are discrepancies among critical dimensions identified “in abstract” and their mapping (i.e. perception of critical topics and critical zones to go deep on data collection);
- There are general stereotypes and “caricatures” of users profiles that show up motivation to go deeper on their exploitation and better understanding.

2.11 Comparison

Although the research sites are very different, they face, in the perception of the participants, very similar challenges as a result of climate change. Most of the challenges occur because of too much water (floods) or too little water (droughts). But some of the sites also report challenges due to increase in air and water temperature, causing for instance issues with cooling for electricity production.

Floods are a primary concern in Bergen, Badalona, the Wupper Basin and Tagus Basin and of lesser or no concern in the Peristerona Watershed and the Veluwe. Droughts are a primary concern at the Veluwe, Wupper Basin, Tagus Basin, Peristerona Watershed and of lesser or no concern in Bergen and Badalona. The Wupper Basin and the Tagus Basin therefore have the broadest range of issues. They are both large river basins which typically means a wider more complex range of issues.

In the drought cases there is a distinction between immediate impacts, such immediate decline of water quantity, decline of vegetation, decline of water quality or forest fires which targets a broad range of sectors; and long term impact, such as the changing groundwater levels at the Veluwe.

In all of the drought cases, the participants note the immediate distributional issues that arise. Who gets priority in using the remaining water? How does the behavior of the one sector affects the other? This is also represented in the Tagus Basin case, where “policy and collective action” and the balance between “competition and cooperation” were mentioned as difficult issues. Interesting links can be made to see how actors deal with these issues in the different institutional contexts that the research sites provide.

What also becomes apparent from the workshop participants is the inherent complexity of the issues and the multiple reinforcing stresses from the same cause. For instance: from the Cyprus case it becomes apparent that increased temperature leads to decline in water supply and an increase in water demand. Also, it leads to an increase in the use of pesticides, which affects the quality of the available water supply.

But the effect of temperature is not one sided. In the Wupper Basin, a rising temperature may lead to increased water flows and longer growth seasons. In the Veluwe case, dry summers may lead to less vegetation and so less evapotranspiration and an increased groundwater inflow.

As becomes apparent from the Wupper Basin workshop, flood prevention also causes all sorts of distributional issues, mainly because flood paths can target very specific groups, while flood protection often has to be financed by the public. In the cases of Bergen and Badalona, floods causing CSO's have a broad range of negative effects on all sectors present in the area. These

issues also shows a strong interaction with existing infrastructure design (combined sewers), human behavior (using sewers as 'garbage cans') and neighboring issues such as water use and pollution.

This is by no means a full comparison but it shows some important insights for BINGO:

- Similar causes may lead to very different effects for different stakeholders in different circumstances. The effects are complex in nature and thus require solutions that are sensitive to complexity and uncertainty.
- Despite the differences, there is a notable overlap in issues, which make for interesting comparison in the BINGO project.
- The involvement of the CoP is necessary for assessing the complexity of the system and developing matching adaptation strategies.
- Distributional aspects of the issues and the solutions must be understood to be able to develop good adaptation strategies.
- There is among the participants a need for knowledge of climate change in their region that is accessible and intelligible for non-experts.

2.12 Challenges of the CoPs

The BINGO project aims to create Community of Practices at each research sites that will enable a strong interactive collaboration between researchers and end users. Enhancing this interaction is one of the main goals of the BINGO Project. Creating strong CoPs is vital to succeed with this objective. Based on this first round of workshops these challenges faced at the workshops have been summarized in two groups; technical challenges, and non-technical challenges. The technical challenges include practical things around the organization of the workshops, the facilitation of the use of different tools, and application of tools and resources. The non-technical challenges include all issues related to human-human interactions, creating a secure atmosphere for communication, facilitation of good, open, and clear communication, and active involvement from the participants.

Technical challenges

- Time management of the CoPs, how to ensure that there is sufficient time for discussion and input, while keeping to the agenda/allocated time. This resulted in that some reported that the intensive co-production and lack of time to go deeper into some topics, due to the richness of the contributions, and the interest of participants to continue the discussions.
- Tools/methods/resources to allow for more discussion and interactions
- Use of Basecamp to animate the CoP, specific ideas of what to post /frequency etc.

- How to facilitate interactions and learning between the CoP at each research site

Non-technical challenges

- Committing time to participate in the CoP – several CoPs reported that though the participants were interested and found the topics interesting and very needed it was difficult to get the participants to commit to CoP in a busy schedule.
- Some participants had doubts about how efficient and successful the interaction of beneficiaries between countries could be.
- Formulation of questions to facilitate interactions and discussion around the table
- How to facilitate interactions and learning between the CoP at each research site

The participants were also asked what they considered the most positive and most negative aspects of the workshops. The replies are summarized below:

Most positive aspects of the workshops:

- the good ambiance between stakeholders, their interest in BINGO research development and the richness of relevant knowledge co-production.
- While coming from a more abstract approach to critical dimensions towards their “real mapping”, a relevant joint perception began to be built but also relevant knowledge and communication gaps have been identified.
- Excellent representation of the stakeholders/end-users groups previously identified
- Good channel to “officially” present the BINGO project to stakeholders and end-users.
- Basecamp as communication channel can enhance discussion over time
- The most positive was getting a wide range of stakeholders together around the same table for discussion. Face to face meetings enables a better and deeper understanding of the various view points and interests.

Most negative aspect of the workshops:

- the intensive co-production and lack of time to go deeper into some topics, due to the richness of the contributions and the interest of participants to continue the discussions.
- The most negative aspect of the workshop was the fact that even though all want to be invited to the future activities, only few actually full-heartedly said yes to the CoP.
- The formulation of much more focused or orientated questions would have facilitated the intervention of all the people during the round table.
- it appears difficult to get all participants to commit to a CoP in a busy schedule.
- There were also doubts about how efficient and successful the interaction of beneficiaries between countries could be.

3 M15 Workshops

3.1 Introduction

The M15 workshop is the second workshop in the series and was labeled “Are We Prepared?”. The workshop was part of WP5, mainly T5.1 and T5.3. The workshop forms an important step in identifying relevant adaptation measures which can be further analyzed in T5.2. It also allowed the CoP to reflect on the policy and governance issues that were addressed in the stakeholder interviews that were part of T5.3. Finally, in accordance with the Road Mapping approach, visioning was introduced as a method to identify desired and undesired futures from the perspective of climate change adaptation.

The purpose of this workshop was fourfold:

- Keep the CoP updated on the BINGO-project
- Develop future visions for adaptation at the research sites
- Identify adaptation measures to address climate risks
- Discuss policy and governance for adaptation at the research sites.

A guiding powerpoint was sent out to all research sites which suggestions for the program and the group sessions, but the research sites were free to choose their own ways of achieving the workshop’s goals. Also, a portfolio of adaptation measures was prepared and distributed as a starting point for discussion in the CoP. Finally, the preliminary result of the interviews on policy and governance was shared with the CoPs to be discussed.

3.2 Participation

A total of 138 people attended the M15 workshops at the six research sites of which 84 men and 54 women. Figure 3 shows the distributions per research site. Cyprus, Badalona and Wuppertal showed most skewed distributions, with Tagus being most successful in attracting female participants. Bergen shows the most balanced distribution, with the Veluwe somewhat in between.

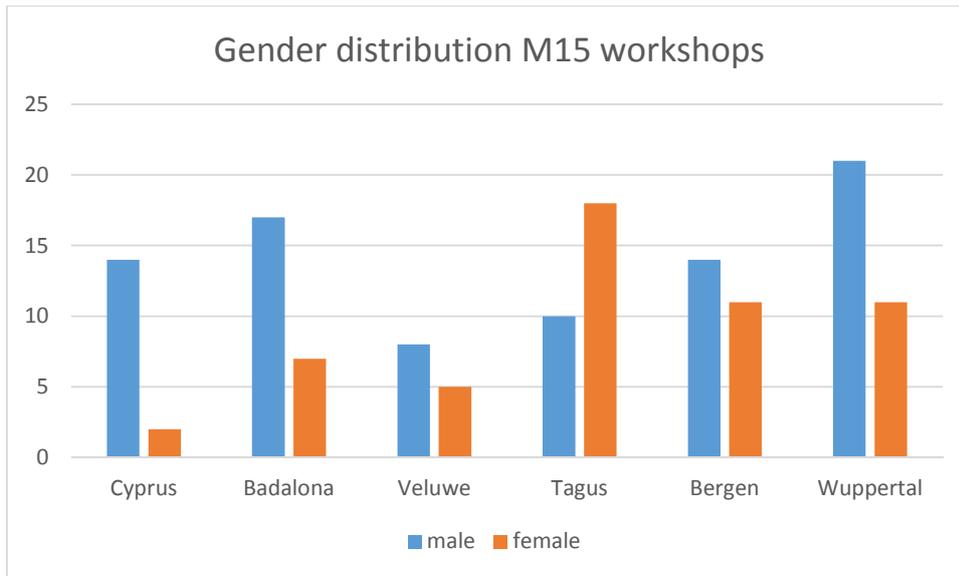


Figure 3: Gender distribution M15 workshops

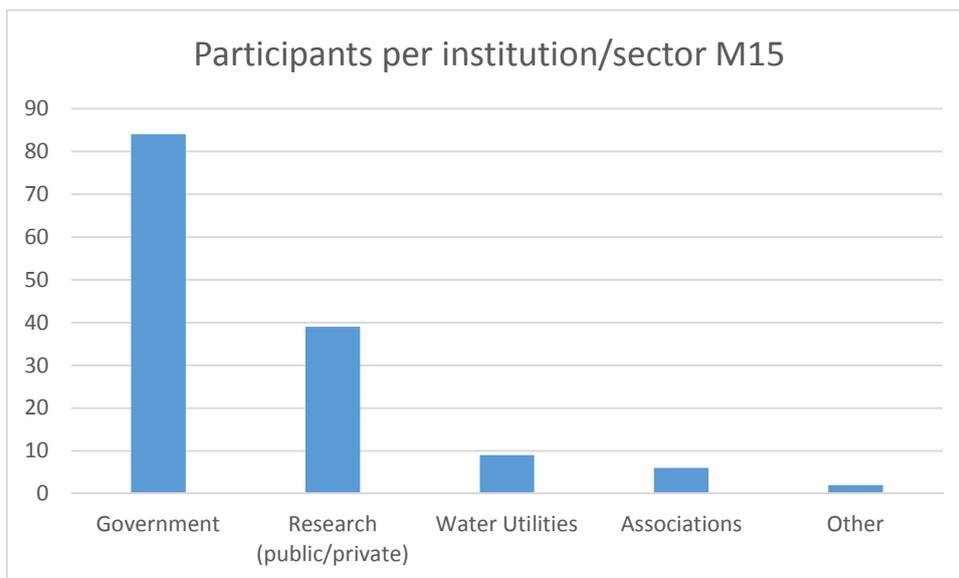


Figure 4: Participants per institution/sector M15 workshops

The background from the participants is more heavily skewed towards government and research (see Figure 4) than in the M8 workshops. This also slightly affects the sectors represented at the workshops (see Table 4), compared to the M8 workshops.

Table 4: Sectors represented at M15 workshops

Sectors represented at M15 Workshop
Agriculture
Environmental
Energy Supply
Fishery
Government
Irrigation
Research/Education
Tourism
Water Supply

3.3 Summary of outcomes

The following paragraphs give a short summary of the outcomes of the workshops, based on the workshop reports. A central goal of the M15 workshop was to develop future scenarios (best case and worst case) and to identify adaptation options based in these scenarios. Finally, the CoP's could take the opportunity to discuss the first policy and governance analysis from T5.3. Again, the CoP's were free to choose their own approach, to achieve the goals set by the BINGO project.

3.4 Cyprus Peristerona Watershed

The Peristerona CoP discussed the policy and governance interviews, but there were no comments to the work done. The main results from the workshop are the identification of future developments (both positive and negative) for agriculture and domestic water supply and, based on that, the discussing and scoring of potential adaptation measures.

3.4.1 *Perception of stakeholders and possible future developments*

The participants worked on pessimistic and optimistic future developments for both agriculture and water supply, based on the current expectations of climate change, drought in particular. The results are presented in Table 5-8. The arrows indicate a causal relation to the next development, a plus indicates a combination of outcomes.

Table 5: Agriculture - Pessimistic Views

Agriculture (Irrigation) – Pessimistic views	
Groundwater wells will dry	→
No seasonal crops (trees) The type of crops will be affected	→
Agricultural production will be minimized	→
Production cost will increase Livestock production will be negatively affected	
Dependence on foreign agricultural products Import dependency	→
Destruction of the natural environment (flora and fauna) More people will move from the countryside to urban areas (urbanization) Rural communities will be abandoned Fires Erosion	+
Desolation of rural Cyprus – deserted landscape Rural abandonment If the measures we are taking fail, rural areas will become desert	+
Change of occupation – less farmers	→
Minimization of the agricultural sector There will be no farmer	

Table 6: Agriculture - Optimistic views

Agriculture (Irrigation) – Optimistic views	
Increase public awareness on water conservation	→
Cease wasteful irrigation water use Rational water use	→
Improved (smart) irrigation systems	→
Plant according to the needs (demand) of the market Plant crops with less water requirements Plant rain fed crops Plant crops with better market value	→
Better planning by the Ministry of Agriculture to help farmers Government provides assistance and incentives to farmers	→
Public awareness on the benefits of dietary consumption of local products	→
Construction of a dam Use of recycled treated water for irrigation	→
Land consolidation to create economies of scales resulting in less wasteful irrigation water use Irrigable land consolidation with larger plot areas and more appropriate conditions/infrastructure (e.g. roads)	+
Organization of agricultural production Professional standards for farmers / Professionalism	

Table 7: Domestic Supply - Pessimistic Views

Domestic Supply – Pessimistic views	
Poor hygiene	+
Poor water quality	→
Social problems with communities' residents	→
Reduced residential and commercial development	→
More frequent damages to water supply network	→
Additional financial cost	→
Environmental degradation (less green spaces)	

Table 8: Domestic Supply - Optimistic Views

Domestic Supply – Optimistic views	
Better water quality	+
Secured water supply network	→
Residential development	→
Better quality of life	→
Maintenance of small-medium enterprises and more job opportunities	→
Savings of financial resources (at the community level)	→
More green spaces	

3.4.2 Existing and potential climate adaptation measures

Table 9 and

Table 10 show adaptation measures to droughts and a hierarchy of preferred measures according to the perception of stakeholders. In total, 18 adaptation measures to droughts were pre-selected by the research team, 10 for irrigation and 8 for domestic supply. Stakeholders were asked to return to their sectoral groups and discuss each measure. Stakeholders were then asked to vote for the preferred adaptation measures of their sector. Each stakeholder received half the votes (stickers) of the total number of preselected measures, i.e. 4 votes were given to stakeholders in the domestic supply sector and 5 votes to the irrigation group. Stakeholders could allocate their votes to any measure, including multiple votes to one measure.

Table 9: Adaptation Measures for Irrigation

No.	Adaptation Measures for Irrigation (votes by 7 stakeholders)	Existing	Relevant	Feasible	Votes
1	Improved irrigation (scheduling) technologies	I	I	I	4
2	Installation of water meters on groundwater pumps	x	-	-	2
3	Water pricing enforcement	x	-	-	1
4	Use of treated sewage water	x	I	I	7
5	Farm education	I	I	I	3
6	Code of Good Agricultural Practices enforcement (including pesticides)	I	I	I	1
7	Use of drought tolerant agricultural crops	x	I	I	3
8	Integrated livestock waste management	I	I	I	
9	Groundwater recharge systems	I	I	I	3
10	Improve irrigation divisions cooperation	-	I	I	2
11*	Improve infrastructure (dam construction and convey network)	x	I	-	9
<i>I = Yes, x = No, - = Disagreement</i>					
<p>* This measure was suggested by stakeholders but not everyone agreed. In particular, farmers in the midstream area of Peristerona watershed (Orounda) are in favour of constructing a dam for irrigation, but farmers further downstream are against it, as less water will flow and recharge groundwater, i.e. the only source of water for irrigation.</p>					

Table 10: Adaptation Measures for Domestic Water Supply

No.	Adaptation Measures for Domestic Water Supply (Votes by 3 stakeholders)	Existing	Relevant	Feasible	Votes
1	Domestic water saving equipment	1*	1	1	4
2	Maintenance and modernization of water distribution networks	×	1	×	2
3	Rainwater harvesting systems	×	1	1	2
4	Treated sewage water for green infrastructure	×	1	1	1
5	Water desalination	×	1	×	
6	Integrated livestock waste management	×	1	1	
7	Awareness campaign for local society	1	1	1	3
8	Improve stakeholders' cooperation	1	1	1	
<i>1 = Yes, × = No, - = Disagreement</i>					
* Domestic water saving equipment exist but not in every household					

3.5 Wupperverband

The Wupper CoP had three group discussions organized around three themes:

- Water use/water abstraction (drinking water, water for cooling system and hydropower plants)
- Flood protection and land management
- Human, economy and environment

The participants were invited to provide input and discussion on selected topics.

3.5.1 Water use/abstraction

The main focus of this discussion was water use related to *drinking water supply, temperature, and power plant operation* (i.e. hydropower plants and cooling processes).

This is consistent with the main water use categories relevant for the Wupperverband, namely, service water, domestic water, and process or industrial water (raw water is the sum of domestic and process or industrial water).

The discussion was divided into two main categories: a) goals and b) measures. Under “goals”, it was discussed which aspects were (most) relevant: Water quality (especially for raw water) is from the stakeholders’ perspective very important. Related actors should ensure security for drinking water supply at reservoirs and streams and water bodies. Water temperature was found to be an important parameter as well; under this aspect, ecological issues become more relevant. Finally, sufficient water quantity for drinking water supply, water management (including service water), and environmental and industrial purposes was mentioned as a third scope. However, water quantity (e.g., minimum river discharge for ecological flow) also depends on water temperature, and water temperature on water quality, so there is a clear and strong synergy between these aspects and the related actors.

Under “measures”, several aspects were discussed in the frame of climate change and BINGO approach. From a political point of view, fast processing from approval phase for taking action during extreme events were mentioned as one of the most relevant aspects. Furthermore the Water Framework Directive was mentioned with regard to reassessment/adjustment of target objectives (achievement of appropriate qualitative and quantitative status of water bodies). Also, inclusion of prioritisation by extreme situations, which is apparently not yet well defined in the planning approval should be accomplished.

From a technical perspective, and as climate change is characterized by uncertainties, forecasting enhancement for reservoir management (to guarantee water supply and ecological flow during dry periods and enough capacity for flood protection during high flows) is

necessary. A more accurate prediction of hydrologic uncertainties is also crucial, which is one of BINGO's aims. As a result, preparation and adaptation for future trends for temperature management (e.g., for reservoir management, water supply for process or industrial water, and ecological flow) -considered as a relevant approach- could be achieved. Sediment deposits in the reservoir systems was mentioned as an additional impact due to intense precipitation; thus, assessment of existing systems and (if necessary) further expansion of hydraulic structures (such as drainage systems) could be implemented.

Improvement of cooperation between sectors, e.g., agriculture, forestry, and water sectors is also important to define the most vulnerable elements and to develop strategies that benefit all. Finally, financial support was cited as pertinent for implementation of different measures, whereas it was found to be useful if available information about financing options or subsidies were bundled.

3.5.2 Flood protection and land management

Various objectives in the context of climate change regarding different topics and relevant difficulties in achieving and implementing appropriate measures were discussed. In addition, potential contributions from BINGO's work were considered.

In the field of forestry, the reduction of storm damages as well as drainage protection in the forest (which is not a big issue for closed tree stands) were mentioned. A corresponding measure (with long lead time) is e.g. the increase of the stocks of "climate adaptive" tree species.

In the field of agriculture, the aim of erosion reduction during periods of drought was mentioned, which could be reached by an "intelligent" increase in tree populations and better cultivation management practices for agriculture.

A general theme was the safeguarding of water resources in drought times. For this purpose, the use of rainwater could be a relevant approach, but its practical usefulness still needs to be examined further, as well as the generation and use of interconnected water supply systems.

Most of the discussion focused on the goal of protection against stormwater events in urban areas (e.g. the capping of "peaks"), whereby the concepts of "classical" floods (fluvial) and stormwater flooding ("pluvial") must be clearly separated since they relate to different risks. Here, urban planning was named as a key activity field for providing retention areas for stormwater management e.g. through multifunctional land use solutions (thus increasing the potential for "storing" large amounts of rainwater in the urban space). However, competing interests as well as questions about the legal situation and responsibilities/liabilities were mentioned as hindrances. The strengthening of the "self-protection", i.e. utilizing the

responsibility of the citizens, was discussed as a further important area of action. Here, the creation of risk maps is of great importance, since "hot spots" can be identified (with the associated modelling uncertainties have to be made transparent). Further measures are the modelling and use of emergency waterpaths, the greening in the urban area (e.g. "green roofs") as well as landscape planning in general (in order to plan the "external" parts of the urban area cooperatively and to integrate them into the stormwater management).

Various hydrological modelling efforts/ scenarios (such as the changes in water levels caused by climate change, the effects of surface sealing, evaporation reduction, roof greening, erosion, etc.) were discussed as potential contributions by BINGO. In addition, economic investigations would help by comparing the cost of measures to the reduction of damage costs, as well as investigations into the use of information regarding stormwater flooding risks by citizens and related problems. Finally, an institutional investigation seems helpful for identifying the barriers and potential solutions for a stronger connection between urban planning and the management of water / multifunctional land use in urban areas.

3.5.3 *Humans, economy and the environment*

The focus was set more broadly on the "sustainability perspective", i.e. the three dimensions of sustainability. Hence, objectives for possible measures were discussed in a more general way. For example, the possibility for measures addressing more than one objective were highlighted, and the notion that environmental objectives, especially regarding the overall functionality of the ecosystems, should not be neglected. Also, the group discussed the importance of creating awareness for decisions taken, and explaining the underlying objectives to non-experts too. Very specific objectives/framework conditions applicable to the Wupper region were listed, namely:

- Specific objective: Guaranteeing the functionality of the drainage and sewage systems.
- Framework condition: Guaranteeing minimal flows not only for the environment, but also the functionality of the sewage treatment plant.

Beside these general objectives, several possible conflicts and criteria for the prioritization of measures were being discussed:

- Prioritization: Drinking water for the human population will be prioritized in any event.
- Conflict: E-Flows vs. security of supply.
- Conflict: Keeping free capacity in dammed reservoirs for safeguarding against heavy precipitation events vs. security of supply.

Also, it was mentioned that to solve critical issues, conflicts of interests should be clearly mapped and catalogued, considering ethical questions.

Finally, concrete measures were proposed and discussed, which were:

- Depicting risks (especially for flooding) in risk and hazard maps, and the economic consequences of doing so (i.e. the balancing the interests of the individual, whose property might be devalued, with the interests of the general populace of being informed about the spatial dimension of risks/hazards).
- Better linking and connecting dams and dammed reservoirs, and adapting the management to new hydrological trends.
- Integration of flood protection much earlier in planning processes of all departments (e.g. regional environmental planning).
- Creating awareness and concrete guidance/procedures for the general population.
- Defining "minimum requirements" for drinking water for private persons, and defining (and pricing) everything above as "luxury".

3.6 Badalona

The Badalona CoP reported results of three activities from the workshops:

- Group visioning activity: What is the desired end state for 2066?
- Discussion on preparedness based in the risks identified in the M8 workshop.
- Discussion on Policy and Governance.

3.6.1 Visioning: what is the desired end-state for 2066?

In group sessions, the Badalona CoP developed a nightmare and dream scenario for the long term future (50 years).

Nightmare scenario

This is the compilation of the reported visionary end state in terms of **effects**:

- More intense and frequent urban flooding, especially in the area between the C31 road and the railroad track
- Higher risk for people's safety
- Impacts on road infrastructures: urban public mobility affected
- Higher social alarm
- Urban furniture affected
- Sudden collapse of pavements
- Higher pollutant spills on beaches: more polluted sediments, longer and more intense impact duration, etc.
- Decrease of beach areas (loss of sand)
- Higher CSO events: higher number of days with beaches closed with the corresponding impacts on tourism, leisure and directly on benefits for tertiary economic sector
- Lower phreatic resources
- Problems with odors due to the accumulation of pollutants in the sewer system (sediments and others)
- Economic and material damages

This is the compilation of the reported **causes** leading to this nightmare scenario:

- Lack of infrastructures (adequacy of the urban drainage system)
- Lack of cleaning tasks
- Lack of optimal control of existing infrastructures
- Non-optimal environmental management: lack of green infrastructures, etc.
- Lack of emergency protocols towards flooding or pollution episodes in beaches
- Lack of coordination between administrations

- Lack of investments
- Lack of dissemination: of causes and effects, but also of tax burden
- Lack of sensibility/awareness
- Lack of long term perspective
- Lack of solutions against CSO
- Lack of inlets
- Increase of sea level
- High slopes between the highlands and the sea

Dream scenario

This is the compilation of the reported visionary end state in terms of **effects**:

- Less flooding and CSO episodes
- Less vulnerability regarding flooding and impacts on receiving waters
- Coastal areas in optimal situation for social uses
- Reduction of pollutant discharges into receiving waters
- Higher available resources (budget) for local administrations
- Better quality of life
- Integrated management of the network
- Less climate change than expected
- Higher water resources due to rainwater harvesting

This is the compilation of the reported **causes** leading to this dream scenario:

- Improvements on the sewer network: maintenance and investments
- Investments on retention tanks (according to what was defined in the Drainage Master Plan)
- Increase on the infiltration capacity of the city (also in the upper parts of the city: headwaters, etc.)
- Rainwater harvesting in buildings
- Improvement on the superficial drainage
- Cleaner city (better cleaning practices and better civility)
- Higher economic activity leading to more available resources
- Interconnection of networks
- Regional policies for local development of adaptation strategies
- IT technologies for the optimal management of the sewer network
- Better weather predictions

- Reaction from society
- Implementation of mitigation and adaptation strategies
- Complete consciousness about climate change, leading to a prioritization of necessities and a corresponding funding
- Clear action protocols against emergencies (flooding and environmental impacts)
- Coordination between administrations and participation of the civil society
- Important dissemination activity among all the stakeholders and citizens
- New investments: retention tanks, sewer network enlargement, control gates, CSO treatment, etc.
- Early warning systems
- Mechanisms for dynamic management of infrastructures (active control)
- Efficient maintenance

Table 11 and Table 12 compile the main causes and effects reported for each scenario:

Table 11: Badalona Nightmare Scenario 2066

NIGHTMARE SCENARIO		
AMBIT	CAUSE	EFFECT
Natural	<ul style="list-style-type: none"> • Accumulation of sediments in the sewer network • Change in land uses in the Serra de Marina (decrease of infiltration capacity) 	<ul style="list-style-type: none"> • Problems with bad odours in the urban area • Increase of pollutants in beaches • Decrease of beach areas • Increase of sediments wash-off • Worsening of the overflow structures functionality • Worsening of the marine environment • Increase of flooding episodes • Decrease of tourism (decrease of incomes) • Economic and material damages
Governance	<ul style="list-style-type: none"> • Lack of investments from the administration • Less ability/possibility to collect taxes 	
Social	<ul style="list-style-type: none"> • Lack of information to citizens • Lack of social awareness 	

Table 12: Badalona Dream Scenario 2066

DREAM SCENARIO		
AMBIT	CAUSE	EFFECT
Natural	<ul style="list-style-type: none"> • Improvement of the non-urbanized land • Increase of infiltration capacity (SUDS) • Riverbanks maintenance 	<ul style="list-style-type: none"> • Flood reduction • Reduction of CSOs • Better quality of marine environment and beaches • Tourism increase • Elimination of (bad) odours • Increase of incomes due to the tourism sector
Governance	<ul style="list-style-type: none"> • Application of the measures proposed in the Drainage Masterplan (retention tanks, inlets increase, etc.) • Development and application of integrated operation and cleaning plans • Investments on cleaning and maintenance tasks • Local initiatives for water reuse 	
Social	<ul style="list-style-type: none"> • Increase of knowledge and civility of citizens 	

3.6.2 Discussion on preparedness

The portfolio of adaptation measures that had been developed jointly by Aquatec, CETaqua, Ajuntament de Badalona, Aigües de Barcelona and AMB were presented just with a short definition of each one of them and the risk addressed. The adaptation measures were presented according to their applicability location: on source measures, within the sewer system, within the WWTP, end-of-pipe and within the receiving waters.

A total of 25 measures were presented. From these measures, the following were identified as the most feasible ones:

- Erosion control in rural catchments
- Well-designed (and maintained) on-source sediment traps
- Inlets increase
- Siphonic inlets/gully pots just if they are properly maintained (otherwise they can cause problems with mosquitoes).
- Smart cleaning (not just corrective)
- Sustainable Urban Drainage Systems (SUDS) / nature-based solutions
- Domestic rainwater harvesting
- Flood barriers
- Modification of some problematic CSOs structures
- Retention tanks (according to the last Drainage Master Plan)
- Cleaning of river banks
- Integrated management (coordination with WWTP)
- Early warning systems and emergency protocols
- In general measures to avoid nuisances to citizens due to odors coming from the sewer system

On the other hand the following measures were identified as unfeasible for the Badalona case-study:

- Rebuilding of combined sewer systems to separate sewers and prevent CSO: too complex and expensive to apply in Badalona were most of the network is combined
- Cleaning boats: non-efficient measure

3.6.3 *Policy and Governance discussion*

It is agreed that the current context of Policy and Governance in Badalona and at an upper scale in Catalonia and Spain is not the most optimal one to support adaptation to climate change initiatives.

It is true that the “diagnosis” of climate change has been widely disseminated (COP 21, etc.) but now is time to take action and start applying mitigation and adaptation measures.

Regarding adaptation measures, it is missed an objective funding program to start implementing them, so that local administrations had resources to implement them.

Maybe in Spain the main focus has been the effects of droughts to the different economic sectors, especially the agriculture sector.

At local level there are some initiatives such as the “Local plans for climate change adaptation” developed by some municipalities, such as the ones developed in some municipalities belonging to the Metropolitan Area of Barcelona.

Water is a political priority but must be properly addressed.

Maybe the current water taxes cannot afford all the required infrastructures, etc. to face the consequences of climate change. In case water taxes were increased it would be required a deep dissemination/awareness campaign to well explain which issues these taxes address: new investments, etc. and specially to explain the benefit behind each adaptation measure (cost-benefit analysis).

The citizen participation is crucial in the decision-making processes (transparency on water taxes-investments). For example, to submit on referendum which, from a list of possible adaptation measures, to apply.

3.7 Bergen

The CoP in Bergen worked on the workshop goals in three sessions:

- Visioning
- Preparedness
- Policy and governance

Each group session was followed by a general discussions. The results are reported in the following paragraphs.

3.7.1 Visioning

The participants were divided into smaller groups and asked to perform a visioning of their: 1) nightmare scenario and 2) dream scenario for both storm water and water supply The results are reported in Table 13 and Table 14.

Table 13: Summary of group discussions on visioning of stormwater

Storm water	
Nightmare scenario	Dream scenario
<p>Projections of climate change become reality. The population increases and urbanization (including densification of cities and more paved surfaces) continue. There is more storm water and stronger runoff. Our system cannot handle the new conditions and our flood paths are not working. There is an increased risk for flash floods, which leads to higher risk for health, safety, mobility, damages, etc. Insurance companies become more restrictive and the trust in responsible parties is weakened. The political, legal, and financial conditions weaken our planning system and the plans we have are not good enough.</p>	<p>We have adequate flood paths that directs the water safely away from where it can be of harm. We are successful in separation the sewage system and manage to implement blue-green solutions (not buried). The blue-green solutions result in better living conditions for those living in the densest city areas. The public authorities take responsibility and manage to reduce the frequency of random dispositions. We are successful in communicating knowledge and create a common understanding of why there are requirements to urban development.</p> <p>How do we succeed?</p> <p>In order to secure safe flood paths we need the right knowledge: sufficient data, prognoses, and tools. Communicating risk analyses is very important. We need to incorporate high-level plans for water and wastewater into the public plans, and early establishment of stormwater strategies in superior plans. We need to develop regulations to improve the legal orientation.</p>

Table 14: Summary of group discussion on visioning of water supply

Water supply	
Nightmare scenario	Dream scenario
The population increases substantially and so does the water consumption / demand. We are not able to reduce the leakages in our distribution network. The water reservoirs are more exposed due to population growth and urban development. Water reservoirs located close to the city are 'sacrificed' to urban development.	The precipitation increases in line with increased water demand. We are successful in leakage reduction. We protect our water resources and export the water we don't need.

Main results from the plenary discussion that followed:

- Communication is key: we need to communicate well and make sure that we have confidence and trust
- Political: We need to take advantage of political will to allocate financial resources to climate adaptation
- Interdisciplinary: We need to work interdisciplinary and closer with other sectors, such as roads and railway who have suffered from large damages caused by flooding. We have a lot of data that we can make more use of in our planning. We need to work hard on connecting plans (e.g. areal plans, water, wastewater and stormwater plans).
- Uncertainty: big decisions are taken on the basis of data with large uncertainties. We need to use our planning tools to capture this uncertainty: it needs to be captured at the local level, it cannot be political.
- Emergency preparedness: we need to do risk reduction measures. It is the Agency of water and sewerage's responsibility to communicate the risk to the actors that are responsible for implementing the measures.

3.7.2 Preparedness

Next the CoP discussed preparedness around a set of prepared questions:

1. By which principles does Bergen manage consequences of climate change, prevention, and compensation? Are these known?
2. What consequences of stronger runoff will be relevant for inhabitants, companies, insurance sector, etc.?
3. How is this communicated to relevant actors and what are relevant measures from their side?
4. Does the county governor have any input?

5. How is insurance policy and regulations prepared for changes?
6. To what extent are probabilities included in emergency plans? Is it communicated to exposes parties?
7. Are there tools for receiving, systemizing, and utilizing information from users?

Main results of the discussion:

Bergen is leading (in Norway) with regards to blue-green solutions. Such principles are important and need to be “guarded” and transparent to the politicians. Interdisciplinary cooperation is key.

Bergen is continuously working on “ROS”-analyses (risk and vulnerability analysis) and communicating them to the public. It is challenging to move from high-level plans to more local plans but it is done because it will improve knowledge and make it easier to communicate the reason for certain restrictions. While developing local plans it is important to have in mind how these plans will be used and communicated.

Insurance companies are working on reducing their responsibility, and this will be a challenge in the time to come. How can the municipality approach this? Increase water fees? It is the insurance sector’s opinion (or argument for lower responsibility) that the municipalities are not doing enough. It needs to be communicated to the insurance sector that this is not true, and that the situation is not as bad as they portray it. It was noted that the insurance sector should invited and present at the next BINGO workshop in order to communication on work towards a solution that works for all.

3.7.3 Policy and governance

The questionnaire on policy and governance and the results were presented by the research partner. The filling out of the questionnaire prior to the workshop had identified some governance gaps that were the subject of the following plenary discussion. Adaptation measures to close governance gaps, success factors, possible conflicts of interest, and crucial partners in order to close the governance gaps were discussed (

Table 15).

Table 15: Summary of discussion on policy and governance

Governance gap	Adaptation measures	Success factors	Possible conflicts of interest	Crucial partners
Integrating a strategic stormwater plan in the municipal master plan	Have the strategic stormwater plan politically enacted	The strategic stormwater plan needs to be enacted before the municipal spatial plan.	Flood paths: conflict with road owners. Allocation of area for flood protection in urbanized areas.	Agencies for planning and building services and Agency for urban environment.
Clarification of responsibilities and financial system for stormwater solutions (NOU 2015:16)	Use the possibilities we have to influence			
Lack of knowledge on climate change and consequences for stormwater, water supply (vulnerability)	Participating in projects such as BINGO and Hordaklim (another climate service project). Spread the knowledge we have already: communicate stormwater challenges in arenas/forums that already exists	Be visible, communicate our ideas. Good overview of relevant actors (who do we need) and overview of possible arenas, like a list of conferences, where we could share our ideas.		
Implementation of strategic plans to the tactical and operational level	Develop and use analytical tools and models.	That we have people that understand the models and we manage to take advantage of the diversity of the group when we design the new stormwater system at Damsgård. We need to increase the separation rate.	Lack of competence and resources. Other urban development 'steal' our resources.	

3.8 Tagus

The CoP of the Tagus Estuary worked on a visioning exercise consisting of four stages:

1. Work on “nightmare” & “dream” scenarios (meant to be radical but plausible)
2. Identify main challenges /critical issues to develop:
3. Work on feasibility and exploitation of critical paths
4. Identify main success and failure triggers

The results of these stages are reported below. Finally, the policy and governance analysis for the Tagus Estuary was discussed.

3.8.1 Visioning

Dream Scenarios

Participants supported their “dream” scenario in four main topics that they would like to experience in the future:

- **Available water in quantity and quality** – water sources and abstraction systems allowing to ensure 100% of needed water with the required quality and no stress in water accessibility for the different users.
- **Strategic visioning and guidelines in action** – allowing shared awareness about the challenges, with actionable orientations guiding and accommodating activities developed and lead by the different stakeholders, and with good solutions on the road to cope with CC, ensuring enough water in quantity and quality.
- **A water collaborative governance system in action** – with real conditions to accommodate and develop a permanent cooperation engaging all relevant stakeholders to address CC/water nexus challenges, with evidences that all stakeholders work in a well-articulated routine sharing common concerns to ensure and achieve integrated and sustainable practices and solutions, and with good relations between each other.
- **Water efficient use as mainstream** - as a “societal deal”, supported by a shared awareness and implication of domestic and the different sector’s consumers and corporative utilities/institutional stakeholders; going side by side with energy efficient use investments; ensuring a global openness/acceptance/development to new and/or more efficient solutions to cope with water scarcity; and ensuring adaptive resilience and transformation towards resources management.

Nightmare Scenario

Participants expressed and explored their “nightmare” scenarios around 4 main arenas of events, experiences and impacts manifestations, if adaptation failed:

- ... in the territory
- ... near the population
- ... to the sectors
- ... to corporations

Table 16: Nightmare Scenario: Consequences for Territory

Territory
Consecutive years of drought
Crops and rice fields with no water
Forest fires
Insect blooms that create new diseases
Lowering of piezometric levels of groundwater abstractions
Hydrometric level in the Albufeira de Castelo de Bode has fallen below 88 meters
Degradation of the ecological status of water bodies
Poor water quality in the Tagus flow between Portugal and Spain due to wastewater discharges
A flood like the one that occurred in 1941
Mouchão Póvoa and on the left riverside of Sorraia
Storm tides and severe inundations occur at Lezíria do Tejo plan and Sorraia river
Conchoso abstraction gets non-operational
Tagus River serves no more Valada section and there is reduction of Tagus affluences to Valada section
Tagus river gets meandering
Valada abstraction in Tagus river gets non-operational
Water abstractions at Valada are not strategic reserve option anymore
Industries in Vialonga stopped working and closed
tourism activity declines
Desertification: people abandon the region
financial crisis continues
political instability

Table 17: Nightmare Scenario: Consequences for the Population

Population
decrease in water quality which becomes severely compromised
tap water looks dirty
tap chlorine-flavored water
no water to bath, toilet and irrigation
people began to reuse wastewater
no drinking water available
health problems and people died
>2M people get no water at all during 1 week and 50 faced severe health problems
awareness to CC challenges and to an efficient use of water was not put in practice
population was not aware of treats and consequences of misuse of water, and wasted lots of water
population don't defend water bodies
increased cost of living
unemployment grows
import of goods raise and is not sufficient to compensate the lack of production

Table 18: Nightmare Scenario: Consequences for Sectors

Sectors
lack of relevant alert and information to sustain decision
monitoring and control of the quantity and quality of water bodies decreased and / or was abandoned
population has no access to reliable information
part of the energy production falls
agricultural production falls
water provision became discontinuous
water services became less reliable and faced serious problems
farmers had no water for their campaigns
irrigators associations closed their services
farmers provide their own water abstractions with poor quality
water use conflicts between domestic and other relevant uses (hydroelectric production, agriculture, industry)
inhabitants fight for water in supermarkets
competition between regions to access water became an open conflict routine (farmers from different regions fight for same water sources)
commitments achieved at “Albufeira Convention” and “Transfers’ Policy” between Portugal and Spain (concerning transnational rivers) were broken.
Intersectoral co-operation failed and corporations don’t speak to each other
Co-operation between Water and Energy utilities was not settled
Conflicts escalation between stakeholders
Regulatory Authorities mediation of conflicts came late and was not working
restriction to use of water and tax benefits to water savings with no effect
licensing of industries and affluence control has relaxed

Table 19: Nightmare Scenario: Consequences for Corporations

Corporations
Plans and strategies were not accomplished and became obsolete
Short term issues prevailed in guiding the decisions
Lack of “sense of urgency” in decision-making
Reduction of investments
Exploitation of alternative water sources were not done
Desalinated water exploitation was not accomplished
EDP (Electricity Producing Company)turbocharged water was not re-used
Dam in-depth water discharges were not used in time
Emergency strategies were not activated
Investments to improve water abstraction in Valada (at Tagus river) were not done
Alternative solutions to ensure water services to population (in quantity and quality) in moments of crisis were not planed and tested
Capacity to deal with climate scenarios uncertainty and CC was not developed or was not robust enough
Strategic risk assessment was not consistently applied
Redundancy systems were not developed and sub-systems interoperations were disinvested
Operating assets management was neglected and caused an increase in expenses
Abstraction systems were not adapted to new situations and were not shifted in due time
Measures to encourage an efficient use of water were not implemented
Reduction on loss of supply systems were not implemented and high losses continued to be registered
Water treatment high standards were neglected due to lack of investment in water treatment products and new solutions
Treatment system can not deal with the decrease of water quality in their origins
The National Health Authority suggests inhabitants to boil water before consumption
Water utilities good image is broken

Beside fears/risk perception pushed to its extreme expression, **nightmare scenarios** were also supported/*inspired by several extreme past events* (1941 hurricane; several floods; 1992/93 drought) and by the PT “crisis ambience” recent experience

The main **nightmare issues** are

- *not being able to accomplish already existing solutions and/or good practices orientations* (i.e. discontinuity of already existing practices and/or not being able to implement existing guidelines and plans);
- lack of consistency in decision and investments;
- delays in anticipating solutions and/or developing and implementing alternative/new solutions

The main **dream challenges** are mainly related to

- *planning and organizational focus,*
- *ability and assertiveness*
- *to ensure both technical and governance ambitions feasibility*

Participants chose to explore solutions and possible roadmaps to success based on the dream scenarios topics and treats identified in the nightmare scenarios:

Table 20: Possible solutions for available water in quantity and quality

Available water in quantity and quality
Investment on non-hydroelectric energy production
Explore alternatives to current water production solutions
Monitoring of river beds
Population awareness of sustainable use of resources
Wastewater treatment guaranteed to a higher level
Investment in water quality monitoring
Taxes
Use of less water-consuming crops
Efforts placed in reducing transport losses - increase efficiency
Diversify water sources
Invest in means and technologies to guarantee new abstractions

Table 21: Possible solutions for strategic visioning and guidelines in action

Strategic visioning and guidelines in action
Better clarification of what one wants as a strategy
Political commitments or regime pacts independent of governments
Articulate between sectors actions/measures
Implementation of the user-payer principle (mandatory counting)
Selection of measures by cost-benefit analysis including environmental dimensions
CAP (agriculture stakeholder) oriented to increase crops more adapted to the soil and climate
Maintain the incentive system for the efficient use of water in agriculture (economic, controlled implementation)
Incentives to reduce losses in the supply systems (payment of taxes or tariff)
Rules for urban construction design targeting efficient water use and water reuse
Circular wastewater system at city level (reusing gray water)
Hydric Resources Taxes are used for improving water bodies

Table 22: Possible solutions for a water collaborative governance system in action

A water collaborative governance system in action
Full adaptation of all actors in society to climate change
Cooperation and permanent adaptation
Awareness of the gap between the various actors
Dialogue between the different Portuguese national actors in the advisory councils (CNA, CRH, CNR, etc.)
Promotion of integrated management between various actors
Activate the AUDPH and EFM assemblies (where the various water management sectors are represented)
Ensure integrated and participated management
Economic increments and more € invested in water resources management (by the public admin)
Awareness campaigns designed to inform the civil society and support adaptation practices to climate change

Table 23: Possible solutions for a water efficient use as mainstream

Water efficient use as mainstream
Water efficient use (WEU)
Energy efficiency
Dealing with shortages
Development of WEU awareness and consciousness near citizens
Redistribution of crops by type of soil
Apportionment of water distribution in agriculture
Development of efficient irrigation techniques
Conservation / maintenance of water transport structures (efficiency)
To explore new technological solutions to water distribution
To produce energy based on dams' discharges in Sorraia river
Compensation tanks

3.8.3 *Summing up Debriefing (are we prepared?)*

In general terms, the Tagus Basin workshop participants (i) identified already existing relevant technical recommendations and measures; (ii) recognized already existing good practices orientations in sectoral and corporation strategic plans regarding CC adaptation that could be implemented; (iii) expressed themselves reasonable comfortable and confident on their potential outcomes if moved to practice, but also (iv) showed interest in exploring brand new and/or alternative solutions that could speed and/or robust CC adaptation strategies.

However *the big obstacle that participants identified has been the practical difficulty to “move” from those already existing solutions and orientations “to practice”*. And the reasons that have been pointed and discussed were less centered in technical issues, but rather in (i) the political and corporation decision making process; ii) the (non)existing financial opportunities to put plans in practice; and (iii) the lack of information/communication on the topic.

Summing up on main causes to success/failure pointed to:

... on the decision making process

- Real political will and clear orientations (more than just “vague/confusing statements” and/or just “regulations/penalties”!)
- “Sense of Urgency” about CC challenges shaping both political and corporative priorities and decisions
- Orientations and decisions not trapped (imprisoned) by “short term” visions and results (able to develop “long term” visioning and larger roadmaps)
- Ability to “move to practice” by developing an integrated and collaborative governance solution
- Quality and effective status of strategic plans (mainly in what concerns their implementation design; their real influence/orientation to more coherent and feasible inter-sectoral solutions; and their real support to corporative decision process) -

... on the (non)existing financial support to put plans in practice

- Learning with recent “crisis” experience and negative impacts
- Ability to distinguish between measures that are heavily dependent on investment and those that can be also impacting and implemented but less costly
- “Sense of Urgency” about CC challenges shaping “short term” and “long term” investments

... on the lack of information/communication on the topic

D5.2 COMPILATION REPORT ON INITIAL WORKSHOPS AT THE SIX RESEARCH SITES

Month 24 2017

- Keep going on CC adaptation strategies research and knowledge production
- Ensuring that data, information, learnings and knowledge are shared with the great diversity of stakeholders and common citizens in an “easy way”
- Invest on moving from “knowledge to action” (improving research and non-researches interactions; working on how to move from “ideal models” towards “feasible models”; ...)

3.8.4 *Additional Comments*

Taking into account that WSM15 was the third enlarged stakeholders’ meeting in Tagus Basin some topics and relevant/ difficult dimensions have been confirmed, deeply explored and reinforced, such as:

- global concerns with extreme events and climate changes challenges
- the pressure in the agriculture sector: topics as saline intrusion; crops and water availability; agriculture efficiency and local ecosystem characteristics and inter-dependencies
- concerns in water services: with existing abstraction and distribution infrastructures and with resilience efficiency
- pressures to engage common citizens and develop their awareness
- interest and openness to explore alternative and new technical solutions to strength adaptation strategies to CC and (mainly reinforced!)
- the complex, multidimensional and multiscale impacts chain of CC at the Tagus research site
- big challenges in addressing adaptation to extreme weather events and CC are related to “human capacity” and to “governance solutions”
- the focus on policy and collective action – the Tagus basin is shared with Spain; cooperation (vs competition) based on shared purposes and effective interactions; land planning challenges; management/decision critical points; and collaborative planning challenges

3.9 Veluwe

The CoP of the Veluwe developed three future dreams for the Veluwe. These dreams were then challenged by potential threats in the context of climate change. Adaptation measures were developed to counter these threats. Finally, policy and governance issues were discussed among the participants. The results are reported below.

3.9.1 Visioning: dreams for the Veluwe

Based on the question “What is your dream for the Veluwe?” the participants divided into three subgroups to put their dream image of the Veluwe on paper. This resulted in three scenarios, as described in the tables below.

Table 24: Scenario Room for Change

Room for Change
<p>The “Room for Change” scenario describes the Veluwe as a robust system, with all current functions (water, nature, agriculture, living, recreation) being maintained in the future. For this purpose, it was important that the Veluwe remained open to all these functions, as far as these functions can be maintained by the system. Balance between humans and nature, in a self-sufficient system, were fundamental concepts in this scenario. New concepts like agricultural forests fit into it.</p>

Table 25: Scenario A Robust Veluwe

A Robust Veluwe
<p>A Robust Veluwe' turns the central part of the Veluwe into a green-blue heart, free from agriculture and mining and large scale tourism, but open to small-scale recreation, regulated by wildlife management and reforestation. In this way, the groundwater reserves can be optimally utilized (within the Veluwe, but perhaps even beyond as a strategic reserve for the Netherlands) and the water balance in the future will be safeguarded. Other functions, including a more flexible and decentralized drinking water extraction, were relocated to the edges of the Veluwe.</p>

Table 26: Scenario Water System

Water System
<p>'Water System' also focused on the water supply on the Veluwe. In this scenario, the main threats encountered on the Veluwe water supply, such as penetration of the protective clay layer, water evacuation and growing nitrogen concentrations are under control. Here too, the central green heart of the Veluwe was retained (inter alia by replacement needle forest with natural deciduous forest). Other functions (such as extensive recreation and occupation) were carefully located at the flanks so that the disturbance of the water system is minimal.</p>

Discussion

There were interesting similarities between the scenarios. Water - not surprisingly given the background of the participants in the group - formed an important part of the future images. In 'A Robust Veluwe' and 'Water System', the central area of the Veluwe was the most important area for safeguarding the future water balance on the Veluwe. These scenarios sought space for combination with other functions particularly at the edge of the Veluwe.

There were also differences between the scenarios. Where 'Room for Change' provided space for maintaining current and innovative functions at the Veluwe, the second and third dream scenes excluded certain areas (especially the central area) for certain functions. Also visions of future management of the Veluwe differ; 'A Robust Veluwe' and 'Water System' prioritized the water function over the other functions while 'Room for Change' did not assign priorities. Finally, in 'A Robust Veluwe' there was clearly room for water abstraction at the Veluwe (partly in a more decentralized and flexible form), while this was not automatically reflected in 'Room for Change' and 'Water System'. After a brief discussion of these differences, it was concluded that they did not give acute 'conflicts' between the scenarios. Moreover, they show different accents that were put in the scenarios, which, of course, could lead to conflicts in further concretization.

3.9.2 *Potential threats to the scenarios*

After the scenarios were outlined, the same groups identified the main threats posing the realization of the dream images. Fragmentation of governance was identified as an important threat; Terrain management on the Veluwe is aimed the interest of the landowner's. Different owners do not have an overarching vision on the future Veluwe. In conjunction with this, future developments in agriculture were seen as a potential threat. The vacancy that occurred in the Gelderse Vallei after many farmers pulled out of the area attracted individual landowners. They bought pieces of land and developed their own activities there, which reinforces fragmentation.

Decentralized water abstractions can also contribute to fragmentation: people are increasingly digging wells in their own garden (for example, for fountains). The effect of these wells on the water system is still unknown. New environmental policy increases the threat of fragmentation; The Environmental Act no longer applies an upper limit, but has an open attitude towards co-activities in an area allowing more space for linking multiple user functions to an area.

Other major threats had to do with the growth of the population and the associated growth of urbanization - also on the Veluwe, the growing water demand and the increase of (large scale and motorized) tourism in the area. These last threats were also linked to climate change. The warmer climate not only creates a more pleasant holiday climate, but also a greater demand for water in the summer period, while the supply and quality of water will then decrease.

Based on these threats, the following adaptation measures were identified (Table 27):

Table 27: Adaptation Measures for the Veluwe

Adaptation Measures
Convert 5000 hectares of pine forest into agricultural forests (eg soil improvement, drought control, biodiversity)
Improve quality of surface water (eg in streams) as a potential drinking water source
Regulate the expansion of Recreational housing with concern for the environment
Water-saving measures for individuals
Reduction of industrial withdrawals by applying new techniques
Reduction of water extraction for irrigation
Reduction of agricultural drainage at the edges of the Veluwe
Close of streams to reduce groundwater drainage
Relocation of groundwater extractions to reduce environmental impact
Switching from groundwater to surface water abstraction
Convert forest to savannah to reduce evaporation
Improve retention of built-up area for additional groundwater supply
Disconnect storm water from sewers for additional groundwater supply
Natural water retention zone
More cooperation between spatial planning and water management
Prohibition of private small-scale water abstractions
Adjust land use for evaporation reduction
Central coordination in maintaining the water balance
Combat heat stress in urban areas by increasing green zones
Fire prevention
Develop a shared vision of the Veluwe from the perspective of climate change

This exploration of possible measures was put in a broader light the analysis conducted within the BINGO project on the policy and governance context for climate adaptation on the Veluwe. This analysis, based on surveys with a number of stakeholders from the 'Community of Practice' formed at the first meeting, showed, for example, that there are sufficient resources available to respond to climate change. This conclusion gave rise to discussion. It was debated, for example, that there is no shared future image of the Veluwe. At the same time, it was stressed that a shared vision is not always achievable, especially in areas with different actors and interests, and that discussing means rather than goals can be an outcome. Also, it is not clear who at the Veluwe should set adaptation goals. The province has an important role to play, but it must cooperate with other actors, and this is often difficult.

The connection between the water sector and other sectors was another topic of discussion, which is not adequately regulated at the Veluwe according to the participants. Municipalities in particular are still very much oriented at construction and development. An important question is who should take the initiative in setting up more connections. People from the spatial planning perspective say they are open to incorporate the water perspective, but do not always put that into practice. Apparently the water professionals are not yet able to emphasize the importance of water in other policy and decision-making bodies. Water management requires a longer time horizon than spatial planning, which makes it difficult to better manage this representation. In the past, the Dienst Landelijk Gebied sat at the table with other local actors and helped water managers to defend the water interests. Now that this organization has been dissolved, this help is not provided anymore.

The participants also noticed a lack of a clear responsibility structure at the Veluwe. In theory, the division of responsibility is clear - municipalities are responsible for regulating private initiatives in the subsoil, for example - but in practice responsibilities are not always respected and there is uncertainty. As a result, there are gaps in the structure of responsibility.

Finally, the participants wondered whether the current policy was adaptive enough to cope with the effects of climate change. Groundwater protection and nature conservation are often very conservative, and allow little adaptation to changing circumstances. This conservative attitude could, for example, block the flexible relocation of functions at the edges of the Veluwe.

3.10 Comparison

As became evident already at the M8 workshop, the research sites deal with different issues in different constellations of stakeholders, with different future horizons in different policy and governance situations. This makes a comparison between the research sites both challenging and interesting. In some cases, similar problems lead to different measures, because of

different conditions. In other cases, similar measures are considered for different reasons or to solve different problems.

The Cyprus agriculture case shows the importance of climate adaptation by showing how a future with failed adaptation will lead to a desolation of rural Cyprus, while successful adaptation may even lead to a consolidation of farm land with larger plot areas. This is different at the Veluwe, where the system as a whole is not so much under threat. There, the combination of functions and the assigning priorities among the different functions is the main challenge.

The adaptation measures in Cyprus are in part directed at the behavior of farmers and partly at improvement of water infrastructure, such as groundwater recharge systems and check dams and erosion control. The latter is also considered in Badalona, but then with the purpose of delaying water run-off and preventing floods.

In the case of Cyprus domestic water supply, the focus is on both domestic water saving, improvement of infrastructure and using alternative water sources, such as salt water and rain water. Rain water harvesting was also proposed in the Badalona case, but with a different purpose, namely flood prevention.

The Wuppertal also explored the use of rain water storage for periods of droughts, but the protection of urban areas during extreme rainfall or flooding got more attention. Here, urban planning was identified as a key activity, through multi-functional land uses, made more complicated by competing interests and questions of liability and responsibility. Competing interests are also central to the Veluwe and the Tagus case, where different users and functions use the same water source, which is becoming increasingly scarcer. Both sites mention the importance of stakeholder collaboration; how to achieve this must be a central question in WP5 of the BINGO project.

In the Water Management case of the Wuppertal some emphasis was put on the importance of good forecasting of climate events as well as the reduction of hydrological uncertainties. This is also a central issue in the Bergen case. Managing storm water in Bergen is considered in large part a matter of having sufficient data, prognoses and tools. Storm water management should be well integrated into city policy and also above the city level.

This integration is often challenging, as also becomes evident in the Veluwe case. Knowledge of water issues is often lacking with spatial planners and the effort to increase that knowledge is too little.

Consistency in decision and investment is also at the heart of the Tagus case. A major concern in their nightmare scenarios is the failure of intersectoral cooperation and the subsequent

competition for water resources. This is also reflected in one of the roadmaps, which is focused on a water collaborative governance system.

One of the concrete infrastructural measures proposed in Bergen, is the separation of the sewer system in waste and storm water. This solution was also considered in the Badalona case, but deemed too complex and expensive.

3.11 Positive and less positive aspects of the workshops

From the evaluations, it becomes clear that the CoPs are positive on the work being done and the interaction in the second round of workshops. The most important positive aspects are:

- The open debate between participants and the confidence between participants to share and discuss sensitive topics. This is particularly important since collaboration between different stakeholders is considered a key factor in successful adaptation.
- The opportunity to share perceptions and formulate and discuss different adaptation options to climate change.
- The sharing of knowledge and information (including work-in-progress) from the BINGO-project to the CoPs.
- The good representation of stakeholders which allowed for a sufficiently broad discussions.
- The group vision activity was very productive giving the opportunity to any one of the attendees to participate.
- The upcoming workshops and the membership of BaseCamp provide an important doorway for future collaboration.

The positive aspects outweighed the less positive ones. In some cases the duration of the workshop was noted as an issues. A duration longer than 5 hours is not recommended and sufficient breaks should be included. Also the continuity in participants between the M8 and M15 workshop was mentioned as an issue. It is recommended to maintain (if possible) the same group for the whole project.

ANNEX 1 WORKSHOP REPORTS

Cyprus M8 report

WORKSHOP M8 REPORT: CYPRUS



NORTHERN TROODOS RESEARCH SITE, PERISTERONA WATERSHED, CYPRUS

SETTING THE SCENE



THE CYPRUS INSTITUTE &

I.A.CO ENVIRONMENTAL AND WATER CONSULTANTS LTD

WORKSHOP M8 REPORT: CYPRUS



Organizing partner:	The Cyprus Institute (Cyl) & I.A.CO Environmental and Water Consultants Ltd (IACO)
Workshop Place:	Cultural and Environmental Foundation of Morphou Bishopric, Peristerona Village, Cyprus
Date:	24 February 2016
Number of invited guest:	14 (with the request to pass the invitation on to other important local stakeholders)
Number of guest attending:	10 guests, 6 BINGO partners

Workshop Agenda

Time	Session
17:00-17:10	Registration
17:10-17:25	Welcome Ayis Iacovides, IACO Ltd Community Leader, Peristerona Community
17:25-17:35	Introduction to BINGO Project Phoebe Vayanou, IACO Ltd
17:35-18:10	Introduction of Participants Christos Zoumides, Cyl
18:10-18:25	The BINGO Research Site in Cyprus Christos Zoumides, Cyl
18:25-19:05	Perceptions of Climate-Water Risks Christos Zoumides, Cyl
19:05-19:35	BINGO Community of Practice Ayis Iacovides, IACO Ltd
19:35-19:45	Conclusions Elias Giannakis, Cyl
19:45-20:00	Feedback Questionnaire
20:00	End of Workshop & Snacks

Objectives:

- To set the scene & get to know each other
- To inform stakeholders about the BINGO project
- To establish common understanding of water-climate risks at downstream Peristerona Watershed (research site)
- To introduce the principles and tools of BINGO Community of Practice

Material distributed to participants:

- BINGO business cards
- Workshop agenda
- Copies of presentations
- Evaluation questionnaires
- Post-its & markers

Characterization of participants:

Policy bodies	Local level	<ul style="list-style-type: none"> • Peristerona Community Council • Orounda Community Council • Kato Moni Community Council • Agia Marina Community Council • Katokopia Community Council • Kato Zodia Community Council • Pano Zodia Community Council
	National level	<ul style="list-style-type: none"> • Water Development Department • Geological Survey Department
Research institutes	<ul style="list-style-type: none"> • The Cyprus Institute 	
SMEs	<ul style="list-style-type: none"> • IACO Ltd 	
Associations	<ul style="list-style-type: none"> • Local Irrigation Associations 	
Sector	<ul style="list-style-type: none"> • Agriculture (mainly crop production) • Domestic water supply (households) 	

Selected local and external stakeholders were invited to the stakeholder workshop. Local stakeholders attending the workshop (8 in total) were community leaders and farmers. External stakeholders (8 in total) consisted of officers of two governmental departments, namely, Water Development Department and Geological Survey Department, and six BINGO research site team members (see Annex I for the full list of participants).

Short summary of workshop including activities

In the first session of the workshop, participants were welcomed by Ayis Iacovides (IACO Ltd) and by the hosting community leader. Then, Phoebe Vayanou (IACO Ltd) gave a short introduction to BINGO project, supported by a power-point presentation, based on the Storyline presentation prepared by the BINGO Project Coordinator (see Annex II).

An ice-breaker exercise was conducted to establish a relaxed working atmosphere, to “activate” participants and give everyone the opportunity to present themselves. Thirty photos portraying climate change risks in water resources management, the majority taken in the Peristerona Watershed, were displayed on a table in the hall during the participant arrival. All participants were asked to select one photo. The participants were asked to introduce themselves (Photo 1). Then, they were asked to explain why they had chosen the specific photo. Finally, they were asked to place their names in the stakeholder matrix, according to their level of motivation and influence in the case-study area (Photo 2). Almost all of them indicated that their motivation in water resources management (x-axis) is high, whereas in the case of influence on water management (y-axis) the allocation was more widespread (Photo 2).



Photo 1: A stakeholder explains how the water is diverted for irrigation from Peristerona River.

Photo 2: The final allocation of workshop participants in the stakeholder matrix.

Christos Zoumides (Cyl) made a short introduction to the research site in Cyprus and highlighted the on-going research in the selected site by the Cyprus Institute research team (see Annex II). The objective of the next session was to discuss and report stakeholders’ perceptions regarding the climate change risks to water resources management. Participants were split into two groups: (1) irrigation and (2) domestic water supply. All identified climate change risks were written on a Flipchart (Photo 3

and 4). Each group selected one reporter who presented the group's results to the plenary.



Photo 3: Group exercise on identifying climate change risks on domestic water supply

Photo 4: Group exercise on identifying climate change risks on irrigation

After the group exercise, participants were introduced to the objectives and scope of the BINGO Community of Practice (CoP), as well as other available dissemination tools, i.e. Facebook, Websites etc (see Annex II). Elias Giannakis (Cyl) closed the workshop by briefly presenting the main outcomes and conclusions. All participants filled out the evaluation form before they left.

Short summary of outcomes and results:

The main thematic topics addressed at the workshop were climate change risks on domestic water supply and irrigation. Stakeholders' perceptions are presented below:

Climate change risks on domestic water supply:

- Prolonged periods of drought (> 3 years) have put an increased risk on water quality and water supply.
- The increased water demand due to prolonged periods of high temperatures and the absence of alternative domestic water resources further increase the risk in terms of domestic water security.
- The reduction in water supply is mainly attributed to a reduction in surface water flows of Peristerona River, which recharges the aquifers from which the communities pump groundwater; in Agia Marina the groundwater resources are not directly affected.

- Prolonged periods of drought will also have a significant effect on Peristerona water supply borehole performance, e.g. for wet years: 17 m³/hour; for average years: 7-10 m³/hour, for drought years such as 2008: 0.7 m³/hour.
- Additionally, the high fluctuations in water supply create major pressure changes in the piped system, thus creating problems such as broken pipes and leakage losses, all leading to higher maintenance cost.
- A 130 lt/person/day quota and tiered pricing for domestic water supply are implemented in Agia Marina village; potential new boreholes imply additional water charges.

Climate change risks on irrigation:

- Significant reduction of groundwater resources replenishment and performance of boreholes.
- Overexploitation of groundwater resources.
- Salinization of groundwater resources.
- Increase of water pollution due to reduced water flows (increased concentration of pollutants due to less dilution capacity).
- Reduction of irrigation water supply from river diversions
- Higher water demand for irrigation and livestock.
- Increased irrigation water demand for fodder crops due to lower precipitation and higher temperatures, which result in the reduction of natural (pasture) vegetation
- Higher temperatures result in more crop pests and diseases, which leads to increased use of pesticides affecting thus the quality of crop products and food safety.
- Climate change necessitates the use of recycled water with potential negative repercussions on the quality of soils and groundwater resources.

Additionally, stakeholders provided valuable insights in the structure and the operation of irrigation associations including:

- successful examples in the area
- how they adapt to climate change
- economic viability
- technological level
- monitoring of water resources management (e.g. water metering, Water Development Department controls etc.).

Video testimonials collected? Four video interviews were made the week after the workshop, to give the stakeholders time to prepare and to film them in action.

If yes, list of questions and identification of end-users who gave testimonials.

List of questions:

1. What is the worst climate related water problem you remember from the past?
2. What was the impact of this event and how did you deal with it?
3. How could water managers and researchers cooperate better to reduce the risks of climate change on water resources?

People interviewed:

1. Michalis Photiou, Community Leader of Peristerona Village
2. Giorgos Michaelides, Community Leader of Katokopia Village
3. Christos Christofi, Hydrogeologist at the Geological Survey Department
4. Adriana Bruggeman, Associate Professor at the Cyprus Institute

II. In your opinion, what were the most positive and less positive aspects of the workshop?

The most positive aspects of the workshop were the active participation and cooperation of stakeholders during the presentations and group exercises, the identification of climate changes risks at individual (user) level and the views and opinions of stakeholders' on how to confront these challenges.

The less positive aspects of the workshop were the small number of participants. However, except for the preparatory visit by IACO, this was the first time that we met with the local stakeholders, so we were happy that they all joint. The stakeholders had little interest in the use of Basecamp. There were also doubts about how efficient and successful the interaction of beneficiaries between countries could be.

III. What suggestions do you have for future workshops?

- engage more participants
- longer duration of the meetings
- less technical presentations
- feasible solutions to cope with climate change challenges
- more detailed information regarding the objectives and the actions of the project

Annex I: List of Workshop Participants

No	Mr./Ms	First name, name	Stakeholder characterisation: Affiliation & Institution
1	Mr.	Charalampos Demetriou	Hydrologist; Water Development Department
2	Mr.	Giorgos Michaelides	Community Leader; Katokopia Village
3	Mr.	Christos Christofi	Hydrogeologist; Geological Survey Department
4	Mr.	Sotiris Hatzidimosthenous	Community Leader; Orounda Village
5	Mr.	Charalampos Matsoukas	Community Leader; Kato Moni Village
6	Mr.	Christakis Kattirtzis	Community Leader; Kato Zodia Village
7	Mr.	Marinos Chrysostomou	Community Leader; Agia Marina Village
8	Mr.	Michalis Photiou	Community Leader; Peristerona Village
9	Mr.	Ioannis Fouskotos	Community Leader; Pano Zodia Village
10	Mr.	Petros Neofytou	Community Council Member; Peristerona Village
11	Mr.	Iacovos Iacovides	Researcher; IACO Ltd (Cyl)
12	Mr.	Ayis Iacovides	Researcher; IACO Ltd (Cyl)
13	Mr.	Phoebe Vayanou	Researcher; IACO Ltd (Cyl)
14	Ms.	Adriana Bruggeman	Researcher (Cyl)
15	Mr.	Christos Zoumides	Researcher (Cyl)
16	Mr.	Elias Giannakis	Researcher (Cyl)

Annex IV: Evaluation Summary

The overall evaluation for each question on the basis of the grading system: 1= inadequate, 2= fair, 3= satisfactory, 4=good, 5=very good is as follows:

1. Meeting preparation and logistics	Average Grade
Meeting information provided in advance (e.g. dates, venue, agenda)	4.6
Meeting venue (adequacy of the room where the meeting took place)	4.6
Materials distributed during the meeting to support the sessions	4.7
Overall average	4.7
2. Overall assessment of the meeting	Average Grade
Attainment of the objectives of the meeting (the objectives of meeting were met)	4.3
Positive and collaborative atmosphere among participants	4.9
Duration of the meeting	4.5
Opportunity for individual participation and input in the meeting	4.8
Overall average	4.6
3. Evaluation of the sessions	Average Grade
Clarity of presentations/speakers	4.5
Discussions (moderation, conclusions reached)	4.7
Overall average	4.6
4. Which communication tools do you prefer for your information relative to the BINGO programme (number signifies no. of persons)	No. of persons choosing item
Basecamp	1
Facebook	0
Webpage	2
E-mail	6
Printed information Leaflets	6
Meetings	8
Others (please explain)	1 (Fax)

D5.2 COMPILATION REPORT ON INITIAL WORKSHOPS AT THE SIX RESEARCH SITES

Month 24 2017

Wuppertal M8 report

WORKSHOP M8 REPORT FORM



Organizing partner: Wupperverband, InterSus, IWW
Workshop Place: Wuppertal, Germany
Date: 19.02.2016
Number of registrations: 42 (incl. 8 BINGO team members)
Number of guests attending: 18 (26 excused absences)

Agenda for the workshop

- 9.00 – 9.15** **Welcome and registration**
- 9.15 – 9.35** **Official welcome and introduction of BINGO-project**
- 9.35 – 11:30** **World café – setting the scene**
- Who should do what?
 - Too much/too little water, what does this mean for me?
 - Which information is missing?
- 11:30 – 12.30** **Debate on World Café's results and Farewell**
- 12.30 – 13:00** **Lunch and end of Workshop**

Objectives:

- ✓ To introduce stakeholders, with information to the BINGO project and personnell.
- ✓ To engage stakeholders in a collaborative approach at the Research Site.
- ✓ To collect stakeholders' ideas/perceptions regarding climate change (i.e. extreme weather events) in the research site of the Wupper basin.
- ✓ To find data/knowledge and structural gaps and needs which should be taken into account for the research in BINGO.

Materials used and distributed to the participants:

For Registration

- 1 Attendance list
- Batches (name/institution)

General

- 5 display panels
- Flipchart sticks
- Sets of pasteboards
- Additional post-its, clips, etc.
- 2 BINGO Roll-Ups

Participant Folder

- General program
- BINGO flyer
- BINGO business card
- Flyer “Hochwasserpas”
- Individual evaluation card
- Writing pad and pen

For Video Testimonials

- Camera
- Tripod
- Prepared interview questions

Characterization of the participants

Table 1 shows the number of registrations and actual participants, the respective sector of activity and the level of governance each stakeholder is active in. Many participants had to cancel the participation short before, because of sickness (wave of cold/flu).

Table 1 Overview of stakeholders

Institution / sector	No. of participants (registrations)
Authorities	1 (13)
Federal authorities and ministries, i.e.: MKULNV, LANUV	0 (2)
District Governments (i.e. Bezirksregierung Düsseldorf, Bezirksregierung Köln)	0 (3)
Environmental Agencies (e.g. Wuppertal, Solingen, Remscheid, Leverkusen, Oberbergischer Kreis)	1 (8)
Representatives of companies (sector)	2 (4)
Drinking water	1 (2)
Energy	1 (2)
Others	2 (8)
Such as agricultural sector, environmental NGOs, tourist associations, German Insurance Association, etc.	2 (8)
Internal Stakeholders	5 (11)

From different departments (e.g. water basin management, sanitary environmental engineering, reservoir management, waterbodies development)	5 (11)
---	--------

Short summary of the workshop's activities

9.00h – 9.15 Welcome and Registration

- Participants' registration
- Welcome by the research host team (Wupperverband: Marc Scheibel, Paula Lorza; InterSus: Eduard Interwies, Stefan Görlitz; IWW: Andreas Hein, Hans-Joachim Mälzer, Jill Selbach, Juliane Koti, Tim aus der Beek)

9.15 – 9.35 Official Welcome

- Brief welcome to WS#1 "Setting the Scene" (Marc Scheibel)
- Short introduction of the BINGO project (question-and-answer interview game by Marc Scheibel and Andreas Hein)
- Short explanation of the role and motivation of the Wupperverband within the BINGO project (Marc Scheibel)
- Brief introduction of the participants (name, organization, brief description of work/function)

9.35 – 11:30 World Café

- Brief introduction to the research site and planned activities during the BINGO project (Tim aus der Beek, Marc Scheibel)
- Group activities focussing on common understanding in the research site towards climate change; at each table/group, the participants were invited to provide input and discussion on the selected topics (duration per table: 20'):
 - Who should take care for what? (Moderation: Andreas Hein, Eduard Interwies)
 - Too much/little water, what does this mean for me? (Moderation: Hans-Joachim Mälzer, Stefan Görlitz)
 - Which information is missing? (Moderation: Juliane Koti, Tim aus der Beek)
- Two researchers at each table kept the discussion alive and made sure that contributions and ideas were registered on pasteboards/flipcharts.

11:30 – 12.30 Debate on World Café's Results and Farewell

- Debriefing of group activities, presentation of results by table speakers (Andreas Hein, Hans-Joachim Mälzer, Juliane Koti)

- Collective debate on results (moderation Marc Scheibel)
- Brief explanation of the BINGO Community of Practice and the possibility to join in on basecamp
- Invitation to all participants to fill the individual evaluation form
- Announcement of Stakeholder Workshop #2: 30.09.2016
- Thanks for participation in WS#1

12.30 – 13:00 Lunch and End of Workshop

- Participants were invited to have an informal lunch

Short summary of outcomes and results:

Data base and knowledge gaps

- In current prognosis models, the influence of climate change (i.e. higher chances that weather extremes occur) is not sufficiently taken into account. Tools and prognosis models developed within BINGO should not only be as accurate as possible, but also transferable into existing systems. Beside forecasts on water quantity, also water quality and temperature should be taken into account.
- Knowledge gaps with regard to consequences of climate change are seen in the following areas: ecology, biodiversity, changes in soils and soil moisture, limnology, hydrological balance.

Information exchange and transfer

1. Role of institutions/stakeholders
 - Data and information collected by different stakeholders/institutions should be shared as „open data“ (e.g. agricultural data regarding the application of pesticides and soil erosion could be used for forecasts of water quality). It has to be clarified how such data exchanges can be realized under compliance with data protection. Furthermore, responsibilities and realization of data treatment/polishing/provision have to be taken into account.
 - To create a valuable basis for the coordination of different interests, available data could be prepared for different scenarios (i.e. more/less precipitation), naming responsibilities and roles of relevant stakeholders to find approaches regarding process, prioritization, impact, burden sharing, ...
2. Participation and information of the public

The public is generally very interested in topics related to water, a lack, however, is seen regarding proper information for the public. It was suggested to bundle public information to inform and increase the awareness of individual responsibility, whereas the following issues have to be clarified:

- Data treatment/presentation/bundling: available data (from different institutions/stakeholders etc.) should be summed and bundled, whereas data and information should be treated and presented in a way that they are easy to understand even for non-technically educated citizens.
- Data availability and provision: it has to be clarified where data can be bundled by whom and how public access can be realized.

Needs and options for action

- Options for action should be based on the understanding that decisions regarding climate change and extreme weather events have to be made hand in hand by different stakeholders on different levels at different institutions. The following stakeholders were mentioned: urban development/planning, water management, legislative and regulating authorities, water boards, municipalities/cities/districts, agriculture, conservationist and the general public.
- It was emphasized that the legal framework (i.e. approval procedures) needs to be more flexible as such procedures are time intensive and limiting a fast response.
- Responsibilities within different stakeholder groups and institutions were found to be not optimal (e.g. drainage infrastructure as an asset of municipality not operated by WA).
- Options for action could be also adjustment/reassessment of target objectives (e. g. Water Framework Directive).

Impacts of climate change within the Wupper region

It was found that the extent of potential losses is assessed in a very subjective way. The issues of “individual responsibility” and “self-provision” should be in everyone’s mind, as for example costs caused by damages or for countermeasures have to be compensate by the general public. The following issues were discussed:

1. Flood prevention

- Extent of loss is dependent on position and altitude/elevation above ground level

- The runoff from roads in urban areas is not always optimal, additional floodplains are needed in urban area for short-time retention to avoid damages within infrastructures and individual property
 - In case of heavy rainfall events: river quality is affected by runoff or storm water overflow discharge
2. Commercial impacts of CC in the Wupper basin
- Water has a commercial relevance within the Wupper region. In case of long-lasting periods with low precipitation, conflicting use (provision of raw water for drinking water, industrial processes, power generation etc.) is seen as a challenge for water management. The following issues were discussed:
- Water temperatures may rise due to climate change and the increase of air temperatures and of precipitation, which leads to changes of ecosystems within the Wupper catchment; river temperatures and in some part river water quality can be “handled” by water management (opening/closing of dewatering conduits of the dams).
 - Cooling systems might be affected (e. g. if water temperatures are too high, power stations cannot be run without warming water temperature above a critical limit = shut down)
 - Operation of power systems (hydropower systems): decrease of power generation due to low water level
3. Agriculture and forestry
- Positive effects on agriculture: climate change might lead to higher temperatures and more annual groundwater recharge, and therefore to longer growing seasons. Negative effects: Immigration and spreading of new species and plants, increase of damages due to heavy rain and periods with low precipitation; countermeasures might be: agricultural consulting services, crops sown under and alignment of furrows cross to the slope to avoid or decrease runoff from inclined fields in case of heavy rainfall events.
 - Forestry is important as there are huge woodland areas in the Wupper river catchment; their positive effects are the avoidance of soil erosion and buffer in case of heavy rainfall events, the negative effect, however, is the additional water need of wooded areas in case of periods with low precipitations.
4. Drinking water supply
- During long-lasting dry periods: low level in dams and insufficient raw water quantity, problems with algae and algae-borne toxins due to higher temperature
5. Leisure activities/Tourism

Prohibition of leisure activities (e.g. canoeing, fishing) in case of low water level due to low discharge periods

Feedback / Review of Workshop

In your opinion, what were the most positive and less positive aspects of the workshop?

Most positive:

- very collaborative and productive atmosphere
- very engaged participants and fruitful discussions

Less positive:

- Low number of participants (10) due to flue (many cancellations caused by illness) and short-term announcement (6 weeks before workshop)
- Representatives from regulatory authorities were missing

What suggestions do you have for future workshops?

- Earlier announcement of workshop (Workshop#2 at 30th of September is already notified to stakeholders)
- Contact persons have to be clarified - especially within regulatory authorities (due to invitation for workshop #1 contact persons were identified)

Video Testimonials

At the end of workshop video testimonials were collected with two interview partners:

- Paula Lorza – Civil Engineer and Hydrologist at Wupper Association
- Andreas Hein – Economist at IWW Water Center

Interview questions:

1. Do you expect to see climate change in the next ten years in the Wupper region?
2. If yes, how will society and the environment be affected?
3. Have you been aware of all identified climate change problems in the Wupper region discussed within this workshop?
4. Do you think sharing views and communication with other stakeholders and with researchers can help in your activity?
5. How did you like the first stakeholder workshop?

Annexes

1. List of participants
2. Evaluation by Participants: Summary

1- List of participants (Remark: Email not shown with regard to data protection)



Anwesenheitsliste

Wetterextreme und Klimawandel im Wupper - Einzugsgebiet.

1. Stakeholder-Workshop des EU-Projektes BINGO - Bringing INnovation to onGOing Water Management - Freitag, 19. Februar 2016, 9 bis 13 Uhr, beim Wupperverband in Barmen

Vorname	Nachname	Email	Unterschrift
Tim	aus der Beek		
Lutz	Bodin		entschuldigt
Thomas	Einfalt		entschuldigt
Jens	Fischer		
Susanne	Fischer		
Torsten	Frank		
Jürgen	Fries		
Anna	Giskes		
Stefan	Görlitz		
Andreas	Hein		
Daniel	Heinenberg		entschuldigt
Philip	Heldt		entschuldigt
Renate	Hessenius		entschuldigt
Eduard	Interviews WIES		
Thomas	Kemme		entschuldigt
Georg	Kimmerle		
Inka	Kollar		
Juliane	Koti		
Ursula	Koukolitschek		entschuldigt
Rolf	Kucera		entschuldigt
Christine	Kuhlmann		



WUPPERVERBAND
für Wasser, Mensch und Umwelt



BINGO
a better future under
CLIMATE CHANGE



Vorname	Nachname	Email	Unterschrift
Volker	Leonhard		<i>Leonhard</i>
Marlene	Liebeskind		entschuldigt
Alexander	Löcke		<i>Loecke</i>
Paula	Lorza		<i>Lorza</i>
Thorsten	Luckner		entschuldigt
Achim	Mälzer		<i>Maelzer</i>
Karla	Marschollek		entschuldigt
Christian	Massing		entschuldigt
Bernd	Mehlig		entschuldigt
Monika	Meves		entschuldigt
Walter	Mittler		entschuldigt
Andrea	Müller		entschuldigt
Manfred	Müller		
Peter	Nieland		<i>Nieland</i>
Hubert	Nobis		entschuldigt
Elke	Reichert		<i>entschuldigt</i>
Rainer	Roggatz		entschuldigt
Marc	Scheibel		<i>Scheibel</i>
Heinrich	Spitz		<i>Spitz</i>
Heinz-Gerd	Stosiek		entschuldigt
Dirk	Terlinden		
Matthias	Ufer		entschuldigt
Susanne	Varnhorst		<i>Varnhorst</i>
Peter	Vorkötter		entschuldigt
Mingyi	Wang		entschuldigt
Günter	Wasserfuhr		<i>Wasserfuhr</i>
Carsten	Zimmermann		
Michael	Zirngiebl		



The project BINGO has received funding from the European Union's Horizon 2020 Research and Innovation programme, under the Grant Agreement number 641739.

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2- Evaluation by Participants: Summary

Evaluation summary

Name of Meeting	M8 Workshop - Setting the Scene: Wetterextreme und Klimawandel im Wupper-Einzugsgebiet
Date/Place	19.02.2016 / Wuppertal (Germany)
No. of evaluation forms	10

Rating: 1=poor; 2=sufficient; 3=medium; 4=good; 5=very good

1. Meeting preparation and logistics	No.	Ø
Meeting information provided in advance (e.g. dates, venue, agenda)	9	4,2
Meeting venue (adequacy of the room where the meeting took place)	9	4,4
Materials distributed during the meeting to support the sessions	9	4,3
Comments: -		

2. Overall assessment of the meeting	No.	Ø
Attainment of the objectives of the meeting (the objectives of meeting were met)	9	4,2
Positive and collaborative atmosphere among participants	9	4,8
Duration of the meeting (1=totally inadequate; 5=adequate)	10	4,6
Opportunity for individual participation and input in the meeting	9	4,8
Comments: Sessions within World Café could have been longer (30 min instead of 20 min)		

3. Evaluation of the sessions	No.	Ø
Clarity of presentations/speakers	10	4,7
Discussions (moderation, conclusions reached)	10	4,6
Comments: Professionell!		

In your opinion, what were the most positive and less positive aspects of the meeting?

Positive:

- Good Workshop
- Different stakeholders were brought together
- Climate change is finally taken into account in more detail and with technical expertise
- Decision makers (i.e. stakeholders with practical experiences) are involved
- Good preparation, intensive involvement of participants
- Bundling of information, complexity of "climate change"

Less positive:

- Stakeholder have been motivated for collaboration within a topic discussed (indeed) quite often
- Missing stakeholders from regulatory authorities

What suggestions do you have for future meetings?

Comments:

- Necessarily with stakeholders from regulatory authorities
- Presentation of results obtained so far, target-performance comparison of project objectives

Badalona M8 report

WORKSHOP M8 REPORT FORM



Organizing partner: Aquatec in collaboration with Ajuntament de Badalona

Workshop Place: Centre Cultural del Carme, Badalona

Date: January 26th, 2016

Number of invited guest: the original invitation was sent to a group of around 25 key people who finally distributed it among their colleagues/collaborators

Number of guest attending: 40

Agenda for the workshop

- Welcome and registration [9'00-9'30]
- Official welcome (message from Badalona city council and Aquatec) [9'30-9'40]
- Workshop's objectives and methodology [9'40-9'45]
- Participant introductions [9'45-9'55]
- Introduction to BINGO project [9'55-10'05]
- General introduction to climate change and the potential effects in Badalona [10'05-10'15]
- General definitions: hazard, vulnerability and risk [10'15-10'25]
- Damage assessment procedure to be applied in the Badalona case-study [10'25-10'45]
- Brief introduction to research site, main features [10'45-11'00]
- Coffee break [11'00-11'30]
- Round table: identification of the risks for the Badalona site Badalona [11'30-12'30]

Discussion points:

- What are the hazards and why we consider them as such?
 - Legislation, regulations and standards that apply in this context
 - Internal context definition: role of the stakeholders
- General conclusions [12'30-13'00]

Objectives:

- Dissemination of BINGO project between local stakeholders and potential beneficiaries of the results (key people selected for the workshop).
- Identification of the risks that, within a context of climate change, are affecting the city of Badalona, more specifically, the urban drainage system.

Material distributed to participants:

- BINGO official brochure

- Agenda of the workshop
- Document with a printed copy of presentations:
 - Introduction to BINGO project
 - General introduction to climate change and the potential effects in Badalona
 - General definitions: hazard, vulnerability and risk
 - Damage assessment procedure to be applied in the Badalona case-study
 - Brief introduction to research site, main features

Characterization of participants

Type of stakeholder		Stakeholder	Nº of attendees	Total
R+i (public and private)		Aquatec	3	9
		CETaqua	3	
		UPC	2	
		CSIC	1	
Administration	Municipal	Ajuntament de Badalona	<ul style="list-style-type: none"> • Environment/Ecology dept.: 7 • Urbanism/public services dept.:5 • Civil protection dept: 1 • Toursim dept.: 1 	16
	Supra-municipal	Àrea Metropolitana de Barcelona (AMB)	1	
		Consorci Serra de Marina	1	
Local entities/services		Club natació Badalona	2	8
		Club nàutic Bétulo	1	
		Associació SASBA	1	
		Fishermen association	1	
		Badalona harbour	1	
		Escola del mar	2	
Utilities-water companies		Aigües de Barcelona	5	6
		Aquatec	1	
Humanitarian organizations		Creu Roja <i>Red cross</i>	1	1
TOTAL				40

As it can be seen in the table, it was a good correlation between the main stakeholders: administration, local entities/services, water companies and research centers. The only stakeholder that was invited but did not attend the workshop was the regional administration ACA (Catalan Water Agency).

Short summary of workshop including activities.

According to the agenda, the workshop was divided into three main sections:

1. Registration of participants, welcome and self-introduction of attendees
2. Set of presentations to focus the general objective of the BINGO project and the Badalona case study, the main objectives of the workshop and the key technical explanations to understand the scope of the project.
3. Round-table to discuss (face-to-face) the key topics concerning the risk definition and perception for the Badalona case-study.

Short summary of outcomes and results:

This is a compilation of the most interesting points arisen during the round-table discussion:

- The sea level rise (due to CC) is a factor that needs to be considered in the framework of the project due to its effects is some of the CSOs locations located in the beach.
- Due to the high use of Badalona's beaches (both by its citizens and tourists) the effects that CC can have on the morphology of beaches (sand reduction, etc.) should be also considered.
- The fishermen's association is worried about the increase of marine litter, which has forced the fishermen to fish in farther locations from the coast.
- Due to the effects of CC on the coast morphology the legislation concerning the marine-land territory will need to be reviewed.
- The variations in groundwater level is also a factor that can directly affect the urban drainage network.
- Importance to economically assess the adaptation strategies needed.
- Importance of the cleaning tasks performed in the sewer network (currently it is not done as frequent as required due to resources/budget constraints).
- The sediments entering into the sewer network are a problematic issue that directly affects CSOs. The use of sediment traps located in strategic locations

upstream in the catchment and also in the beaches is pointed out as a measure to prevent this problem.

- The increase of sea level and groundwater level also affects the vulnerability of buildings and other infrastructures.
- Necessity to increase water taxes to meet all the requirements derived from current legislation (e.g. the Spanish RD1290/2012) that is starting to force local administrations/water services suppliers to reduce CSOs.
- Importance of the management of the 9 km² of non-urban area (Marine Mountains) that directly influences the city of Badalona in several aspects: production of sediments, biodiversity, etc.
- The decrease of sea water quality (due, among others, to CSOs) directly influences the biodiversity of sea's species.
- Important to consider the effects of all these changes in the Badalona's harbor.
- Necessity to educate/raise awareness of citizens on how their habits (e.g. to throw lots of rubbish to the bathroom) has also a direct effect on the sewers condition and finally on CSOs.
- Important to consider both the damages occurring during an emergency and also after that (post-emergency damage assessment).
- Factors that directly affect vulnerability: population ageing, increase of flooding areas, increase of groundwater level, etc.
- The ships anchored in the harbor are also a source of pollution for the beaches.

Video testimonials collected? Yes

If yes, list of questions and identification of end-users who gave testimonials.

The following questions were formulated in the video testimonials:

1. Were you aware of all the identified problems, related to climate change, in the management of the Badalona's urban drainage system?
2. Do you agree with the risk categories being approached? Would you add any other?
3. Who do you think is the main representative for the management of such risks?
4. Which is your specific role or how could you contribute to the risk management?

The following people were interviewed:

- César Mösso: Researcher of the Maritime Engineering Laboratory at the Polytechnic University of Catalunya (UPC)

- Enric Vázquez-Suñé: Researcher of the Institute of Environmental Assessment and Water Research at CSIC
- Pere Malgrat: Urban Drainage Director from Aquatec
- Xavier Seglar: Technician of the "Escola del Mar de Badalona" (research center for marine studies belonging to the Badalona's city council)

II. In your opinion, what were the most positive and less positive aspects of the workshop?

Most positive aspects:

- Excellent representation of the stakeholders/end-used groups previously identified
- Good channel to "officially" present the BINGO project to stakeholders and end-users.
- Important participation of key stakeholders in the round-table. Although not all the participants take part on the discussion, at least one representative of each key group participated, including: Badalona city council, research centers, local entities and water companies.
- Good atmosphere and general interest in the project and expected outcomes.
- Doorway to future collaborations through upcoming workshops and BaseCamp

Less positive aspects:

- Given that Badalona was the first organized workshop we had not enough material or information to better focus the discussion part of the workshop, that is, to formulate much more focused questions. For example to the kind of questions/doubts arising during task 4.1 preparation.
- The formulation of much more focused or orientated questions would have facilitated the intervention of all the people during the round table.

III. What suggestions do you have for future workshops?

- To agree between all the partners the exact questions/key points that must be discussed in the workshops.
- To compile the set of methodologies that have obtained better results (in terms of participation for example) in the previous workshops.

Annexes

- 1- List of participants
- 2- Presentations (PPT)
- 3- Evaluation by Participants: Summary
(How many evaluation questionnaires have been filled in/ average evaluation/ most relevant comments received)

ANNEX 1. LIST OF PARTICIPANTS

1. Daniel González-UPC
2. César Mosso-UPC
3. Esther Suárez-AMB
4. Cinta Pérez-Consorci Serra de Marina
5. Susana Rios-Creu Roja
6. Albert Pérez-Aigües de Barcelona
7. Pere Aguiló-Aigües de Barcelona
8. Maria Monzó-Aigües de Barcelona
9. Eduard Bosch-Aigües de Barcelona
10. Xavi Aldea-CETaqua
11. Jaume Amorós-CETaqua
12. Pere Malgrat-Aquatec
13. Beniamino Russo-Aquatec
14. Pablo Sánchez-Aquatec
15. Montse Martínez-Aquatec
16. Esteve Ruiz-Club Natació Badalona
17. Meritxell Gallardo-Club Natació Badalona
18. Emma Planes-Club Nàutic Bétulo
19. Ramón Costa-Confraria de pescadors
20. Eva Márquez-Associació SASBA
21. Enric Vázquez-CSIC
22. Imanol Sanz-Marina Badalona
23. Manel Giraldo-Aigües de Barcelona
24. Consol Soler-Turisme Aj.Badalona
25. Àlex Mañas-Reg. BDN Pròspera i Sostenible
26. Oriol Lladó-Reg. BDN Habitacle
27. Javier López- Reg. Espais Públics
28. Enric Cahner-Escola del Mar
29. Rubén Escudero-Clavegueram Aj.Badalona
30. Pere Lluís Vegué-Urbanisme Aj.Badalona
31. Esther Puigbarraca-Protecció Civil Aj.Badalona
32. Aïda Llauro- BDN Pròspera i Sostenible
33. Josep Ledo-Urbanisme Aj.Badalona
34. Pep Montes-Ecologia Urbana Aj.Badalona
35. Gregori Muñoz-Servei Medi Ambient Aj.Badalona
36. Toño Gérez-Espais Naturals Aj.Badalona
37. M^a Luïsa Forcadell-Laboratori Ecologia
38. Ferran Martínez-Ecologia Urbana Aj.Badalona
39. Manuel Gómez-CETaqua
40. Xavier Seglar-Escola del Mar

ANNEX 3. EVALUATION BY PARTICIPANTS. SUMMARY

This is the general evaluation obtained from the workshop evaluation form distributed among the workshop's participants at the end of the event.

Total number of responses: 32

Average evaluation for each of the questions

Rating scale: 1= poor, 2= sufficient, 3= medium, 4=good, 5=very good

1. Meeting preparation and logistics	Average Grade
Meeting information provided in advance (e.g. dates, venue, agenda)	3.8
Meeting venue (adequacy of the room where the meeting took place)	4.1
Materials distributed during the meeting to support the sessions	3.9
Overall average	3.9

2. Overall assessment of the meeting	Average Grade
Attainment of the objectives of the meeting (the objectives of meeting were met)	3.9
Positive and collaborative atmosphere among participants	4.5
Duration of the meeting	4.1
Opportunity for individual participation and input in the meeting	4.4
Overall average	4.2

3. Evaluation of the sessions	Average Grade
Clarity of presentations/speakers	4.2
Discussions (moderation, conclusions reached)	4.1
Overall average	4.1

II. In your opinion, what were the most positive and less positive aspects of the meeting?

The following is a compilation of the comments posted by some of the people. Please notice that most of them are answers corresponding to just 1 person, but we have compiled all of them.

The most positive aspects being commented are:

- High representation of the most important stakeholders (according the framework of BINGO project) from the city of Badalona.
- Active participation of the different stakeholders attending the meeting and interesting answers from the technicians.
- Good brainstorming related to the impacts resulting from climate change.
- Correct duration of presentations.
- Good opportunity to know the BINGO project

The less positive aspects being commented are the following:

- The round table could have been more orientated in order to obtain clear and concrete answers for the key questions being formulated.
- Short duration of the meeting

III. What suggestions do you have for future meetings?

The following suggestions were posted (also by just very few people):

- To keep on promoting the participation of politicians and decision-makers in the following workshops.
- To have identification cards for all the participants.
- Explanation of the results being obtained from the rest of case-studies
- Make discussions through small groups

WORKSHOP M8 REPORT FORM



Organizing partner: NTNU /Bergen

Workshop Place: Bergen

Date: 18th February 2016

Number of invited guest: 30

Number of guest attending: 18

Agenda for the workshop

- 1) Introduction to the BINGO project
- 2) The place of the BINGO project in Bergen policies and activities of the City of Bergen
- 3) Community of Practice: expectations and role in the BINGO project
- 4) Perceptions of climate risks in Bergen
- 5) Conclusions and further planning

Objectives :

- Dissemination of BINGO project between local stakeholders and potential beneficiaries of the results (key people selected for the workshop).
- Identification of the risks that, within a context of climate change, are affecting the city of Bergen, more specifically, the urban drainage system.

Material distributed to participants:

- BINGO official brochure
- Agenda of the workshop
- Introduction to BINGO project
 - Brief introduction to research site, main features

Characterization of participants

Type of stakeholder	Stakeholder	N° of attendees	Total
R+i (public and private)	NTNU	2	4
	UniResearch	1	
	UiB	1	
Administration / municipal	Supra-municipal City of Bergen	<ul style="list-style-type: none">• Urban water systems (6)• Green infrastructure (3)	14

			<ul style="list-style-type: none"> • Climate (2) • BSBI (1) • Civil protection dept: 1 • Urbanization and planning (1) 	
				18

Short summary of workshop including activities.

According to the agenda, the workshop was divided into three main sections:

1. Welcome and introduction rounds
2. Background presentations of the BINGO project and the agenda for the day
3. A round the table introductions with some relevant presentations. This was done to make sure everybody had a better understanding of the roles.
4. Post-it activity with each participants identifying the potential risks as they saw it for the drinking water system and the wastewater system.
5. Round-table to discuss (face-to-face) the key topics concerning the risk definition and perception for the Bergen case-study.

Short summary of outcomes and results:

The main outcome from the post-it activity is summarized below in two sections; one for drinking water and one for waste water. In this document we have only listed the identified risks, not evaluated any of these statements.

Drinking water – opportunities and risks

- Poor design values
- Enough water
- Possibility to combine drinking water supply and hydropower production
- Possibility to interchange source dependent on water quality
- Improved circuit connectivity
- Risk of water shortage

Waste water – opportunities and risks:

- Urban floods due to rainwater
- Separate sewers- keep up the level or increase rehabilitation
- Urban green space lost to urbanization

- Not enough focus on increased precipitation volumes in the urban water sector design phase.
- Holistic planning
- Critical personnel not involved at the right time
- Increased focus on open stormwater solutions (avoid piping)
- Urban flooding

Video testimonials collected?

If yes, list of questions and identification of end-users who gave testimonials.

Questions:

1. Do you think climate change will affect the area and more specifically your work and if so can you elaborate a bit on the way it will affect you and your work?
2. Do you see any challenges in the near future as a result of climate change?

People that were interviewed:

Magnar Sekse

Eva Britt Isager

Erik Kolstad

II. In your opinion, what were the most positive and less positive aspects of the workshop?

The most positive was getting a wide range of stakeholders together around the same table for discussion. Face to face meetings enables a better and deeper understanding of the various view points and interests.

On the less positive side was that it appears difficult to get all participants to commit to a CoP in a busy schedule. I believe the workshops will be fruitful, and should aim to connect the stakeholders on individual and group level.

III. What suggestions do you have for future workshops?

- Aim to prepare and agree between participants on the questions and important points that must be discussed in the workshops.
- Send out background information from each stakeholder to improve preparedness of the participants.
- Keep a record of activities/ methods that proved the most effective /successful I the workshop, maybe also shared between the CoP at the different research sites.

Annexes

- 1- List of participants
- 2- Presentations (PPT)
- 3- Evaluation by Participants

ANNEX 1. LIST OF PARTICIPANTS

1. Tone Merete Muthanna, NTNU
2. Erle Kristvik, NTNU
3. Erik Kolstad, Bjerknessenteret/Uni Research (Absent w/ sick kids)
4. Sigrid Johansen, stud. Geofysisk Inst. UiB
5. Mary Økland, BSBI
6. Eva Britt Isager, klimaseksjonen
7. Per Vikse, klimaseksjonen
8. Karen Tvedt, Byrådsavdeling for Byutvikling
9. Tom Sandahl, Grønn etat
10. Ole Sandven, Grønn etat
11. Signe Wie, Grønn etat
12. Kari Maisol Knudsen, Samfunnssikkerhet og beredskap
13. Hogne Hjelle, VA-etaten
14. Marit Aase, VA-etaten
15. Nazia Zia, VA-etaten
16. Ivar Kalland, VA-etaten
17. Magnar Sekse, VA-etaten
18. Beate Høgh, VA-etaten

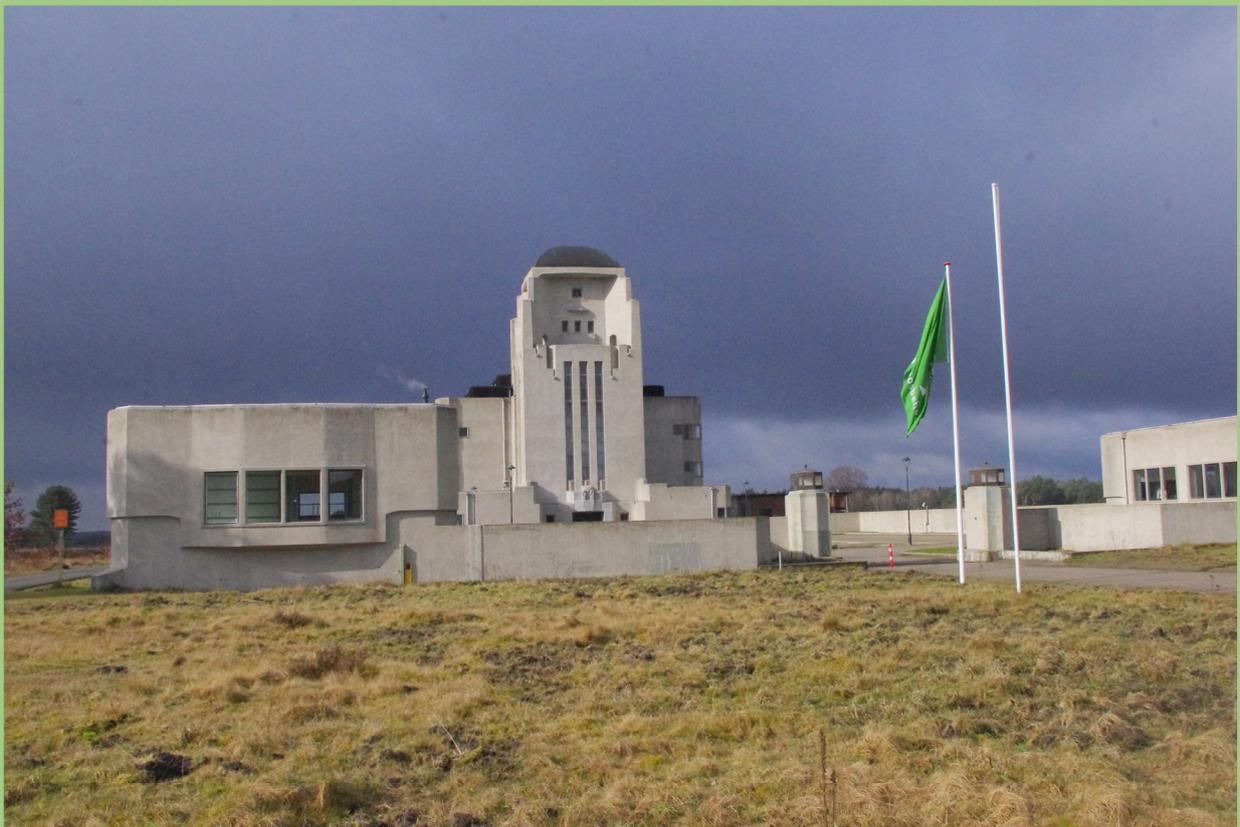
ANNEX 2. Presentations

See attached PDFs

ANNEX 4. Evaluation by participants

No written evaluation performed, but a general discussion of the concept and outcomes. All over the participants were content with the workshop, though some would have liked to have more specific goals in the output / to do list until next time.

The Veluwe M8 report



Radio Kootwijk March 2016

WORKSHOP M8 REPORT FORM



Organizing partner: Provincie Gelderland/KWR Watercycle Research Institute

Workshop Place: Radio Kootwijk, Gelderland The Netherlands

Date: 3rd of March 2016

Number of invited guest: 27 from 13 organisations

Number of guest attending: 24 from 10 organisations

Agenda for the workshop

1. Arrival and lunch
2. Welcome and introductions
3. Inventory of expectations related to climate change
4. The BINGO project and the CoP
5. Inventory and prioritization of issues and questions among the participants
6. Interest and willingness to participate in the CoP
7. Further steps and closure of the meeting

Optional: stroll on the Veluwe.

Objectives :

Informing the stakeholders in the area about the BINGO project and collecting as much information as possible from the stakeholders about climate change related challenges they expect for the research site the Veluwe. A further objective was to create interest within the group of stakeholders and if possible let them join the CoP.

Material distributed to participants: BINGO brochure and BINGO business cards.

Characterization of participants:

Types of organization		
Policy bodies	Provincial	Regional
	Provincie Gelderland	Water Board Vallei en Veluwe
Research institutes	KWR Watercycle Research Institute	
Utilities	Vitens (water company)	
Private land-users org.	Gelders Particulier grondbezit	
NGOs	Natuurmonumenten	

	Bekenstichting Bosgroep Stichting Natuur- en Milieuzorg Noord-West Veluwe
Educational/High school	Hogeschool van Hall Larenstein

Short summary of workshop including activities.

There were plenary sessions and small group break-out session. The break-out sessions were meant to create cohesion between various stakeholders and to collect and prioritize information available amongst the various participants. Reporting on the outcomes was done as plenary exercises.

The first plenary session was meant as a warming up of the group and to enhance active involvement.

1. Participants were asked to line up:

- In order of the alphabet using the first letter of their name
- According to the distance between their home town and the Veluwe
- The number of years they are involved in the area

This created significant interaction between participants.

2. Next people worked in groups, each consisting of three people who did not know each other prior to this workshop, to list the challenges they expect to arise during climate change. The outcomes were presented to the whole group.

3. In a break-out session each participant was asked to list his/her most important question with respect to the area (related to climate change) and to 'sell' their question to other participants. This involved a lot of walking around and interacting also because after each contact, the card with the question had to be swapped. The results were presented in the plenary session and questions that 'sold' best were listed.

4. Plenary sessions were focusing on:

- The introduction to the BINGO project and the CoP by Henk-Jan van Alphen
- The position of the BINGO work on the Veluwe with other ongoing research in the area by Teun Spek.

Finally participants were asked to mention their interest to participate in the CoP. Very few actually voiced their interest for the CoP on the spot. However, all of them want to be invited for the next activities.

Short summary of outcomes and results:

We now have a list of challenges for the research site that stakeholders expect to be caused by climate change in the near future and beyond. Next to the expectations we also have good insight in the needs the stakeholders have to address these challenges: they include knowledge needs, such as data and monitoring/modelling input, policy aspects and interaction with other stakeholders. We also have an extensive list of questions that stakeholders have with respect to the research site. These questions have been put in order of priority.

Expected challenges as mentioned by the participants

- The research site the Veluwe is not capable of fully coping with the impacts of climate change. The system is not robust.
- Climate change predictions have a high level of uncertainty and it is not clear what to expect for the (near) future. What is certain and what is uncertain.
- Impacts are expected on the various functions of the research site; drinking water supply, agriculture, nature, recreation and residential functions.
- Insight of short term and long term impacts is needed to be able to manage the area.
- More forest fires are expected, that might hamper the drinking water supply (access to the pumping stations) but also the introduction of foreign firewater.
- There is mention of a maximum scenario 'Global Economy' for 2040 including a 30% increase in drinking water demand nation-wide. It is not clear how this will be realized. Strategic water reserves are presently being determined on a national and provincial scale.
- Water allocation and water management need more transparency and communication. Which water is earmarked for which purpose. How to deal with water from extreme events: drain or retain in the area.
- Do we expect more drought periods or more extreme rainfall events or both?
- Changes in climate do impact on the evaporation in the area and also on groundwater levels and on changes in vegetation.
- Education and training of future water managers need to address extreme events and the high level of uncertainty.

What are the knowledge and research needs?

- There was general consensus about the need to share knowledge and expertise amongst the various stakeholders in the research area. This knowledge is

required as a basis for proper management of the system to support the various functions the Veluwe has.

- Cooperation of all involved should be high on the agenda.
- Research is needed to fill gaps in knowledge and should focus on landscape scale. The knowledge collected should give insight in the impacts of various functions of the research site and the water system, impacts of extreme events and short term and long term bottle necks.
- Research should focus amongst others on the impact on the water system (including the impact of the urban areas), the water balance in relation to the vegetation and the flora and fauna, the groundwater recharge versus evaporation and potential adaptation measures.
- A joint vision for the area needs to be developed. In this vision it also needs to be made clear for the non-experts (general public/laymen) what the impacts of climate change are and how these are addressed.
- The ultimate aim is to make the system more robust and resilient.

Video testimonials collected? Yes we did four video interviews.

If yes, list of questions and identification of end-users who gave testimonials.

Questions:

1. Today we focus on the impact of climate change on the Veluwe. What is your connection with the area concerned?
2. Do you think climate change will affect the area and more specifically your work and if so can you elaborate a bit on the way it will affect you and your work?
3. Do you see any challenges in the near future as a result of climate change?
4. What are your views on today's workshop and the Community of Practice?

People that were interviewed:

Sara Eeman Hogeschool van Hall Larenstein

Jan Hoogendoorn Vitens Water supply company

René Holdert Gelders Particulier Grondbezit (private land owners)

Jan van der Velde chair Bekenstichting

In our opinion the most positive aspect of the workshop was the interaction between the stakeholders and the fact that there was consensus about a number of issues such

as the need to cooperate and the call for integration of knowledge available at the various organisations.

The most negative aspect of the workshop was the fact that even though all want to be invited to the future activities, only few actually full-heartedly said yes to the CoP.

What suggestions do you have for future workshops?

There is a need and request for interaction between the six CoP or at least exchange of information between CoPs. We suggest to make this a standard issue on the agenda. We experienced that for many people the use of Basecamp does not appeal or is not a popular option.

Annexes

1- List of participants



Naam	Organisatie
Henk-Jan van Alphen	KWR Watercycle Research Institute
Flip Witte	KWR Watercycle Research Institute
Stefanie Pflug	KWR Watercycle Research Institute
Adriana Hulsmann	KWR Watercycle Research Institute
Jolijn van Engelenburg	Vitens
Rosa Hueting	Vitens
Jan Hoogendoorn	Vitens
Sjoerd Rijpkema	Vitens
Richard Meijer	WS Vallei en Veluwe
Wim Goedhart	Natuurmonumenten
Robbert Ketelaar	Natuurmonumenten
René Holdert	Gelders Particulier grondbezit

Jan van de Velde	Bekenstichting
Wim Zeeman	Bekenstichting
Rino Jans	Bosgroep
Sara Eeman	Hogeschool van Hall Larenstein
Ad Bot	Hogeschool van Hall Larenstein
Daan van Keulen	Hogeschool van Hall Larenstein student
Gerard van Dijk	Stichting Natuur- en Milieuzorg Noord-West Veluwe
Jan Streefkerk	Stichting Natuur- en Milieuzorg Noord-West Veluwe
Marcel Vossenstein	Stichting Natuur- en Milieuzorg Noord-West Veluwe
Teun Spek (coördinator)	Provincie Gelderland
Cees Collé	Provincie Gelderland
Britta Verboom (dagvoorzitter)	Provincie Gelderland

Not present: Staatsbosbeheer (Eric Klein Lebbink), Vallei Gemeenten (Charles Rijsbosch), Provincie Gelderland (Bram Vreugdenhil).

D5.2 COMPILATION REPORT ON INITIAL WORKSHOPS AT THE SIX RESEARCH SITES
Month 24 2017
Tagus M8 report

TAGUS BASIN RESEARCH SITE, PORTUGAL

SETTING THE SCENE



Maria João Freitas, Ricardo Bernardo, João Lutas Craveiro

LNEC

Organizing partner: LNEC - National Laboratory of Civil Engineering

Workshop Place: LNEC, Lisboa, Portugal

Dates:

1st session – 16th of February 2016

2nd session – 5th of April 2016

Number of invited guest / Number of guest attending:

1st session - 49 from 24 organizations / 37 from 16 organizations (22 female & 15 male)

2nd session – 56 from 31 organizations / 29 from 11 organizations (16 female & 13 male)

Global guest attending: – 48 from 19 organizations (26 female & 22 male)

Workshop Agenda

1 st session - 16 th of February 2016	2 nd session - 5 th of April 2016
9.30h – Welcome & Housekeeping	9.30h – Welcome & Housekeeping
10.15h – BINGO Video & Participants presentation	10.00h – Meeting BINGO & WAreas
11.00h – Introduction to the Research Site	11.30h – WS#1a outputs debate – The Hydra metaphor
11.15h – SWOT in Round World Café & Debate	12.45h – Mapping risks in Tagus Basin
12.45h – Shopping exercise on SWOT	13.00h – Lunch break
13.00h – Lunch break	14.00h – Mapping and Storytelling exercises
14.30h – LEGO & PESTLE - Risk Perception exercise & Collective Debate	14.55h – “Persona” Exercise & presentation
16.00h – What is a Community of Practice & BINGO Basecamp presentation	15.45h – Debriefing, Further steps; WS#1b evaluation & Farewell
17.00h – WS#1a Debriefing	
17.15h – Further steps & WS#1 evaluation & Farewell	

Objectives:

1st session: 16th of February 2016

- ✓ To start-up a regular and friendly interaction between Stakeholders (STKH)
- ✓ To introduce STKH, with “smooth” information, to BINGO Persona
- ✓ To engage STKH in a collaborative approach to the Research Site
- ✓ To create a “share” ambiance around perceptions on climate change challenges and climate risks to the RS Tagus Basin
- ✓ To launch the BINGO Community of Practice (CoP) in its principles and tools and to motivate STKH to a CoP active, relevant and co-productive experience

2nd session: 5th of April 2016

- ✓ To detail BINGO objectives and framework
- ✓ To explore WS#1 outputs and climate risks to the RS Tagus Basin
- ✓ To allow a narrow “definition” of perceived risks in Tagus Basin

Material distributed to participants:

- BINGO stickers & cards for individual identification
- General program;
- List of participants and affiliation;
- Research Site illustrative map;
- BINGO brochure;
- Permission forms for recordings and Facebook posts;
- Keynotes on ethic use of produced information and data reservations;
- Individual evaluation card

Characterization of participants (Types of Organizations):

Policy bodies		
<i>National</i>	<i>Regional</i>	<i>Local</i>
ERSAR –Water and Urban Waste National Regulator APA – Environment Portuguese Agency ANPC – Civil Protection National Authority IPMA – Portuguese Sea and Atmosphere Institute DGADR – Agriculture and Regional Development National Board	CCDR-LVT – Lisbon & Tagus Valley Regional Development Authority DRAP LVT – Agriculture & Fishing Regional Department APL – Lisbon Public Harbour Agency	CM VFX – Vila Franca de Xira City Council CM Almeirim – Almeirim City Council CM Loures – Loures City Council CIMLT – Lezíria do Tejo Inter-Municipal Community
Research institutes	LNEC – National Laboratory of Civil Engineering SPI – Portuguese Society for Innovation CES –UC – Social Studies Center, Coimbra University	
Water Utility	EPAL – Lisbon Water Supply Utility	
Associations	CAP – Portuguese Farmers Confederation ABLGVFX – Lezíria Grande and Vila Franca de Xira Beneficiaries Association ARBVS – Sorraia Valley Beneficiaries and Irrigation Association	

Summary of workshop activities

The Tagus research site Stakeholders and the Research Team were invited to a 1st Workshop (WS) “Setting the Scene” (16th of February 2016) and then to a 2nd one (5th of April 2016) to explore and to go deeper in the facts regarding BINGO and the Portuguese Research Site (RS).

In the **1st session of the Workshop**, participants were welcome by the research host team, invited to make their registration and to share a coffee at the Coffee Corner. They also picked-up a card, check their working table according to the “naipe”/colour and sat in the four available tables. A longitudinal table was placed at the centre of the room.

The host made a brief welcome to WS#1 and the facilitator introduced WS#1 Housekeeping information (i.e objectives of the meeting, why attendants have been invited, how it is intended to run and a presentation of meeting staff roles). The research site Tagus was briefly introduced by a Video and all participants presented themselves saying their name, the name of the organization they represent, their organization main activities and mission and their role there. Inspired by the sorted card, participants were also invited to share a personal favorite tip and to tell a short story related to the word. The BINGO Persona (Rafaela Matos, the project coordinator) also introduced herself following the same procedure. This moment was very relevant to establish an informal and friendly ambiance to facilitate joint work during the day.

Then, the Research Site Coordinator, supported by a powerpoint, made a short introduction to the research site – Tagus Basin, sharing available data.

Participants were, then, invited to co-produce a SWOT in Round World Café. Each of the four tables was devoted to one of the SWOT dimensions (Strengths, Weakness, Opportunities and Threats) addressing 3+1 previous challenges: a) water and services provision; b) urban floods; c) agriculture and droughts; and d) other issues. In each table participants were invited to give inputs and to promote the discussion about its SWOT dimension and moved to another table after 15 minutes time. Each table maintained one “resident facilitator” (some tables just preferred to maintain two facilitators) to keep the discussion alive and to make sure that “all” contributions and ideas were registered in post-its in the four available color “challenges” postboards. At the end, each table facilitator made a short *résumé* and the collective production were placed in the big central table while an open debate was facilitated.

Participants were, then, invited to a “shopping game” around the table where the SWOT co-production was settled. Each participant was provided with 3 “green signs” to post in the dimensions they consider of “utmost relevance” and with 3 “red signs” to post in the ones they consider of “utmost difficulty to manage”. After an informal lunch a brief assessment of the most “relevant” and “difficult” dimensions was made and the discussion was enlarged and deepen. All the production so far was posted in a wall of the room, to be accessible to all and consulted during the afternoon works.

Risk perception was, then, addressed by using a LEGO exercise. Around the question “How far is Tagus Basin RS exposed to risks?” participants were invited to post in each Lego piece: a) risks they identify at the RS (using red post-its), and b) ideas/solutions in need, to cope with those risks, in a sustainable and resilient way (using green post-its). All the Lego pieces were placed at the big central table and then participants organized the pieces following the PESTLE framework, clustering the pieces according to their political, economic, social, technological, legal and environmental nature. It was a very active moment when participants had the opportunity to discuss fears and to realize how different concepts and perspectives were mobilized. After that, WS#1 facilitator invited participants to look at the contributions on the table, to deepen the topic and to create a joint perception on the several and diverse dimensions and multiple ways to approach the topic (complex problem approach) and eventual tensions and paradoxes.

After this joint production, and based on the workshop experience of collaborative work, participants were introduced to the BINGO Community of Practice (CoP) main principles and objectives, and to BINGO Basecamp structure, features and rules, by a virtual flight. Participants were invited to keep in touch and to keep sharing ideas, questions, and insights through the Basecamp Platform and a 2nd face-to-face workshop was scheduled to the 5th of April, to go deeper in the knowledge and facts of the BINGO project and of the Tagus Research Site.

The **2nd Workshop session** participants met in a shared coffee, and welcome the new members. Again, brief housekeeping information was shared and a brief presentation around the tables was made.

According to the three objectives that have been settled in the previous session, a first approach was made around BINGO framework and working areas. The BINGO research staff introduced and explained the planned BINGO activities and expected outputs, and an open dialogue was facilitated between participants around Questions & Answers to go deep into details.

Then, till lunch time the WS#1 1st session was dedicated to share the results of the 1st Session data treated treated outputs were shared with the participants. Participants were invited to follow a metaphor (The Hydra metaphor) in order to a) recognize the multidimensionality and heterogeneity of perspectives, b) follow a “brick by brick” framework putting together BINGO and Stakeholders mind maps, clarifying and recognizing bridges and gaps; c) explore potential tensions between words & concepts on use; and d) build a joint perception and references, enabling future fruitful dialogues and, in same way, a shared and common language.

During lunch break, participants were invited to identify their perceptions of risk vulnerabilities, and also protected areas in the territory, in order to create a joint evaluation of “impact zones”. A big map of the Lower Tagus Basin was posted at the room wall, and each participant sign on it, by using different colour post-its and brief words. Participants were invited to identify and mark a) places they identify as more vulnerable to risks (using red post-its); b) places they identify as less vulnerable to risks (using green post-its); and c) places they are more acquainted with, since they usually move in.

In the afternoon, and in order to join and document real events and risk features, each table group prepared and shared storytellings. One of the groups analyzed the impact zones map and told to the remaining groups its “story”. The other four groups chose an impact zone and described an event that occurred in the past, and simulate would happen if a similar and/or a different event would occur again nowadays. This exercise and the shared storytelling allowed the identification of main triggers do be addressed and developed, both in BINGO and within the stakeholders professional daily activities.

At the end of the working journey, and inspired by the previous exercise, each group built a “Persona” and explored a profile: (a) I am... a drought in Tagus Basin; (b) I am ... a little farmer at the Tagus Basin; (c) I am ... a teenager living at Tagus Basin; and (d) I am ... a decision maker. Each group shared with everyone their “Persona” and interactions between the different “Personas” were encouraged.

The WS#1 facilitator animated a final debriefing and push to follow up interactions and debates on Basecamp Platform. Participants were invited to fulfill the individual WS#1b evaluation card and to share a last farewell coffee.

Summary of outcomes and results:

1. CoP motivation and dynamics was settled and developed during each of the two face-to-face meetings and, in the meantime, in the Basecamp Platform. Everyone asked to be kept in contact and participants that couldn't attend the 2nd meeting send their apologies.
2. The main thematic topics to be addressed at Tagus Basin have been identified as follows:
 - a) Extreme events – Climate changes
 - b) Agriculture – saline intrusion; water availability; agriculture efficiency; ecosystem characteristics
 - c) Water Services – infra-structures; system resilience
 - d) People and goods safety – land use; awareness; knowledge, end-users profile
 - e) Policy /collective action – basin shared with Spain; control; competition/cooperation; land planning; management/decision; prevention.
3. Most “relevant” and “difficult” dimensions to approach have been identified as follows:
 - a) “Agriculture” and “People and goods safety” were perceived as the more relevant topics to address (i.e. water availability; new technologies and efficient and smart agriculture; nature based solutions implementation; awareness and communication with end-users and inhabitants).
 - b) The most difficult dimensions identified were the “Water Services” and the “Policy and Collective action” (i.e. Tagus river Basin shared with Spain; saline intrusion; river banks occupation; aged infra-structures and water losses).
 - c) The main concern to overcome has been expressed as the tension between “competition” and “cooperation” by different sectors and stakeholders around water availability, and between the different sustainability dimensions (economic, social, environmental and institutional).
4. A shared reference to address risks (with details on climatic variables; extreme events; impact on resources; thematic areas of impact) was settled.
5. Risk vulnerabilities and protected areas at the Tagus Basin were mapped.

6. Critical dimensions felt in past events and the foresight of “keeping versus change of impacts” if those events would happen again (based on floods events and use of green solutions) have been identified and discussed:
 - a) In case of extreme events it is important to ensure alternative water provision as to ensure that consumers can take the water to their own houses;
 - b) In case of extreme events, social media tools are crucial to facilitate collective actions (awareness, adaptive behaviors, etc.) but also to prevent alarm disruptive reactions. The use of ICTs (Information and Communication Technologies) is a tool that facilitates awareness and can promote collective organization;
 - c) We can learn from the past with respect to green or nature-based solutions but also with their dependency on critical factors (i.e. political, financial and human resources).
7. Awareness and perception on specific events and users profiles (drought persona; small farmer; local teenager; policy maker) was built:
 - a) Drought was identified as “silent” and “subtle” in its manifestations, as well as “unsparing” in its consequences. Even if selective at the beginning, it becomes more “in-depth” as it reveals.
 - b) Small farmers are more skeptical to technological solutions to address climate change. They experience climate change impacts, even they don’t theorize much about it. They are much more vulnerable than big farmers mainly in what regards access to insurance and alternative organization protections.
 - c) Teenagers are more environmental sensitive and ICT users. They are also more focused on direct impacts of climate change in daily life (i.e. mobility and commuting).
 - d) Policy makers are very sensitive to their public image and to their public opinion and most focused on the immediate results of actions to be taken. Climate change is now a topic in their agenda, even though they don’t know yet what would be the best actions to undertake.
8. The results of the different exercises allowed to identify:
 - a) A global and systemic understanding of the climate change impacts and its complexity;

- b) A complex, multidimensional and multiscale impacts chain at the Tagus RS;
- c) There are big challenges to “human capacity” to be addressed regarding adaptation to extreme events;
- d) Attention should be paid to solutions that create a “false feeling” of safety;
- e) Domains and sectors where some solutions can be found are different from the ones where the main impacts are expressed;
- f) Diverse approaches to the topic according to the specificity of stakeholders main activities (focusing differently the same topics);
- g) Diverse understanding and tensions of crucial concepts (i.e. floods/flooding/inundation; drought/pollution; dimension as causes/consequences/solutions; risk pressure/risk exposure/ risk vulnerability/ risk perception);
- h) If past events that people lived would happen again, some critical points would be nowadays overcome, but certainly others would emerge as news;
- i) There are discrepancies among critical dimensions identified “in abstract” and their mapping (i.e. perception of critical topics and critical zones to go deep on data collection);
- j) There are general stereotypes and “caricatures” of users profiles that show up motivation to go deeper on their exploitation and better understanding.

Video testimonials collected? Yes, four video interviews were filmed on the 16th February 2016.

If yes, list of questions and identification of end-users who gave testimonials.

Questions:

- ✓ In the scope of your activity, which pressures/changes are causing impacts in water uses?
- ✓ What implications does climatic change already have in your activity?
- ✓ Which solutions do you think may be a priority, in order to deal with these risks?

People that gave the video testimonials (in English language):

André Fernandes – ANPC

Maria Reis Gomes – CCDR-LVT

Alberto Freitas – DGADR

Basilio Martins – EPAL

In our opinion the most positive aspect of the workshop was the good ambiance between stakeholders, their interest in BINGO research development and the richness of relevant knowledge co-production. Also it was relevant to clarify the critical dimensions that will be addressed by BINGO research and the ones that won't, but may mobilize interactions between stakeholders. While coming from a more abstract approach to critical dimensions towards their "real mapping", a relevant joint perception began to be built but also relevant knowledge and communication gaps have been identified.

The most negative aspect of the workshop was the intensive co-production and lack of time to go deeper into some topics, due to the richness of the contributions and the interest of participants to continue the discussions.

What suggestions do you have for future workshops?

It would be relevant to stress the focus in "real" situations, and to go deeper in understanding some "empty" zones in risk mapping of the Tagus RS. It would also be helpful to continue developing the communication between researchers and stakeholders in what regards concepts clarifications and joint perceptions on diverse points of view. As far as some solutions already came out, their exploitation and development should be encouraged in next meetings.

Annexes

1. List of participants

Name	Organization	1st session 16th of February 2016	2nd session 5th of April 2016
Catarina Madaleno	ABLGVFX	X	
André Fernandes	ANPC	X	
Carlos Mendes	ANPC	X	
Luís Sá	ANPC		X
Helena Alves	APA	X	
Rita Silveira Ramos	APL		X
José Núncio	ARBVS	X	
Pedro Miguel César Ribeiro	Câmara Municipal de Almeirim		X
Carlos Nascimento	Câmara Municipal de Loures		X
Luís Vieira	Câmara Municipal de Loures		X
Rui Alves	Câmara Municipal de Loures		X
Marta Neves	Câmara Municipal de Vila Franca de Xira	X	
Ricardo Pedro	Câmara Municipal de Vila Franca de Xira	X	
Alexandra Brito	CAP	X	
Maria Reis Gomes	CCDR-LVT	X	X
Marta Alvarenga	CCDR-LVT	X	
Alexandre Tavares	CES-UC	X	
Ana Garcia	CIMLT	X	X
Alberto Freitas	DGADR	X	X
António Campeã da Mota	DGADR	X	
Pedro Brito	DGADR	X	
Fernanda Fenyves	DRAP-LVT	X	
Paula Guerra	DRAP-LVT		X
Ana Luís	EPAL	X	X
Basílio Martins	EPAL	X	X
Francisco Serranito	EPAL	X	
Rute Rodrigues	ERSAR	X	X
Vanda Pires	IPMA	X	
Ana Estela Barbosa	LNEC	X	X
André Fortunato	LNEC	X	X
Elsa Alves	LNEC	X	X
Fernanda Rocha	LNEC	X	X
Han de Lange	LNEC		X

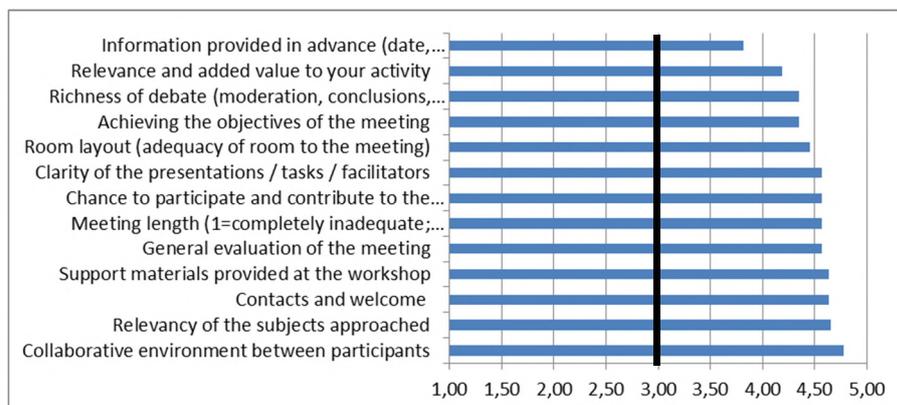
João Craveiro	LNEC	X	X
Jourian Ligtenberg	LNEC		X
Manuel Oliveira	LNEC	X	
Maria Emília Novo	LNEC		X
Maria João Freitas	LNEC	X	X
Maria José Henriques	LNEC		X
Marta Rodrigues	LNEC	X	X
Paula Freire	LNEC	X	X
Rafaela Matos	LNEC	X	X
Ricardo Bernardo	LNEC	X	X
Rui Rodrigues	LNEC	X	X
Teresa Leitão	LNEC	X	
Teresa Viseu	LNEC	X	X
Liljana Georgievska	SPI	X	
Sofia Esteves	SPI	X	

Overview of the Workshop evaluation by Participants

1st session – 16th of February 2016

Nº of evaluations: 23 (score scale: 1.00 to 5.00)

Collaborative environment between participants	4,78
Relevancy of the subjects approached	4,65
Contacts and welcome	4,64
Support materials provided at the workshop	4,64
General evaluation of the meeting	4,57
Meeting length (1=completely inadequate; 5=adequate)	4,57
Chance to participate and contribute to the results of meeting	4,57
Clarity of the presentations / tasks / facilitators	4,57
Room layout (adequacy of room to the meeting)	4,45
Achieving the objectives of the meeting	4,35
Richness of debate (moderation, conclusions, co-produced results...)	4,35
Relevance and added value to your activity	4,19
Information provided in advance (date, location, schedule)	3,82



Summary of written comments by participants:

Positive

- Collaborative and informal environment
- Creativity, interaction and sharing
- Diversity of stakeholders
- Clarity and dynamism of presentation
- Use of Basecamp
- Exchange of ideas
- Excellent logistic support
- Methodology

Negative

- Expositive moments
- Time constraints
- Lack of final summary
- Lunch
- Lack of initial information about BINGO Project
- Confusion of concepts

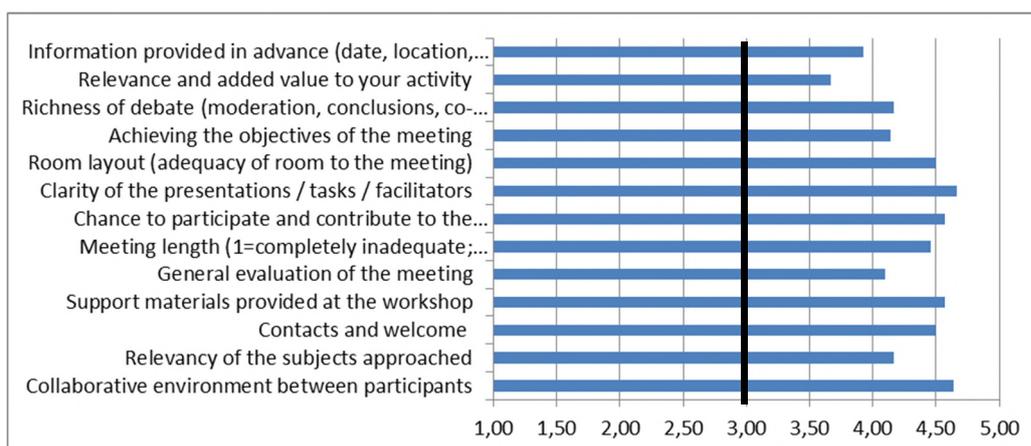
Suggestions

- Stakeholder of civil society
- Present the current stage of BINGO Project
- Invitations should be institutional and not personal
- Simple lunch to eat standing up

2nd session – 5th of April 2016

Nº of evaluations: 14 (score scale: 1.00 to 5.00)

Collaborative environment between participants	4,64
Relevancy of the subjects approached	4,17
Contacts and welcome	4,50
Support materials provided at the workshop	4,57
General evaluation of the meeting	4,10
Meeting length (1=completely inadequate; 5=adequate)	4,46
Chance to participate and contribute to the results of meeting	4,57
Clarity of the presentations / tasks / facilitators	4,67
Room layout (adequacy of room to the meeting)	4,50
Achieving the objectives of the meeting	4,14
Richness of debate (moderation, conclusions, co-produced results...)	4,17
Relevance and added value to your activity	3,67
Information provided in advance (date, location, schedule)	3,93



Summary of written comments by participants:

Positive

- Creativity and transmission of knowledge
- Collaborative, informal, participatory and co-production environment
- Opportunity to discuss with stakeholders and understand their vision, problems and needs
- Discussion and relevance of the topics

Negative

- Lack of time to go deep in some topics

Suggestions

- Site visit

Cyprus M15 report

WORKSHOP M15 REPORT

Stakeholder Perceptions on Climate Adaptation Strategies & Measures

Christos Zoumides, Elias Giannakis, Adriana Bruggeman
The Cyprus Institute

Ayias Iacovides, Marios Mouskountis, Iacovos Iacovides
I.A.CO LTD



15 September 2015
Peristerona, Cyprus

Organizing partners: The Cyprus Institute and I.A.CO
Workshop Place: Peristerona community hall
Date: 15 September 2016
Number of invited guest: 23 (excluding project team members)
Number of guest attending: 11 (+6 project team members)

Agenda for the workshop

- 17:15 Welcome
- 17:25 Overview of BINGO activities
[policy and governance interview results]
- 17:45 Scenario Development [Visioning]
- 18:45 Break – BINGO case-study video
- 19:15 Preparedness – Evaluation of current and potential adaptation measures
- 20:15 Conclusion
- 20:30 Dinner

The workshop focused on the Peristerona watershed, one of the two study sites in Cyprus, where drought is the main climate hazard.



Figure 1: Invitation to the workshop

Objectives:

- to provide an overview of the results from the questionnaire on policy and governance
- to understand the perception of stakeholders regarding climate change impacts and expectations (good and bad) in terms of adaptation, and discuss possible events in the next 10 years (scenarios)
- to evaluate existing and potential climate adaptation measures

Material distributed to participants:

- Project flyers
- Short description of adaptation measures, specifying the main goal, the advantages and disadvantages of each measure (0.5 page per adaptation measure).

Table 1: Range and roles of workshop participants

R&I – Cyl	3
Policy Bodies – National level	1
Policy Bodies – Municipal (Community – domestic water) level	4
Utilities – Irrigation Associations (Farmers)	6
Sector Organizations – I.A.CO	3

Note: Cyl & I.A.CO team members facilitated the workshop discussions

Introduction & Results of the Policy and Governance interview

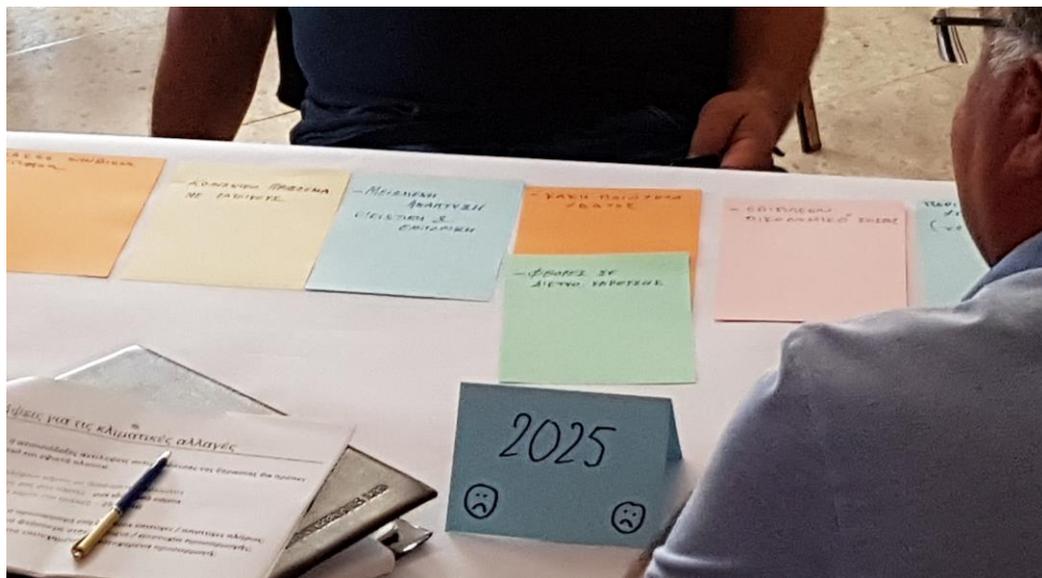
The workshop started by welcoming the participants. An overview of the workshop agenda (slide 2) and a brief introduction to the BINGO project (slides 3 and 4) was presented by Christos Zoumides (Cyl). Then, an overview to the CoP-engaging activities of the project was given, to remind the participants about the main outcomes of the 1st workshop (Feb. 2016 – slide 5), and to update everyone on the main findings of the policy and governance interviews (June 2016 – slide 6); four out of six responders to the interview were also participating in the workshop. The participants were asked for feedback on the governance findings, but there were no comments.

Visioning

Prior to the visioning exercise, stakeholders agreed on the participatory dialogue 'rules' (slide 7). The visioning exercise was explained (slide 8), indicating that we are looking for the perceptions of participants towards climate change and particularly towards droughts. We didn't refer to scenario development, as this term would have been challenging for stakeholders. Originally, this exercise was planned for four groups; two sectors (irrigation and domestic water supply) with two groups per sector, one for the optimistic and one for the pessimistic perceptions. Given the number of attendants, participants were separated in two sectoral groups; farmers and the Department of Agriculture official addressed the irrigation issue, while community leaders addressed the domestic water supply. Four tables were set up with a large sheet of white paper, A3-size colored cards and markers. Each group did first the optimistic and then the pessimistic table. Some time was given to stakeholders to write their perceptions on optimistic/pessimistic future developments on the cards and then share and discuss them with the rest of the group. The cards were grouped and connected showing cause and effects relations. The discussions were moderated by two project partners (1 Cyl & 1 I.A.CO) per sector. Once the views were discussed and agreed between the groups, a representative of each group presented to the others their optimistic and pessimistic future perceptions. The main findings of each group are given below.

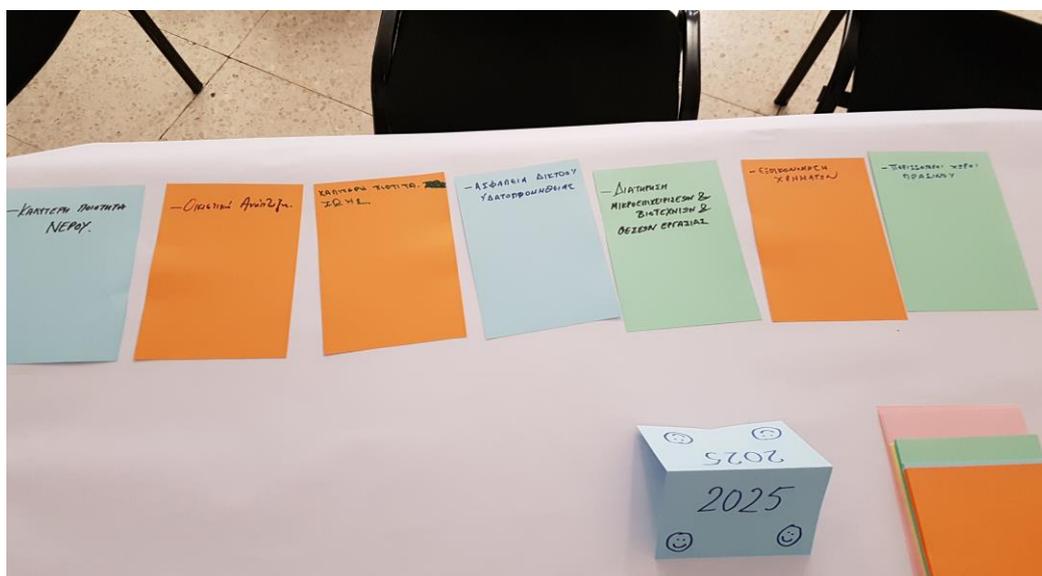
Domestic Supply – Pessimistic views

Poor hygiene	+
Poor water quality	→
Social problems with communities' residents	→
Reduced residential and commercial development	→
More frequent damages to water supply network	→
Additional financial cost	→
Environmental degradation (less green spaces)	



Domestic Supply – Optimistic views

Better water quality	+
Secured water supply network	→
Residential development	→
Better quality of life	→
Maintenance of small-medium enterprises and more job opportunities	→
Savings of financial resources (at the community level)	→
More green spaces	



BINGO Video

During the second part of the break we showed the BINGO Cyprus video on drought (two of the featured stakeholders were present in the audience). Christos Zoumides added real-time translations of the English parts.

Discussion on preparedness

After the break and the display of the case-study video, Christos Zoumides (Cyl) explained to participants the purpose of the preparedness exercise, i.e. to discuss adaptation measures to droughts and to end-up with a hierarchy of preferred measures according to the perception of stakeholders. In total, 18 adaptation measures to droughts were pre-selected by the research team, 10 for irrigation and 8 for domestic supply. Stakeholders were asked to return to their sectoral groups and discuss each measure. A handout with a short description of each measure was given to stakeholders to facilitate the discussion. Each measure was first explained by the group moderator. Stakeholders were then asked to discuss and agree whether the measure *exists*, if it is *relevant* to address the main climate risk (drought) and if it is *feasible*. The decision of each group was marked on an A1 sheet which listed all the measures per sector; when no agreement was reached among stakeholders it was marked by a semicolon (dash in the tables below). After all pre-selected measures were discussed and evaluated, stakeholders were asked to add any other measure that they think important. Stakeholders were then asked to vote for the preferred adaptation measures of their sector. Each stakeholder received half the votes (stickers) of the total number of preselected measures, i.e. 4 votes were given to stakeholders in the domestic supply sector and 5 votes to the irrigation group. Stakeholders could allocate their votes to any measure, including multiple votes to one measure. After the heated discussions, they could all vote at their leisure. The results are presented below.

No.	Adaptation Measures for Irrigation (votes by 7 stakeholders)	Existing	Relevant	Feasible	Votes
1	Improved irrigation (scheduling) technologies	✓	✓	✓	4
2	Installation of water meters on groundwater pumps	x	-	-	2
3	Water pricing enforcement	x	-	-	1
4	Use of treated sewage water	x	✓	✓	7
5	Farm education	✓	✓	✓	3
6	Code of Good Agricultural Practices enforcement (including pesticides)	✓	✓	✓	1
7	Use of drought tolerant agricultural crops	x	✓	✓	3
8	Integrated livestock waste management	✓	✓	✓	
9	Groundwater recharge systems	✓	✓	✓	3
10	Improve irrigation divisions cooperation	-	✓	✓	2
11*	Improve infrastructure (dam construction and convey network)	x	✓	-	9

✓ = Yes, x = No, - = Disagreement

* This measure was suggested by stakeholders but not everyone agreed. In particular, farmers in the midstream area of Peristerona watershed (Orounda) are in favour of constructing a dam for irrigation, but farmers further downstream are against it, as less water will flow and recharge groundwater, i.e. the only source of water for irrigation.

Περιγραφή	Υφιστάμενο	Σχετικό	Εφικτό	Ψήφοι
1 Σύγχρονα συστήματα άρδευσης	✓	✓	✓	4
2 Εγκατάσταση μετρητών νερού στις αντλίες των υπόγειων υδάτων		✓	✓	2
3 Εφαρμογή τιμολόγησης του νερού		✓	✓	1
4 Χρήση ανακυκλωμένου νερού		✓	✓	7
5 Γεωργική εκπαίδευση	✓	✓	✓	3
6 Εφαρμογή Κώδικα Ορθής Γεωργικής Πρακτικής - <i>Ο.Γ.Π. - Peristerona</i>	✓	✓	✓	1
7 Χρήση ανθεκτικών καλλιεργειών στην ξηρασία		✓	✓	3
8 Ολοκληρωμένη διαχείριση κτηνοτροφικών αποβλήτων	✓	✓	✓	
9 Συστήματα εμπλουτισμού υπόγειων υδάτων	✓	✓	✓	3
10 Βελτίωση συνεργασίας μεταξύ μελών των Αρδευτικών Τμημάτων		✓	✓	2
11 <i>Βελτίωση υποδομής - Βελτίωση Αρδευτικού Οδικού</i>		✓	✓	9
12 				

No.	Adaptation Measures for Domestic Water Supply (Votes by 3 stakeholders)	Existing	Relevant	Feasible	Votes
1	Domestic water saving equipment	✓*	✓	✓	4
2	Maintenance and modernization of water distribution networks	x	✓	x	2
3	Rainwater harvesting systems	x	✓	✓	2
4	Treated sewage water for green infrastructure	x	✓	✓	1
5	Water desalination	x	✓	x	
6	Integrated livestock waste management	x	✓	✓	
7	Awareness campaign for local society	✓	✓	✓	3
8	Improve stakeholders' cooperation	✓	✓	✓	

✓ = Yes, x = No, - = Disagreement

* Domestic water saving equipment exist but not in every household

Μέτρα Προσαρμογής - Ύδρευση

	Περιγραφή	Υφιστάμενο	Σχετικό	Εφικτό	Ψήφοι
1	Συστήματα εξοικονόμησης νερού στα νοικοκυριά	✓	✓	✓	●●●●
2	Συντήρηση και εκσυγχρονισμός των δικτύων διανομής νερού	x	✓	x	●●
3	Συστήματα συλλογής όμβριων υδάτων	x	✓	✓	●●
4	Χρήση ανακυκλωμένου νερού για άρδευση χώρων πρασίνου	x	✓	✓	●
5	Αφαλάτωση	x	✓	x	
6	Ολοκληρωμένη διαχείριση κτηνοτροφικών αποβλήτων	x	✓	✓	
7	Εκστρατείες ευαισθητοποίησης κάτοικων τοπικής κοινωνίας	✓	✓	✓	●●●
8	Βελτίωση της συνεργασίας εμπλεκόμενων φορέων	✓	✓	✓	
9					
10					

Short summary of outcomes and results

- The pessimistic perceptions are closer to reality for farmers; negative perceptions for the future were more easily expressed compared to positive.
- Drought is related to water availability and precipitation, yet farmers and community leaders acknowledge that the future could look brighter with better organization and public awareness on water conservation
- According to the farmers' group, the agricultural sector requires more support by the government, including the establishment of new infrastructure, such as a dam and conveyance network. However, the latter view was conflicting; the downstream communities did not agree with this option as a dam will reduce water flow and therefore groundwater recharge for the downstream area.
- Recycled treated water for irrigation is a resource that is welcomed by farmers.
- Desalination seems to be the last resort for domestic water supply as this is an expensive solution for communities.
- Domestic water saving equipment can be a relatively low cost solution for rural households with high efficiency. People are not fully aware of the benefits of such systems; more awareness campaigns are needed to strengthen the adoption of these systems.

II. In your opinion, what were the most positive and less positive aspects of the workshop?

Participants had the chance to share their perceptions and discuss different adaptation options to climate change. It was also interesting that the new adaptation measure suggested for the agricultural sector (i.e. dam construction) gave the opportunity to experience the arguments between farmers that are for or against it.

On the less positive aspects, despite our efforts to engage more participants (23 people invited), only 10 participants attended. Most participants were called by phone to remind and encourage them to attend. Nevertheless, the ones that attended were opinionated and active in the discussions and the goal of the workshop was achieved.

III. What suggestions do you have for future workshops?

The flexibility in adjusting the recommended workshop structure to the case-study specificities is very welcomed; we want to keep it as such for future workshops.

In line with the suggestions by stakeholders (see evaluation in Annex 3) we could organize short (e.g. 2 hours) meetings with semi-technical presentations on 1-2 adaptation options (e.g. the most voted ones), followed by participatory discussions. We could ask two government officers to present these options, thus ensuring more attendance by experts. For instance, instead of organizing one workshop in M22 (April 2017), two short workshops could be organized in February and April 2017. Also, in the future workshops we will try to engage more women.

Annex 1: List of participants

No.	Name	Organization / Group
1	Aris Constantinou	Domestic – Astromeritis Community Council
2	George Yiorkatzis	Irrigation – Peristerona
3	George Michaelides	Irrigation – Katokopia Community Council
4	Menelaos Koumpoushis	Irrigation – Orounta
5	Michael Fotiou	Domestic – Peristerona Community Council
6	Xanthos Papashiantis	Irrigation – Orounta
7	Stelios Charalambous	Irrigation – Katokopia
8	Sotiris Hadjidimosthenous	Domestic – Orounta Community Council
9	Christakis Kampitzis	Irrigation – Kato Zodia
10	Christos Hadjiantonis	Irrigation – Department of Agriculture
11	Adriana Bruggeman	BINGO partner – Cyl
12	Christos Zoumides	BINGO partner – Cyl
13	Elias Giannakis	BINGO partner – Cyl
14	Ayis Iacovides	BINGO partner – I.A.CO
15	Iacovos Iacovides	BINGO partner – I.A.CO
16	Marios Mouskountis	BINGO partner – I.A.CO

BINGO: Αντιλήψεις και Μέτρα Προσαρμογής στις Κλιματικές Αλλαγές
15 Σεπτεμβρίου 2016, Περιστερώνα

Όνομα	Οργανισμός	Υπογραφή
Ανδρέας Γεωργίου	Κάτω Μονή - Χοιροτρόφος	
Ανδρέας Γιωρκάτζης	ΑΤ Περιστερώνα	
Ανδρέας Χριστοφορίδης	ΑΤ Περιστερώνα	
Άρης Κωνσταντίνου	ΚΣ Αstromeritis	
Γιώργος Γιωρκάτζης	ΑΤ Περιστερώνα	
Γιώργος Κωνσταντίνου	ΑΤ Κατωκοπιά	
Γιώργος Μιχαηλίδης	ΚΣ Κατωκοπιάς	Γ. Μιχαηλίδης
Γιώργος Χαράλαμπος	Επαρχιακή Διοίκηση	
Ιωάννης Φουσκωτός	ΚΣ Πάνω Ζώδιας	
Μενέλαος Κουμπούσιης	ΑΤ Ορούντα	
Μιχάλης Ρήγας	Τμήμα Γεωλογικής Επισκόπησης	
Μιχάλης Φωτίου	ΚΣ Περιστερώνας	
Νικόλας Χριστοφίδης	Τμήμα Αναπτύξεως Υδάτων	
Ξανθός Παπασιάντης	ΑΤ Ορούντα	Ξανθός Παπασιάντης
Πέτρος Χατζηνεοφύτου	ΚΣ Περιστερώνας	
Στέλιος Χαράλαμπος	Κατωκοπιάς	
Σωτήρης Χατζηδημοσθένους	ΚΣ Ορούντας	Σωτήρης Χατζηδημοσθένους
Χαράλαμπος Δημητρίου	Τμήμα Αναπτύξεως Υδάτων	
Χαράλαμπος Μασσούκας	ΚΣ Κάτω Μονής	
Χριστάκης Καπιρτζής	ΚΣ Κάτω Ζώδιας	
Χρίστος Χατζηναντώνης	Τμήμα Γεωργίας	
Χρυστάλλα Κωνσταντίνου	Τμήμα Γεωργίας	

Annex 3: Evaluation by Participants

All workshop participants (except 1 that left before the voting) completed the evaluation questionnaires (10 questionnaires in total). Individual scores are given below each question; the average score is given in bold next to the question. S = stakeholder.

1. Meeting preparation and logistics									
Meeting information provided in advance (e.g. dates, venue, agenda)									5
5	5	5	5	5	5	5	5	5	5
Meeting venue (adequacy of the room where the meeting took place)									5
5	5	5	5	5	5	5	5	5	5
Materials distributed during the meeting to support the sessions									4.7
5	5	5	5	5	3	5	5	5	4
Comments: S7: very well organized meeting									

2. Overall assessment of the meeting									
Attainment of the objectives of the meeting (meeting objectives were met)									4.7
5	5	4	4	5	4	5	5	5	5
Positive and collaborative atmosphere among participants									4.9
5	5	5	5	5	4	5	5	5	5
Duration of the meeting (1=totally inadequate; 5=adequate)									4.6
4	5	4	5	5	4	5	5	5	4
Opportunity for individual participation and input in the meeting									4.5
5	2	5	5	5	4	5	5	5	4
Comments: S7: very informative and simplified meeting S8: Very nice meeting									

3. Evaluation of the sessions									
Clarity of presentations/speakers									4.8
5	5	5	5	4	4	5	5	5	5
Discussions (moderation, conclusions reached)									4.6
5	3	5	5	4	4	5	5	5	5
Comments:									

II. In your opinion, what were the most positive and less positive aspects of the meeting?

- S1: Very good and important meeting (+)
- S4: More participants would be welcomed (-)
- S6: I met farmers and I had the chance to listen to their problems related to water (+)
- S7: Information provided & structure of the workshop (+)
- S9: Exchange of opinions between stakeholders is very helpful (+)
- S10: Cooperation between participants (+)

III. What suggestions do you have for future meetings?

- S6: More participants to join future meetings
- S7: More frequent meetings and more participation by farmers

D5.2 COMPILATION REPORT ON INITIAL WORKSHOPS AT THE SIX RESEARCH SITES

Month 24 2017

Wuppertal M15 report

WORKSHOP M15 REPORT FORM



Organizing partner: Wupperverband, InterSus, IWW
Workshop Place: Wuppertal, Germany
Date: 30.09.2016
Number of registrations: 32 (incl. 7 BINGO team members)
Number of guests attending: 29

Agenda for the workshop

9.00 – 9.30	Welcome and registration
9.30 – 10.30	Official welcome and status quo of BINGO-project
10:30 – 11:30	World café – Are we prepared? Scopes and measures <ul style="list-style-type: none">▪ Water use/Water abstraction▪ Flood protection and land management▪ Economy, Human, Ecology
11:45 – 12.30	Debate on World Café's results and Farewell
12.30 – 13:00	Lunch and end of Workshop

Objectives:

- ✓ To introduce and update stakeholders with information to the BINGO project and personnel.
- ✓ To engage stakeholders in a collaborative approach at the Research Site.
- ✓ To collect and discuss stakeholders' ideas/perceptions regarding climate change (i.e. extreme weather events) adaption strategies and measures in the Wupper basin.

Materials used and distributed to the participants:

For Registration

- 1 Attendance list
- Batches (name/institution)
- BINGO flyer

General

- 3 display panels
- Flipchart sticks
- Sets of pasteboards
- Additional post-its, clips, etc.
- 2 BINGO Roll-Ups
- 2 Beach Flags

Participant Folder

- General program
- BINGO business card
- Flyer “Hochwasserpas”
- Individual evaluation card
- Writing pad and pen

Characterization of the participants

Table 1 shows the number of registrations and actual participants, the respective sector of activity and the level of governance each stakeholder is active in.

Table 1 Overview of stakeholders

Institution / sector	No. of participants (registrations)
Authorities	8 (10)
Federal authorities and ministries, i.e.: MKULNV, LANUV	0 (1)
District Governments (i.e. Bezirksregierung Düsseldorf, Bezirksregierung Köln)	1 (1)
Environmental Agencies (e.g. Wuppertal, Solingen, Remscheid, Leverkusen, Oberbergischer Kreis)	8 (8)
Representatives of companies, other sectors	6 (6)
Representatives from drinking water sector, energy sector, agricultural sector, environmental NGOs, tourist associations, German Insurance Association, etc.	6 (6)
Internal Stakeholders	7 (9)
From different departments (e.g. water basin management, sanitary environmental engineering, reservoir management, waterbodies development)	7 (9)

Short summary of the workshop´s activities

9.00h – 9.30 Welcome and Registration

- Participants´ registration
- Welcome by the research host team (Wupperverband: Marc Scheibel, Paula Lorza; InterSus: Eduard Interwies, Stefan Görlitz; IWW: Andreas Hein, Juliane Koti, Tim aus der Beek)
- Brief introduction of BINGO (BINGO-video)
- Brief introduction of the participants (name, organization, brief description of work/function)

9.30 – 10.30 Status Quo of BINGO Project

- Brief presentation of research sites within BINGO-project (Tim aus der Beek)
- Presentation of first results and work carried out within WPs 2+3 at the Wupper Research Site (Marc Scheibel)
- Brief presentation of WP 4+5 with regard to results of survey and general overview of risks taken into account within BINGO-project at the Wupper research site (Juliane Koti)

9.35 – 11:30 World Café

- Group activities focussing on climate change adaption discussing scopes and suitable measures within the Wupper region; at each table/group, the participants were invited to provide input and discussion on the selected topics (duration per table: 20’):
 - Water use/water abstraction (drinking water, water for cooling system and hydropower plants) (Moderation: Juliane Koti, Paula Lorza)
 - Flood protection and land management (Moderation: Tim aus der Beek, Eduard Interviews)
 - Human, economy and environment (Moderation: Stefan Görlitz, Andreas Hein)
- Two researchers at each table kept the discussion alive and made sure that contributions and ideas were registered on pasteboards/flipcharts.

11:30 – 12.30 Debate on World Café´s Results and Farewell

- Debriefing of group activities, presentation of results by table speakers (Andreas Hein, Stefan Görlitz, Juliane Koti)
- Collective debate on results (moderation Andreas Hein)

- Invitation to all participants to fill the individual evaluation form
- Announcement of Stakeholder Workshop #3: 05.05.2017
- Thanks for participation in WS#2

12.30 – 13:00 Lunch and End of Workshop

- Participants were invited to have an informal lunch

Short summary of outcomes and results:

Water use/water abstraction

The main focus of this discussion was water use related to *drinking water supply*, *temperature*, and *power plant operation* (i.e. hydropower plants and cooling processes). This is consistent with the main water use categories relevant for the Wupperverband, namely, service water, domestic water, and process or industrial water (raw water is the sum of domestic and process or industrial water).

The discussion was divided into two main categories: a) goals and b) measures. Under “goals”, it was discussed which aspects were (most) relevant: Water quality (especially for raw water) is from the stakeholders’ perspective very important. Related actors should ensure security for drinking water supply at reservoirs and streams and water bodies. Water temperature was found to be an important parameter as well; under this aspect, ecological issues become more relevant. Finally, sufficient water quantity for drinking water supply, water management (including service water), and environmental and industrial purposes was mentioned as a third scope. However, water quantity (e.g., minimum river discharge for ecological flow) also depends on water temperature, and water temperature on water quality, so there is a clear and strong synergy between these aspects and the related actors.

Under “measures”, several aspects were discussed in the frame of climate change and BINGO approach. From a political point of view, fast processing from approval phase for taking action during extreme events were mentioned as one of the most relevant aspects. Furthermore the Water Framework Directive was mentioned with regard to reassessment/adjustment of target objectives (achievement of appropriate qualitative and quantitative status of water bodies). Also, inclusion of prioritisation by extreme situations, which is apparently not yet well defined in the planning approval should be accomplished.

From a technical perspective, and as climate change is characterized by uncertainties, forecasting enhancement for reservoir management (to guarantee water supply and ecological flow during dry periods and enough capacity for flood protection during high flows) is necessary. A more accurate prediction of hydrologic uncertainties is also crucial,

which is one of BINGO's aims. As a result, preparation and adaptation for future trends for temperature management (e.g., for reservoir management, water supply for process or industrial water, and ecological flow) -considered as a relevant approach- could be achieved. Sediment deposits in the reservoir systems was mentioned as an additional impact due to intense precipitation; thus, assessment of existing systems and (if necessary) further expansion of hydraulic structures (such as drainage systems) could be implemented.

Improvement of cooperation between sectors, e.g., agriculture, forestry, and water sectors is also important to define the most vulnerable elements and to develop strategies that benefit all. Finally, financial support was cited as pertinent for implementation of different measures, whereas it was found to be useful if available information about financing options or subsidies were bundled.

Flood protection and land management

Various objectives in the context of climate change regarding different topics and relevant difficulties in achieving and implementing appropriate measures were discussed. In addition, potential contributions from BINGO's work were considered.

In the field of forestry, the reduction of storm damages as well as drainage protection in the forest (which is not a big issue for closed tree stands) were mentioned. A corresponding measure (with long lead time) is e.g. the increase of the stocks of "climate adaptive" tree species.

In the field of agriculture, the aim of erosion reduction during periods of drought was mentioned, which could be reached by an "intelligent" increase in tree populations and better cultivation management practices for agriculture.

A general theme was the safeguarding of water resources in drought times. For this purpose, the use of rainwater could be a relevant approach, but its practical usefulness still needs to be examined further, as well as the generation and use of interconnected water supply systems.

Most of the discussion focused on the goal of protection against stormwater events in urban areas (e.g. the capping of "peaks"), whereby the concepts of "classical" floods (fluvial) and stormwater flooding ("pluvial") must be clearly separated since they relate to different risks. Here, urban planning was named as a key activity field for providing retention areas for stormwater management e.g. through multifunctional land use solutions (thus increasing the potential for "storing" large amounts of rainwater in the urban space). However, competing interests as well as questions about the legal situation and responsibilities/liabilities were mentioned as hindrances. The strengthening of the "self-protection", i.e. utilizing the responsibility of the citizens, was discussed as a

further important area of action. Here, the creation of risk maps is of great importance, since "hot spots" can be identified (with the associated modelling uncertainties have to be made transparent). Further measures are the modelling and use of emergency waterpaths, the greening in the urban area (e.g. "green roofs") as well as landscape planning in general (in order to plan the "external" parts of the urban area cooperatively and to integrate them into the stormwater management).

Various hydrological modelling efforts/ scenarios (such as the changes in water levels caused by climate change, the effects of surface sealing, evaporation reduction, roof greening, erosion, etc.) were discussed as potential contributions by BINGO. In addition, economic investigations would help by comparing the cost of measures to the reduction of damage costs, as well as investigations into the use of information regarding stormwater flooding risks by citizens and related problems. Finally, an institutional investigation seems helpful for identifying the barriers and potential solutions for a stronger connection between urban planning and the management of water / multifunctional land use in urban areas.

Humans, economy and the environment

The focus was set more broadly on the "sustainability perspective", i.e. the three dimensions of sustainability. Hence, objectives for possible measures were discussed in a more general way. For example, the possibility for measures addressing more than one objective were highlighted, and the notion that environmental objectives, especially regarding the overall functionality of the ecosystems, should not be neglected. Also, the group discussed the importance of creating awareness for decisions taken, and explaining the underlying objectives to non-experts too. Very specific objectives/framework conditions applicable to the Wupper region were listed, namely:

- Specific objective: Guaranteeing the functionality of the drainage and sewage systems.
- Framework condition: Guaranteeing minimal flows not only for the environment, but also the functionality of the sewage treatment plant.

Beside these general objectives, several possible conflicts and criteria for the prioritization of measures were being discussed:

- Prioritization: Drinking water for the human population will be prioritized in any event.
- Conflict: E-Flows vs. security of supply.
- Conflict: Keeping free capacity in dammed reservoirs for safeguarding against heavy precipitation events vs. security of supply.

Also, it was mentioned that to solve critical issues, conflicts of interests should be clearly mapped and catalogued, considering ethical questions.

Finally, concrete measures were proposed and discussed, which were:

- Depicting risks (especially for flooding) in risk and hazard maps, and the economic consequences of doing so (i.e. the balancing the interests of the individual, whose property might be devalued, with the interests of the general populace of being informed about the spatial dimension of risks/hazards).
- Better linking and connecting dams and dammed reservoirs, and adapting the management to new hydrological trends.
- Integration of flood protection much earlier in planning processes of all departments (e.g. regional environmental planning).
- Creating awareness and concrete guidance/procedures for the general population.
- Defining "minimum requirements" for drinking water for private persons, and defining (and pricing) everything above as "luxury".

Feedback / Review of Workshop

In your opinion, what were the most positive and less positive aspects of the workshop?

Most positive:

- Very collaborative and productive atmosphere
- Very engaged participants and fruitful discussions
- Economic sectors well represented

Less positive:

- Representatives from regulatory authorities were missing (though invited)

What suggestions do you have for future workshops?

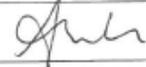
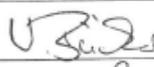
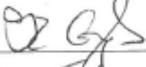
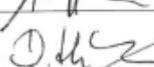
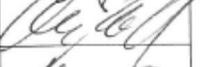
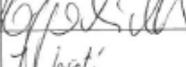
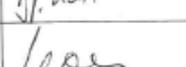
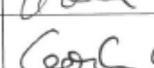
- More precise announcement of topics discussed (e. g. more detailed program) that stakeholders have the opportunity to prepare workshop discussions
- Due to the high frequency of stakeholder-workshops it will not always be possible to show new results/aspects etc. – repetitions have to be avoided to ensure that stakeholders keep in the process (maybe for future workshops even smaller and more expertized/specialized stakeholder groups according to topics discussed would be useful)

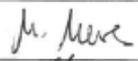
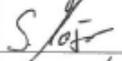
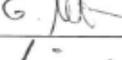
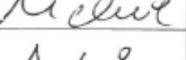
Annexes

1. List of participants
2. Evaluation by Participants: Summary

1- List of participants

Anwesenheitsliste

No	Institution	Vorname	Nachname	Unterschrift
1	WSW Energie & Wasser AG	Jens	Ante	
2	Rheinisch-Westfälisches Institut für Wasserforschung GmbH (IWW)	Tim	aus der Beek	
3	Wupperverband	Gabriele	Bethke-Röhricht	
4	Stadt Wuppertal	Ute	Bücker	
5	Stadt Wuppertal (Studentin)	Katharina	Engels	
6	Wupperverband	Torsten	Frank	
7	Wupperverband	Jürgen	Fries	
8	InterSus	Stefan	Görlitz	
9	LANUV	Martina	Grudzielanek	
10	Rheinisch-Westfälisches Institut für Wasserforschung GmbH (IWW)	Andreas	Hein	
11	Wupperverband	Daniel	Heinenberg	
12	InterSus	Eduard	Interwies	
13	hydro & meteo	Alrun	Jasper-Toennies	
14	T3 Talsperrenbewirtschaftung Betriebsleiter Forstbetrieb	Torsten	Klingenhoff	
15	Stadt Solingen	Ilona	Komossa	
16	Technische Betrieb Solingen (TBS)	Tycho	Kopperschmidt	
17	Rheinisch-Westfälisches Institut für Wasserforschung GmbH (IWW)	Juliane	Koti	
18	Wupperverband	Ursula	Koukolitschek	
19	WSW Energie & Wasser AG	Volker	Leonhard	
20	Wupperverband	Alexander	Löcke	

No	Institution	Vorname	Nachname	Unterschrift
21	Wupperverband	Paula	Lorza	
22	Wupperverband	Thorsten	Luckner	
23	Stadt Wuppertal	Frank	Luppus	
24	Stadt Remscheid	Monika	Meves	
25	Bergisches Energiekompetenzzentrum	Simon	Möser	
26	Oberbergischer Kreis	Andrea	Müller	
27	Currenta - CHEMPARK Dormagen	Günter	Müller	
28	Wupperverband	Peter	Nieland	
29	Stadt Wuppertal	Hubert	Nobis	
30	Wupperverband	Marc	Scheibel	
31	Bezirksregierung Düsseldorf	Matthias	Ufer	
32	Stadt Wuppertal	Susanne	Varnhorst	

2- Evaluation by Participants: Summary

Evaluation summary

Name of Meeting	M15 Workshop - Sind wir auf Wetterextreme vorbereitet? Maßnahmen, Konfliktpotentiale, Herausforderungen
Date/Place	30.09.2016 / Wuppertal (Germany)
No. of evaluation forms	15

Rating: 1=poor; 2=sufficient; 3=medium; 4=good; 5=very good

1. Meeting preparation and logistics	No.	Ø
Meeting information provided in advance (e.g. dates, venue, agenda)	15	3,9
Meeting venue (adequacy of the room where the meeting took place)	15	4,4
Materials distributed during the meeting to support the sessions	14	3,7

Comments:

Goals of the workshop weren't quite clear right from the beginning
Too few parking spots at the venue

2. Overall assessment of the meeting	No.	Ø
Attainment of the objectives of the meeting (the objectives of meeting were met)	13	3,8
Positive and collaborative atmosphere among participants	15	4,4
Duration of the meeting (1=totally inadequate; 5=adequate)	15	4,4
Opportunity for individual participation and input in the meeting	15	4,4

Comments:

Event was a bit short, much of the content was discussed too briefly

3. Evaluation of the sessions	No.	Ø
Clarity of presentations/speakers	15	4,1
Discussions (moderation, conclusions reached)	15	4,1

Comments:

Especially the overview of different European BINGO-research sites was interesting

In your opinion, what were the most positive and less positive aspects of the meeting?

Positive:

Very competent summary and moderation
Good moderation and guidance
Insight into different professions and their interests and problems
Interdisciplinary views

Less positive:

The benefits for participating institutions have to be specified. Otherwise they'll get the impression of a new research project
Absence of important stakeholders
Tasks were too spontaneous
Not enough focus on the broader spectrum
Explanation of why the participating representatives were invited is missing. What was the target audience of the workshop?

What suggestions do you have for future meetings?

Comments:

Change the groups when changing topics
With three groups speaking simultaneous in the same room it is hard to concentrate. Separate rooms, even if it is just the corridor, would be better
Integration of research (FH or Universities) -> inclusion of the most recent studies
Information about the tasks in advance -> opportunity to prepare
Involvement of city planners

Badalona M15 report

WORKSHOP M15 REPORT FORM



Organizing partner: Aquatec in collaboration with Ajuntament de Badalona

Workshop Place: Centre Cultural del Carme, Badalona

Date: November 8th, 2016

Number of invited guest: the original invitation was sent to a group of around 30 people who finally distributed it among their colleagues/collaborators

Number of guest attending: 24

Agenda for the workshop

- Welcome and registration [9'00-9'15]
- Overview of progress in BINGO and Badalona case study [9'15-10'00]
- Visioning: What is the desired end state for 2066? [10'00-11'30]
- Coffee break [11'30-12'00]
- Discussion on preparedness [12'00-13'00]
- Discussion on Policy and Governance [13'00-13'30]
- Closing remarks and next steps [13'30-14'00]

Objectives:

- Overview of progress in BINGO project (in general) and in detail for Badalona case-study during the last 12 months.
- Analysis on the preparedness of Badalona to face the risks related to climate change
- Discussion on the possible adaptation strategies and measures to be applied in Badalona case study
- Analysis of the current situation related to Policy and Governance
- Promote the use of the Badalona CoP in Basecamp

Material distributed to participants:

- BINGO official brochure
- Agenda of the workshop (in advance)
- The presentations (powerpoints) used during the session were distributed in advance through the Badalona CoP in Basecamp

Characterization of participants

Type of stakeholder		Stakeholder	Nº of attendees	Total
R+i (public and private)		Aquatec	3	6
		CETaqua	3	
Administration	Municipal	Ajuntament de Badalona	11	12
	Supra-municipal	Àrea Metropolitana de Barcelona (AMB)	1	
Local entities/services		Badalona harbour	1	2
		Escola del mar	1	
Utilities-water companies		Aigües de Barcelona	3	4
		Aquatec	1	
			TOTAL	24

As it can be seen in the table, it was a good correlation between the main stakeholders: administration, local entities/services, water companies and research centers. The only stakeholder related to administration that was invited but did not attend the workshop was the regional administration ACA (Catalan Water Agency).

Short summary of workshop including activities.

According to the agenda, the workshop was divided into three main sections:

1. Registration of participants, welcome (from Badalona City Council and Aquatec's representatives) and self-introduction of attendees
2. General overview (reminder) on the objective and tasks of BINGO project (display of the official video) and explanation of the workshop's objectives. A more detailed explanation on the technical progress for the Badalona case-study (with special focus on advances related to WP2 and WP3) was also presented.
3. Group visioning activity: What is the desired end state for 2066?
 - 4 groups of 5-6 people each were formed.
 - Each group developed the nightmare and dream scenarios for 2066 (in 50 years' time), identifying the effects (end state) and main causes leading to it.
 - The results of the activity were presented by each group
 - The whole results were commented: similarities/differences on the end state, primary causes for failure, primary success factors, feasibility/certainty of these causes, etc. were identified.

4. Discussion on preparedness
 - Fast reminder on the risks being considered (resulting from M8 workshop) at the Badalona case study
 - Presentation of the first list of adaptation strategies and associated measures being considered. The adaptation measures were developed jointly by Aquatec, Ajuntament de Badalona, Aigües de Barcelona, AMB and CETaqua in the framework of BINGO's WP5. They were presented according to their potential place of application (i.e. on-source measures, within the urban drainage system, at the WWTP, before discharges to receiving waters, at the receiving waters and other integral measures)
 - Discussion between participants about the presented strategies and associated measures: feasibility, pros and cons, missing measures, etc.
5. Discussion on Policy and Governance.
Topics of discussion:
 - What are the strong points of the policy and governance situation? How can they be maintained?
 - What are the weak points? How can they be improved?
 - What are the most important challenges related to the adaptation strategies and measures discussed this morning?
6. Closing remarks and next steps

Short summary of outcomes and results:

This is a compilation of the most interesting points arisen along the different workshop's sections:

❖ Visioning: What is the desired end state for 2066?

Nightmare scenario

This is the compilation of the reported visionary end state in terms of **effects**:

- More intense and frequent urban flooding, especially in the area between the C31 road and the railroad track
- Higher risk for people's safety
- Impacts on road infrastructures: urban public mobility affected
- Higher social alarm
- Urban furniture affected
- Sudden collapse of pavements

- Higher pollutant spills on beaches: more polluted sediments, longer and more intense impact duration, etc.
- Decrease of beach areas (loss of sand)
- Higher CSO events: higher number of days with beaches closed with the corresponding impacts on tourism, leisure and directly on benefits for tertiary economic sector
- Lower phreatic resources
- Problems with odours due to the accumulation of pollutants in the sewer system (sediments and others)
- Economic and material damages

This is the compilation of the reported **causes** leading to this nightmare scenario:

- Lack of infrastructures (adequacy of the urban drainage system)
- Lack of cleaning tasks
- Lack of optimal control of existing infrastructures
- Non-optimal environmental management: lack of green infrastructures, etc.
- Lack of emergency protocols towards flooding or pollution episodes in beaches
- Lack of coordination between administrations
- Lack of investments
- Lack of dissemination: of causes and effects, but also of tax burden
- Lack of sensibility/awareness
- Lack of long term perspective
- Lack of solutions against CSO
- Lack of inlets
- Increase of sea level
- High slopes between the highlands and the sea

Dream scenario

This is the compilation of the reported visionary end state in terms of **effects**:

- Less flooding and CSO episodes
- Less vulnerability regarding flooding and impacts on receiving waters
- Coastal areas in optimal situation for social uses
- Reduction of pollutant discharges into receiving waters
- Higher available resources (budget) for local administrations

- Better quality of life
- Integrated management of the network
- Less climate change than expected
- Higher water resources due to rainwater harvesting

This is the compilation of the reported **causes** leading to this dream scenario:

- Improvements on the sewer network: maintenance and investments
- Investments on retention tanks (according to what was defined in the Drainage Master Plan)
- Increase on the infiltration capacity of the city (also in the upper parts of the city: headwaters, etc.)
- Rainwater harvesting in buildings
- Improvement on the superficial drainage
- Cleaner city (better cleaning practices and better civility)
- Higher economic activity leading to more available resources
- Interconnection of networks
- Regional policies for local development of adaptation strategies
- IT technologies for the optimal management of the sewer network
- Better weather predictions
- Reaction from society
- Implementation of mitigation and adaptation strategies
- Complete consciousness about climate change, leading to a prioritization of necessities and a corresponding funding
- Clear action protocols against emergencies (flooding and environmental impacts)
- Coordination between administrations and participation of the civil society
- Important dissemination activity among all the stakeholders and citizens
- New investments: retention tanks, sewer network enlargement, control gates, CSO treatment, etc.
- Early warning systems
- Mechanisms for dynamic management of infrastructures (active control)
- Efficient maintenance

The following tables compile the main causes and effects reported for each scenario:

NIGHTMARE SCENARIO		
AMBIT	CAUSE	EFFECT
Natural	<ul style="list-style-type: none"> • Accumulation of sediments in the sewer network • Change in land uses in the Serra de Marina (decrease of infiltration capacity) 	<ul style="list-style-type: none"> • Problems with bad odours in the urban area • Increase of pollutants in beaches • Decrease of beach areas
Governance	<ul style="list-style-type: none"> • Lack of investments from the administration • Less ability/possibility to collect taxes 	<ul style="list-style-type: none"> • Increase of sediments wash-off • Worsening of the overflow structures functionality
Social	<ul style="list-style-type: none"> • Lack of information to citizens • Lack of social awareness 	<ul style="list-style-type: none"> • Worsening of the marine environment • Increase of flooding episodes • Decrease of tourism (decrease of incomes) • Economic and material damages

DREAM SCENARIO		
AMBIT	CAUSE	EFFECT
Natural	<ul style="list-style-type: none"> • Improvement of the non-urbanized land • Increase of infiltration capacity (SUDS) • Riverbanks maintenance 	<ul style="list-style-type: none"> • Flood reduction • Reduction of CSOs • Better quality of marine environment and beaches • Tourism increase
Governance	<ul style="list-style-type: none"> • Application of the measures proposed in the Drainage Masterplan (retention tanks, inlets increase, etc.) • Development and application of integrated operation and cleaning plans • Investments on cleaning and maintenance tasks • Local initiatives for water reuse 	<ul style="list-style-type: none"> • Elimination of (bad) odours • Increase of incomes due to the tourism sector
Social	<ul style="list-style-type: none"> • Increase of knowledge and civility of citizens 	

❖ Discussion on preparedness

The portfolio of adaptation measures that had been developed jointly by Aquatec, CETaqua, Ajuntament de Badalona, Aigües de Barcelona and AMB were presented just with a short definition of each one of them and the risk addressed. The adaptation measures were presented according to their applicability location: on source measures, within the sewer system, within the WWTP, end-of-pipe and within the receiving waters.

A total of 25 measures were presented (see attached presentations). From these measures, the following were identified as the most feasible ones:

- Erosion control in rural catchments
- Well-designed (and maintained) on-source sediment traps
- Inlets increase
- Siphonic inlets/gully pots just if they are properly maintained (otherwise they can cause problems with mosquitoes).
- Smart cleaning (not just corrective)
- Sustainable Urban Drainage Systems (SUDS) / nature-based solutions
- Domestic rainwater harvesting
- Flood barriers
- Modification of some problematic CSOs structures
- Retention tanks (according to the last Drainage Master Plan)
- Cleaning of river banks
- Integrated management (coordination with WWTP)
- Early warning systems and emergency protocols
- In general measures to avoid nuisances to citizens due to odours coming from the sewer system

On the other hand the following measures were identified as unfeasible for the Badalona case-study:

- Rebuilding of combined sewer systems to separate sewers and prevent CSO: too complex and expensive to apply in Badalona were most of the network is combined
- Cleaning boats: non-efficient measure

❖ **Discussion on Policy and Governance**

It is agreed that the current context of Policy and Governance in Badalona and at an upper scale in Catalonia and Spain is not the most optimal one to support adaptation to climate change initiatives.

It is true that the “diagnosis” of climate change has been widely disseminated (COP 21, etc.) but now is time to take action and start applying mitigation and adaptation measures.

Regarding adaptation measures, it is missed an objective funding program to start implementing them, so that local administrations had resources to implement them.

Maybe in Spain the main focus has been the effects of droughts to the different economic sectors, especially the agriculture sector.

At local level there are some initiatives such as the “Local plans for climate change adaptation” developed by some municipalities, such as the ones developed in some municipalities belonging to the Metropolitan Area of Barcelona.

Water is a political priority but must be properly addressed.

Maybe the current water taxes cannot afford all the required infrastructures, etc. to face the consequences of climate change. In case water taxes were increased it would be required a deep dissemination/awareness campaign to well explain which issues these taxes address: new investments, etc. and specially to explain the benefit behind each adaptation measure (cost-benefit analysis).

The citizen participation is crucial in the decision-making processes (transparency on water taxes-investments). For example, to submit on referendum which, from a list of possible adaptation measures, to apply.

II. In your opinion, what were the most positive and less positive aspects of the workshop?

Most positive aspects:

- Good representation of the stakeholders/end-users groups previously identified, mainly coming from the Ajuntament de Badalona
- Good channel to “officially” present the BINGO project advances to stakeholders and end-users.
- Good atmosphere and general interest in the project and expected outcomes.
- Doorway to future collaborations through upcoming workshops and BaseCamp
- The group vision activity was very productive giving option to any one of the attendees to participate
- The well-oriented questions during the discussion on preparedness, policy and governance were crucial to obtain direct answers to key questions
- The duration of the meeting was adequate to accomplish all the objectives

Less positive aspects:

- Lack of political representation during the group activity and posterior discussions it would have been crucial, especially when talking about policy and governance
- Lack of local stakeholders already participating at the first workshop

III. What suggestions do you have for future workshops?

- To keep on with this common and well-oriented framework to equally focus the workshops in all the case-studies
- Workshops lasting more than 5 hours are not effective and are deterrents for the participation of people

Annexes

- 1- List of participants
- 2- Presentations (pdf)
- 3- Evaluation by Participants: Summary

ANNEX 1. LIST OF PARTICIPANTS

1. LLORENÇ ALERM-AMB
2. ALBERT PÉREZ CAPILLA-AIGÜES DE BARCELONA
3. EDUARD BOSCH I LLADÓ-AIGÜES DE BARCELONA
4. CARLES JAURES-AIGÜES DE BARCELONA
5. PERE MALGRAT-AQUATEC
6. BENIAMINO RUSSO-AQUATEC
7. PABLO SÁNCHEZ-AQUATEC
8. MONTSE MARTÍNEZ-AQUATEC
9. IMANOL SANZ-MARINA BADALONA
10. ÀLEX MAÑAS BALLESTÉ-REG. BDN PRÒSPERA SOSTENIBLE
11. JUAN CARLOS FORCEN ISLA-CLAVEGUERAM
12. RAMON ORTÍ-NETEJA
13. PERE LLUÍS VEGUÉ-URBANISME
14. ESTHER PUIGBARRACA-PROTECCIÓ CIVIL
15. AÍDA LLAURADÓ-ASSESSORA BDN PRÒSP.I SOSTEN.
16. JOSEP LEDO SECO-URBANISME
17. PEP MONTES-ECOLOGIA URBANA
18. GREGORI MUÑOZ-RAMOS-CAP SERVEI MEDI AMBIENT
19. TOÑO GÉREZ ANGULO-ESPAIS NATURALS
20. M^a LLUÏSA FORCADELL-LABORATORI ECOLOGIA
21. CHIARA COSCO-UPC / CETAQUA
22. SALVADOR VELA RODRIGUEZ-CETAQUA
23. DESIRÉE MARÍN-CETAQUA
24. MONTSERRAT BIGAS-ESCOLA DEL MAR

ANNEX 2. PRESENTATIONS

See attached pdfs:

- Badalona M15 workshop: general presentation used as a basis during the whole workshop (in catalan)
- WP2_CETaqua-WP3_Model Calibration: presentation of progress (mainly WP2 and WP3. Also in catalan)

ANNEX 3. EVALUATION BY PARTICIPANTS. SUMMARY

This is the general evaluation obtained from the workshop evaluation form distributed among the workshop's participants at the end of the event.

Total number of responses: 20

Average evaluation for each of the questions

Rating scale: 1= poor, 2= sufficient, 3= medium, 4=good, 5=very good

1. Meeting preparation and logistics	Average Grade
Meeting information provided in advance (e.g. dates, venue, agenda)	4.0
Meeting venue (adequacy of the room where the meeting took place)	4.5
Materials distributed during the meeting to support the sessions	3.8
Overall average	4.1

2. Overall assessment of the meeting	Average Grade
Attainment of the objectives of the meeting (the objectives of meeting were met)	4.2
Positive and collaborative atmosphere among participants	4.7
Duration of the meeting	4.3
Opportunity for individual participation and input in the meeting	4.7
Overall average	4.5

3. Evaluation of the sessions	Average Grade
Clarity of presentations/speakers	4.4
Discussions (moderation, conclusions reached)	4.3
Overall average	4.3

II. In your opinion, what were the most positive and less positive aspects of the meeting?

The following is a compilation of the comments posted by some of the people. Please notice that most of them are answers corresponding to just 1 person, but we have compiled all of them.

The most positive aspects being commented are:

- Knowledge about the objectives and progress of BINGO project
- Discussion with local stakeholders
- Active participation of the different stakeholders attending the meeting and interesting answers from the technicians.
- Different point of view from a same problem (different background of participants, different interests)
- The synthesis of the different topics being presented
- Goof reflexions about a problem that it is already a reality to which we must advance

The less positive aspects being commented are the following:

- It would be interesting to have representatives from regional administrations such as ACA or AMB.
- The proposed solutions (adaptation measures) must be accompanied by political action that prioritizes the environment and long-term sustainability
- Some of the participants left the meeting before the discussion
- Other environmental vectors of the water cycle must be analysed, not just urban drainage

III. What suggestions do you have for future meetings?

The following suggestions were posted (also by just very few people):

- To keep on informing about the progress of the project
- More information in advance, it will help to prepare the meeting

WORKSHOP M15 REPORT FORM



Organizing partner: NTNU / Bergen K

Workshop Place: Stemmeveien 41, Bergen, Norway

Date: 29.09.2016

Number of invited guest: ca 50

Number of guest attending: 23

Agenda for the workshop

09.00-09.30: Welcome, progress in BINGO, recap of previous workshop

09.30-12.00: Visioning – What is the desired endstate for 2025?

12.00-12.45: Lunch break

12.45-14.30: Discussion on preparedness

14.30-15.30: Discussion on policy and governance

15.30-15.45: Schedule of future activities in BINGO

15.45-16.00: Closing remarks, feedback

Company	Company type	Number of participants
NTNU	Research	3
City of Bergen	Supra-muni administration	19
County Governor of Hordaland	Regional	1
Total		23

Summary of Activities:

The M15 Workshop started by a welcoming session lead by the research partner NTNU. In order to welcome some new participants, some background information on BINGO and the specific tasks for the Bergen research site was provided. Recent progress in BINGO was presented, with special regards to the results of the questionnaire on 'Policy and Governance' as this is being highly relevant for the objective of the workshop. A summary from the M8 workshop was provided and linked to the M15 workshop.

This was followed by a session on 'visioning', where participants were divided into smaller groups and asked to perform a visioning of their: 1) nightmare scenario and 2)

dream scenario. The groups had 40min on each scenario followed by 1 hour of presentation of the results and plenary discussion.

After lunch followed a session on preparedness. The objective of this session was to discuss consequences of climate change for different stakeholders and discuss whether or not existing emergency plans are adequate. The research partner NTNU gave an introductory presentation on risk and resilience, explaining the objectives of the session and necessary background information. This was followed by a presentation from the risk owner, Bergen K, on existing emergency plans and the work being done already. A complementary presentation on 'Governance' was provided by a representative from NTNU. This provided sufficient information to proceed with a plenary discussion on preparedness. The research partner had prepared some questions in advance that were discussed during this session.

After a short break, the workshop was continued with a session on governance. The questionnaire on policy and governance and the results was presented by the research partner. The filling out of the questionnaire prior to the workshop had identified some governance gaps that were the subject of the following plenary discussion. Adaptation measures to close governance gaps, success factors, possible conflicts of interest, and crucial partners in order to close the governance gaps were discussed.

Short summary of outcomes and results:

1) Visioning

Table 1: Summary of group discussions on visioning of stormwater

Stormwater	
Nightmare scenario	Dream scenario
Projections of climate change become reality. The population increases and urbanization (including densification of cities and more paved surfaces) continue. There is more stormwater and stronger runoff. Our system cannot handle the new conditions and our flood paths are not working. There is an increased risk for flash floods, which	We have adequate flood paths that directs the water safely away from where it can be of harm. We are successful in separation the sewage system and manage to implement blue-green solutions (not buried). The blue-green solutions result in better living conditions for those living in the densest city areas. The public authorities take responsibility

<p>leads to higher risk for health, safety, mobility, damages, etc. Insurance companies become more restrictive and the trust in responsible parties is weakened. The political, legal, and financial conditions weaken our planning system and the plans we have are not good enough.</p>	<p>and manage to reduce the frequency of random dispositions. We are successful in communicating knowledge and create a common understanding of why there are requirements to urban development.</p> <p>How do we succeed?</p> <p>In order to secure safe flood paths we need the right knowledge: sufficient data, prognoses, and tools. Communicating risk analyses is very important. We need to incorporate high-level plans for water and wastewater into the public plans, and early establishment of stormwater strategies in superior plans. We need to develop regulations to improve the legal orientation.</p>
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Table 2: Summary of group discussions on visioning of water supply

Water supply	
Nightmare scenario	Dream scenario
<p>The population increases substantially and so does the water consumption / demand. We are not able reduce the leakages in our distribution network. The water reservoirs are more exposed due to population growth and urban development. Water reservoirs located close to the city are 'sacrificed' to urban development.</p>	<p>The precipitation increases in line with increased water demand. We are successful in leakage reduction. We protect our water resources and export the water we don't need.</p>

Main results from the plenary discussion:

- Communication is key: we need to communicate well and make sure that we confidence and trust

- Political: We need to take advantage of political will to allocate financial resources to climate adaptation
- Interdisciplinary: We need to work interdisciplinary and closer with other sectors, such as roads and railway who have suffered from large damages caused by flooding. We have a lot of data that we can make more use of in our planning. We need to work hard on connecting plans (e.g. areal plans, water, wastewater and stormwater plans).
- Uncertainty: big decisions are taken on the basis of data with large uncertainties. We need to use our planning tools to capture this uncertainty: it needs to be captured at the local level, it cannot be political.
- Emergency preparedness: we need to do risk reduction measures. It is the Agency of water and sewerage's responsibility to communicate the risk to the actors that are responsible for implementing the measures.

2) Preparedness

Prepared questions:

1	By which principles does Bergen K manage consequences of climate change, prevention, and compensation? Are these known?
2	What consequences of stronger runoff will be relevant for inhabitants, companies, insurance sector, etc.?
3	How is this communicated to relevant actors and what are relevant measures from their side?
4	Does the county governor have any input?
5	How is insurance policy and regulations prepared for changes?
6	To what extent are probabilities included in emergency plans? Is it communicated to exposes parties?
7	Are there tools for receiving, systemizing, and utilizing information from users?

Main results of the discussion:

Bergen K is leading (in Norway) with regards to blue-green solutions. Such principles are important and need to be "guarded" and transparent to the politicians. Interdisciplinary cooperation is key.

Bergen K is continuously working on “ROS”-analyses (risk and vulnerability analysis) and communicating them to the public. It is challenging to move from high-level plans to more local plans but it is done because it will improve knowledge and make it easier to communicate the reason for certain restrictions. While developing local plans it is important to have in mind how these plans will be used and communicated.

Insurance companies are working on reducing their responsibility, and this will be a challenge in the time to come. How can the municipality approach this? Increase water fees? It is the insurance sector’s opinion (or argument for lower responsibility) that the municipalities are not doing enough. It needs to be communicated to the insurance sector that this is not true, and that the situation is not as bad as they portray it. It was noted that the insurance sector should invited and present at the next BINGO workshop in order to communication on work towards a solution that works for all.

3) Policy and governance

Table 3: Summary of plenary discussion on policy and governance

Governance gap	Adaptation measures	Success factors	Possible conflicts of interest	Crucial partners
Integrating a strategic stormwater plan in the municipal master plan	Have the strategic stormwater plan politically enacted	The strategic stormwater plan needs to be enacted before the municipal spatial plan.	Flood paths: conflict with road owners. Allocation of area for flood protection in urbanized areas.	Agencies for planning and building services and Agency for urban environment.
Clarification of responsibilities and financial system for stormwater solutions (NOU 2015:16)	Use the possibilities we have to influence			

Lack of knowledge on climate change and consequences for stormwater, water supply (vulnerability)	Participating in projects such as BINGO and Hordaklim (another climate service project). Spread the knowledge we have already: communicate stormwater challenges in arenas/forums that already exists	Be visible, communicate our ideas. Good overview of relevant actors (who do we need) and overview of possible arenas, like a list of conferences, where we could share our ideas.		
Implementation of strategic plans to the tactical and operational level	Develop and use analytical tools and models.	That we have people that understand the models and we manage to take advantage of the diversity of the group when we design the new stormwater system at Damsgård. We need to increase the separation rate.	Lack of competence and resources. Other urban development 'steal' our resources.	

Annexes

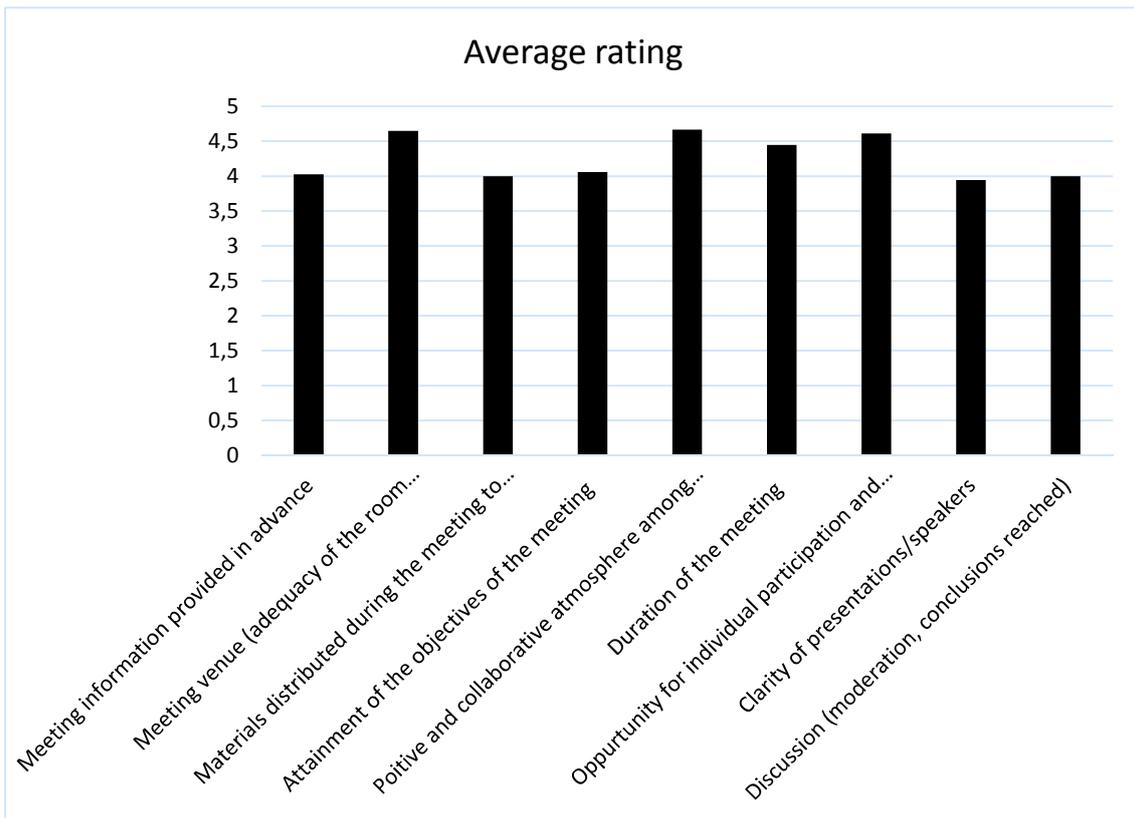
1- List of participants

1	Sveinung Sægrov	NTNU
2	Erle Kristvik	NTNU
3	Manuel Franco Torres	NTNU
4	Eva Britt Isager	Klimaseksjonen
5	Per Vikse	Klimaseksjonen
9	Jørgen Gullestad	Seksjon for samfunnssikkerhet og beredskap
6	Kari Maisol Knudsen	Seksjon for samfunnssikkerhet og beredskap
7	Karen Tvedt	Byrådsavdeling for byutvikling, BBU. Seksjon plan og transport

8	Kjell Kvingedal	Miljøvernsjef; Fylkesmannen i Hordaland
11	Ole Rugeldal Sandven	Vassdragsforvalter. Grønn etat
12	Gunn Østvik Petersen	Etat for byggesak og private planer
13	Svein Steine	Etat for plan og geodata
14	Bjarte Stavenes	Etat for plan og geodata
15	Magnar Sekse	VA-etaten
16	Hogne Hjelle	VA-etaten
17	Gunn Eklund Breisnes	VA-etaten
18	Marit Aase	VA-etaten
19	Solveig Hovland	VA-etaten
20	Zlatco Cmalovic	VA-etaten
21	Nazia Zia	VA-etaten
22	Ivar Kalland	VA-etaten
23	Martin Opdal	VA-etaten
25	Randi Erdal	VA-etaten
26	Hanna Hugosson	VA-etaten
27	Beate Høgh	VA-etaten

2- Evaluation by Participants:

20 evaluation forms were received and the evaluation was



II. In your opinion, what were the most positive and less positive aspects of the workshop?

Most positive: Information from a broad field, educational, positive plenary discussions, good atmosphere, open discussions, group discussions, inspiring, interesting to hear other people's opinions, good reflections.

Less positive: Many items, the group discussions were a little long and the goal of each session should be clearer, not everyone was included in plenary discussions, bad sound (difficult to hear everything being said), few breaks and long work sessions, we missed some people.

III. What suggestions do you have for future workshops?

- Give opportunity for personal preparation
- include more agencies - more interdisciplinary

- more discussion in smaller groups
- better sound / loudspeakers

The Veluwe M15 report

WORKSHOP M15 REPORT FORM



Organizing partner: Provincie Gelderland/KWR

Workshop Place: Hotel Haarhuis, Arnhem, The Netherlands

Date: 22.09.2016

Program

- 9:30** Welcome
- 9:45** BINGO-film, looking back at first workshop
- 10:00** Overview of BINGO Progress
- 10:30** Visioning: Dreams of the Veluwe
- 12:00** Lunch
- 13:00** Threats to the dreams
- 14:30** Adaptation
- 15:30** Policy & Governance
- 16:30** End



Summary of Outcomes:

During the second BINGO meeting, the challenges for the Veluwe water management were central. The most important challenges have been explored and the group

discussed what additional measures may be necessary to maintain the water supply as stable and sustainable as possible.

Based on the question “What is your dream for the Veluwe?” the participants divided into three subgroups to put their dream image of the Veluwe on paper. This resulted in three scenarios, as described in the tables below.



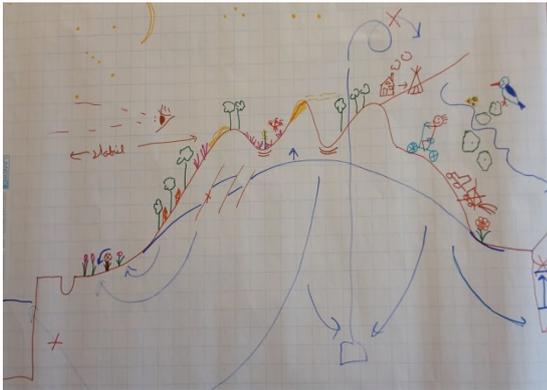
Room for Change

The “Room for Change” scenario describes the Veluwe as a robust system, with all current functions (water, nature, agriculture, living, recreation) being maintained in the future. For this purpose, it was important that the Veluwe remained open to all these functions, as far as these functions can be maintained by the system. Balance between humans and nature, in a self-sufficient system, were fundamental concepts in this scenario. New concepts like agricultural forests fit into it.



A Robust Veluwe

A Robust Veluwe' turns the central part of the Veluwe into a green-blue heart, free from agriculture and mining and large scale tourism, but open to small-scale recreation, regulated by wildlife management and reforestation. In this way, the groundwater reserves can be optimally utilized (within the Veluwe, but perhaps even beyond as a strategic reserve for the Netherlands) and the water balance in the future will be safeguarded. Other functions, including a more flexible and decentralized drinking water extraction, were relocated to the edges of the Veluwe.



Water System

'Water System' also focused on the water supply on the Veluwe. In this scenario, the main threats encountered on the Veluwe water supply, such as penetration of the protective clay layer, water evacuation and growing nitrogen concentrations are under control. Here too, the central green heart of the Veluwe was retained (inter alia by replacement needle forest with natural deciduous forest). Other functions (such as extensive recreation and occupation) were carefully located at the flanks so that the disturbance of the water system is minimal.

Discussion

There were interesting similarities between the scenarios. Water - not surprisingly given the background of the participants in the group - formed an important part of the future images. In 'A Robust Veluwe' and 'Water System', the central area of the Veluwe was the most important area for safeguarding the future water balance on the Veluwe. These scenarios sought space for combination with other functions particularly at the edge of the Veluwe.

There were also differences between the scenarios. Where 'Room for Change' provided space for maintaining current and innovative functions at the Veluwe, the second and third dream scenes excluded certain areas (especially the central area) for certain functions. Also visions of future management of the Veluwe differ; 'A Robust Veluwe' and 'Water System' prioritized the water function over the other functions while 'Room for Change' did not assign priorities. Finally, in 'A Robust Veluwe' there was clearly room for water abstraction at the Veluwe (partly in a more decentralized and flexible form), while this was not automatically reflected in 'Room for Change' and 'Water System'. After a brief discussion of these differences, it was concluded that they did not give acute 'conflicts' between the scenarios. Moreover, they show different accents that were put in the scenarios, which, of course, could lead to conflicts in further concretization.

Potential threats to the scenarios

After the scenarios were outlined, the same groups identified the main threats posing the realization of the dream images. Fragmentation of governance was identified as an important threat; Terrain management on the Veluwe is aimed the interest of the landowner's. Different owners do not have an overarching vision on the future Veluwe. In conjunction with this, future developments in agriculture were seen as a potential

threat. The vacancy that occurred in the Gelderse Vallei after many farmers pulled out of the area attracted individual landowners. They bought pieces of land and developed their own activities there, which reinforces fragmentation.

Decentralized water abstractions can also contribute to fragmentation: people are increasingly digging wells in their own garden (for example, for fountains). The effect of these wells on the water system is still unknown. New environmental policy increases the threat of fragmentation; The Environmental Act no longer applies an upper limit, but has an open attitude towards co-activities in an area allowing more space for linking multiple user functions to an area.

Other major threats had to do with the growth of the population and the associated growth of urbanization - also on the Veluwe, the growing water demand and the increase of (large scale and motorized) tourism in the area. These last threats were also linked to climate change. The warmer climate not only creates a more pleasant holiday climate, but also a greater demand for water in the summer period, while the supply and quality of water will then decrease.

Based on these threats, the following adaptation measures were identified:

Adaptation Measures
Convert 5000 hectares of pine forest into agricultural forests (eg soil improvement, drought control, biodiversity)
Improve quality of surface water (eg in streams) as a potential drinking water source
Regulate the expansion of Recreational housing with concern for the environment
Water-saving measures for individuals
Reduction of industrial withdrawals by applying new techniques
Reduction of water extraction for irrigation
Reduction of agricultural drainage at the edges of the Veluwe
Close of streams to reduce groundwater drainage
Relocation of groundwater extractions to reduce environmental impact
Switching from groundwater to surface water abstraction

Convert forest to savannah to reduce evaporation
Improve retention of built-up area for additional groundwater supply
Disconnect storm water from sewers for additional groundwater supply
Natural water retention zone
More cooperation between spatial planning and water management
Prohibition of private small-scale water abstractions
Adjust land use for evaporation reduction
Central coordination in maintaining the water balance
Combat heat stress in urban areas by increasing green zones
Fire prevention
Develop a shared vision of the Veluwe from the perspective of climate change

Discussion on policy and governance

This exploration of possible measures was put in a broader light the analysis conducted within the BINGO project on the policy and governance context for climate adaptation on the Veluwe. This analysis, based on surveys with a number of stakeholders from the 'Community of Practice' formed at the first meeting, showed, for example, that there are sufficient resources available to respond to climate change. This conclusion gave rise to discussion. It was debated, for example, that there is no shared future image of the Veluwe. At the same time, it was stressed that a shared vision is not always achievable, especially in areas with different actors and interests, and that discussing means rather than goals can be an outcome. Also, it is not clear who at the Veluwe should set adaptation goals. The province has an important role to play, but it must cooperate with other actors, and this is often difficult.

The connection between the water sector and other sectors was another topic of discussion, which is not adequately regulated at the Veluwe according to the participants. Municipalities in particular are still very much oriented at construction and development. An important question is who should take the initiative in setting up more connections. People from the spatial planning perspective say they are open incorporate the water perspective, but do not always put that into practice. Apparently the water professionals are not yet able to emphasize the importance of water in other policy and decision-

making bodies. Water management requires a longer time horizon than spatial planning, which makes it difficult to better manage this representation. In the past, the Dienst Landelijk Gebied sat at the table with other local actors and helped water managers to defend the water interests. Now that this organization has been dissolved, this help is not provided anymore.

The participants also noticed a lack of a clear responsibility structure at the Veluwe. In theory, the division of responsibility is clear - municipalities are responsible for regulating private initiatives in the subsoil, for example - but in practice responsibilities are not always respected and there is uncertainty. As a result, there are gaps in the structure of responsibility.

Finally, the participants wondered whether the current policy was adaptive enough to cope with the effects of climate change. Groundwater protection and nature conservation are often very conservative, and allow little adaptation to changing circumstances. This conservative attitude could, for example, block the flexible relocation of functions at the edges of the Veluwe.

Annexes

1- List of participants

1	Henk-Jan van Alphen	KWR
2	Emmy Bergsma	KWR
3	Gerard van Dijk	Stichting Natuur & Milieu en Milieuzorg Noordwest-Veluwe
4	Jolijn van Engelenburg	Vitens
5	Rosa Hueting	Arcadis
9	Stefanie Pflug	KWR
6	Charles Rijsbosch	Platform Water Vallei & Eem
7	Teun Spek	Provincie Gelderland
8	Britta Verboom	Provincie Gelderland
11	Marcel Vossestein	KNNV/NEW

12	Bram Vreugdenhil	Provincie Gelderland
13	Flip Witte	KWR
14	Wim Zeeman	Bekenstichting

2- Evaluation by Participants:

20 evaluation forms were received and the evaluation was

Meeting preparations and logistics	
Meeting information provided in advance	3,5
Meeting venue (adequacy of the room where the meeting took place)	3,8
Materials distributed during the meeting to support the sessions	4,1
Overall assessment of the meeting	
Attainment of the objectives of the meeting (the objectives of the meeting were met)	4,1
Positive and collaborative atmosphere among participants	4,6
Duration of the meeting (1=totally inadequate; 5=adequate)	3,8
Opportunity for individual participation and input in the meeting	4,4
Evaluation of sessions	
Clarity of presentations/speakers	3,9
Discussion (moderation, conclusions reached)	4,1

II. In your opinion, what were the most positive and less positive aspects of the workshop?

Most positive: Good participation, good atmosphere in trying to find common solutions, well structured. New ideas, new insights. Cross over of knowledge and experiences.

Less positive: Some participants were too dominant in discussion, some discussions could not be finished due to time restrictions. Not clear what is being done with opposing ideas

III. What suggestions do you have for future workshops?

- include more stakeholders
- more creative venue

D5.2 COMPILATION REPORT ON INITIAL WORKSHOPS AT THE SIX RESEARCH SITES

Month 24 2017

Tagus M15 report

TAGUS BASIN RESEARCH SITE, PORTUGAL

ARE WE PREPARED?



Maria João Freitas, Ricardo Bernardo, João Lutas Craveiro

LNEC

Organizing partner: LNEC - National Laboratory of Civil Engineering

Workshop Place: CIMLVT, Santarém, Portugal

Date: 25th October 2016

Number of invited organizations / Number of guest attending:

40 organizations / 28 (18 female & 10 male) from 10 organizations (1 National Policy Body; 2 Regional Policy Bodies; 1 Local Policy Body; 3 Associations; 1 Water Utility; 2 Research Institutes)

Workshop Tagus Research Site Agenda

WS M15 - 25th October 2016

9.30h – Welcome & Housekeeping

10.00h – BINGO *So far*

11.00h – Visioning and Backcasting mapping

13.00h – Lunch break

14.00h – Are we Prepared? – following backcasting mapping

16.00h – Feedback and Debate on “Policy and Governance”
Questionnaires

17.00h – Further steps & WS#3 evaluation

17.30h - Farewell

Objectives: 3rd session: 25th of October 2016

- ✓ To refresh BINGO objectives, framework & results so far
- ✓ To explore visioning & preparedness regarding adaptation strategies
- ✓ To discuss first results from Questionnaire on Policy and Governance

Material distributed to participants:

- BINGO stickers & cards for individual identification
 - General program;
 - BINGO brochure;
- Permission forms for recordings and Facebook posts;
 - Individual evaluation form

Characterization of participants (Types of Organizations):

Policy bodies		
<i>National</i>	<i>Regional</i>	<i>Local</i>
DGADR – Agriculture and Regional Development National Board	DRAP LVT – Agriculture & Fishing Regional Department APA/ARHTO – Environment Portuguese Agency / Administration of the Tagus River Basin and West	CIMLT – Lezíria do Tagus Inter-Municipal Community
Associations	ARBVS – Sorraia Valley Beneficiaries and Irrigation Association FENAREG – Irrigation National Federation COTR- Operational and Technological Center for Irrigation	
Water Utility	EPAL – Lisbon Water Supply Utility	
Research institutes	LNEC – National Laboratory of Civil Engineering SPI – Portuguese Society for Innovation	

Summary of workshop activities

The Tagus research site Stakeholders and the Research Team met on 25th of October 2016 at Santarém, hosted by the CIMLT, BINGO partner.

1. Welcome and Housekeeping

In this 3rd BINGO WS, participants were welcome by the CIMLT host team and invited to share a coffee at the Coffee Corner while socializing with each other's. The session started welcoming new participants and with a briefing on BINGO WS initiative, mainly remembering the WS's roadmap and aims and by highlighting the specific goals of the session. The facilitator shared the agenda and briefed participants on how the journey was planned in its different milestones. Also basic housekeeping information and participation code was shared before participants briefly introduced themselves around the tables.

2. BINGO so far

Then LNEC team shared with all participants, ongoing BINGO activities and results regarding a) refreshing BINGO project objectives, framework and activities so far; b) a flashback on droughts events in Tagus Basin supported by key data/information; and c)

Scenarios trends at Tagus research site, based on BINGO activities regarding WP2 (Climate predictions and downscaling), WP3 (Integrated analysis of the water cycle), WP4 (Assessment of the impacts of extreme weather events) and WP5 (Developing risk treatment and adaptation strategies for extreme weather events).

These presentations involved LNEC colleagues in charge of the different BINGO activities and allowed an integrated awareness on BINGO ongoing progress and a fruitful and lively debate among all participants on provided information.

3. Visioning and Backcasting Challenge

The visioning exercise started before the lunch pause and was completed in the first part of the afternoon. Participants were introduced (i) to the backcasting challenge approach; (ii) to what questions were chosen to guide it; and (iii) to how it was intended to run. Four stages were proposed for the exercise:

Stage 1:

Stage 1: to work on “nightmare” & “dream” scenarios (meant to be radical but plausible), based in the following tips:

- What does 2025 look like if adaptation fails completely? / What does 2025 look like if adaptation fully succeeds?
- What does the endstate look like at the research site? (focusing on the water cycle/system)
- What happened between now and 2025? (describing a possible timeline of events)

Previously to this Workshop the core Portuguese BINGO team (LNEC; CIMLT; EPAL; DGADR) met during an entire afternoon to undertake a backcasting pre-test exercise. In sequence of this pre-test exercise we realized that stakeholders could not be so familiar to its dynamic and it could require much time before production of results. Therefore DGADR and EPAL, based on their pre-test experience and shared results, volunteer to prepare a written narrative (storytelling) around “dream” and “nightmare” scenarios that could speed and inspire the enlarged scenarios co-production at the workshop. This allowed the preparation of the scenarios panel with a timeline reference and a set of inspiring photos to support the visioning exercise. Based on these narratives, a set of post-its was previously prepared with the main topics addressed. A color legend was settle to accommodate contributions regarding different trends and areas of impact/events expression: (a) territory; (b) population; (c) sectors; (d) corporation; (e) others domains. Therefore, both EPAL and DGADR began to share their dream/nightmare scenarios narratives supported with photos/images and maps

while main topics were post-it in the scenario panel, so that all participants could easily follow the narratives and be inspired to give them continuity. In a very smooth way the collective scenarios panel began to be built and all participants quickly contributed with new and/or detailed topics to the collective “dream” and “nightmare” scenarios design, composing a very rich product.

Stage 2:

Stage 2: to identify main challenges /critical issues to develop:

- What are the main impressive/constant topics /challenges to be addressed according to produced dream/nightmare designs?
- Do they pose a real threat?
- Did they already occurred? /Are they currently present at the Tagus research site? (exemples)

The identification of the critical issues/challenges “naturally” followed the previous stage with contributions from all participants by a shared awareness and perception process, inspiring 4 clusters of purposes/topics to be developed at stage 3.

Stage 3:

Stage 3: to work on feasibility and exploitation of critical paths

- How are /should main challenges/critical path be addressed? (ideation)
- Are strategies / measures enough / adequate?
- How easy / difficult is to implement those strategies/measures? (feasibility)
- What should be done to prevent and/or take away the negative effects from the risk? (New ideas?)

Participants that were randomly organized in working group tables (se picture in the front page of this document) picked a topic to develop on feasibility and exploitation of critical paths, worked on it inspired by the global question: “what should happen across the timeline in order to ensure the conditions to place Tagus Basin on the road of the “dream” scenario and faraway of the “nightmare” one? All groups shared their outputs by posting their backcasting tips in the scenarios panel, completing the exercise and allowing an integrated view and discussion around already existing initiatives, new ones and complementary ones in order to ensure their feasibility, efficiency and efficacy.

Stage 4:

Stage 4: to identify main success and failure triggers

- What are the primary causes/consequences for failure? / What are the primary causes/consequences for success?

- Going on exploring the critical paths...

A global debriefing on collective production and scenarios challenge design was animated and participants were invited to contribute to a *Top 5 summing-up* on success critical points and triggers to address at the Tagus Research Site.

4. PT “Policy and Governance” Questionnaires feedback

The BINGO team presented a briefing on Portuguese results of the Questionnaire, addressing the following topics: (a) What are the strong points of the policy and governance situation? How can they be maintained?; (b) What are the weak points? How can they be improved?; and (c) What are the most important challenges related to adaptation strategies and measures to be revisited? Participants followed debating challenges on preparedness, crossing the questionnaire results and the journey outputs, and contributed to a collective summing up debriefing

5. Further Steps & WS#3 evaluation

The BINGO team shared upcoming work on BINGO work plan and WS#3 facilitator pushed to follow up interactions and debates on Basecamp Platform. Participants were invited to fulfill the individual WS#3 evaluation form and to share a last farewell coffee.

Summary of workshop outcomes and results:
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BINGO so far - sharing ongoing activities

Participants recognized and highlighted advantages on this sharing moment, mainly concerning its contribution

- (i) to a better floods and salinity models awareness and perception;
- (ii) to better, more calibrated and adjusted clima modelling solutions; and
- (iii) to strength interest in getting in touch with other projects/initiatives that also addresses the climate change challenges.

Three main topics emerged reinforced by this discussion:

- a) the *relevance of the nexus between urban water circle approach and Climate Changes* (even proposing that this topic should be integrated in the schools curricula from early ages); and

- b) the need to *reinforce taskforces to approach bottom-up initiatives with more global strategies* to cope with CC in order to enhance synergies and to prevent potential conflicts around water use.
- c) a general *concern on how the EU may be “losing its foot” on addressing climate challenges* was also discussed, mainly motivated by a treat perception of a weak strategy and mismatches with fragmented and spread stakeholders initiatives.

Visioning and Backcasting Challenge

- What does 2025 look like if adaptation fails completely? / What does 2025 look like if adaptation fully succeeds?
- What does the endstate look like at the Tagus research site? (focusing on the water cycle/system)

Dream Scenarios

Participants supported their “dream” scenario in four main topics that they would like to experience in the future:

- a) ***Available water in quantity and quality*** – water sources and abstraction systems allowing to ensure 100% of needed water with the required quality and no stress in water accessibility for the different users.
- b) ***Strategic visioning and guidelines in action*** – allowing shared awareness about the challenges, with actionable orientations guiding and accommodating activities developed and lead by the different stakeholders, and with good solutions on the road to cope with CC, ensuring enough water in quantity and quality.
- c) ***A water collaborative governance system in action*** – with real conditions to accommodate and develop a permanent cooperation engaging all relevant stakeholders to address CC/water nexus challenges, with evidences that all stakeholders work in a well-articulated routine sharing common concerns to ensure and achieve integrated and sustainable practices and solutions, and with good relations between each other.
- d) ***Water efficient use as mainstream*** - as a “societal deal”, supported by a shared awareness and implication of domestic and the different sector’s

consumers and corporative utilities/institutional stakeholders; going side by side with energy efficient use investments; ensuring a global openness/acceptance/development to new and/or more efficient solutions to cope with water scarcity; and ensuring adaptive resilience and transformation towards resources management.

Nightmare Scenario

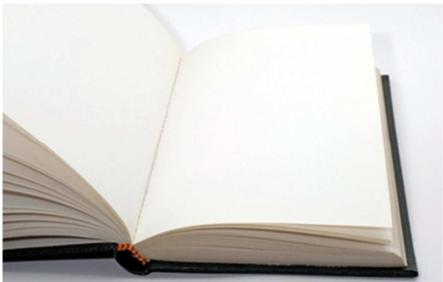
Participants expressed and explored their “nightmare” scenarios around 4 main arenas of events, experiences and impacts manifestations, if adaptation failed:

- a) ... in the territory
- b) ... near the population
- c) ... to the sectors
- d) ... to corporations

Territory	
	<ul style="list-style-type: none"> • 3 consecutive years of drought • crops and rice fields with no water • forest fires • insect blooms that create new diseases
	<ul style="list-style-type: none"> • lowering of piezometric levels of groundwater abstractions • hydrometric level in the Albufeira de Castelo de Bode has fallen below 88 meters
	<ul style="list-style-type: none"> • degradation of the ecological status of water bodies • poor water quality in the Tagus flow between Portugal and Spain due to wastewater discharges

	<ul style="list-style-type: none"> • a flood like the 1941 one occurs in Mouchão Póvoa and on the left riverside of Sorraia • storm tides and severe inundations occurs at Lezíria do Tejo plan and Sorraia river
	<ul style="list-style-type: none"> • Conchoso abstraction gets nonoperational • Tagus River serves no more Valada section and there is reduction of Tagus affluences to Valada section • Tagus river gets meandering
	<ul style="list-style-type: none"> • Valada abstraction in Tagus river gets nonoperational • Water abstractions at Valada are not strategic reserve option anymore
	<ul style="list-style-type: none"> • Industries in Vialonga stopped working and closed • tourism activity declines
	<ul style="list-style-type: none"> • desertification – people abandon the region • financial crisis continues • political instability

<p>Population</p>	
	<ul style="list-style-type: none"> • decrease in water quality which becomes severely compromised • tap water looks dirty • tap chlorine-flavored water • no water to bath, toilet and irrigation • people began to use wastewater
	<ul style="list-style-type: none"> • no drinking water available • health problems and people died • (2M people get no water at all during 1 week and 50 faced severe health problems)
	<ul style="list-style-type: none"> • awareness to CC challenges and to an efficient use of water was not put in practice
	<ul style="list-style-type: none"> • population was not aware of treats and consequences of misuse of water, and wasted lots of water • population don't defend water bodies
	<ul style="list-style-type: none"> • increased cost of living • unemployment grows • import of goods raise and is not sufficient to compensate the lack of production

Sectors	
	<ul style="list-style-type: none"> • lack of relevant alert and information to sustain decision • monitoring and control of the quantity and quality of water bodies decreased and / or was abandoned • population has not access to reliable information
	<ul style="list-style-type: none"> • part of the energy production fall • agricultural production fall • water provision became inconstant • water services became less reliable and faced serious problems
	<ul style="list-style-type: none"> • farmers had no water to their campaigns • irrigators associations closed their services • farmers provide their own water abstractions with poor quality
	<ul style="list-style-type: none"> • water use conflicts between domestic and other relevant uses (hydroelectric production, agriculture, industry, ...) • inhabitants fight for water in supermarkets • competition between regions to access water became an open conflict routine (farmers from different regions fight for same water sources) • commitments achieved at “Albufeira Convention” and “Transfers’ Policy” between Portugal and Spain (concerning transnational rivers) were broken
	<ul style="list-style-type: none"> • Intersectoral co-operation failed and corporations don't b speak with each other

	<ul style="list-style-type: none"> • Co-operation between Water and Energy utilities was not settled • Conflicts escalation between stakeholders
	<ul style="list-style-type: none"> • Regulatory Authorities mediation of conflicts came late and was not working • restriction to use of water and tax benefits to water savings with no effect • licensing of industries and affluence control has relaxed
	<ul style="list-style-type: none"> • Nature Based Solutions (NBS) were not implemented in urban settings and water waste increased

<p>Corporations</p>	
	<ul style="list-style-type: none"> • Plans and Strategies were not accomplished and became obsolete
	<ul style="list-style-type: none"> • short term issues prevailed in guiding the decisions • lack of “sense of urgency” in decision-making
	<ul style="list-style-type: none"> • reduction of investments • exploitation of alternative water sources were not done • desalinated water exploitation was not accomplished • EDP (Electricity Productor Company) turbocharged water was not re-used • Dam in-depth water discharges were not used in time

	<ul style="list-style-type: none"> • emergency strategies were not activated • investments to improve water abstraction in Valada (at Tagus river) were not done • alternative solutions to ensure water services to population (in quantity and quality) in moments of crisis were not planned and tested • capacitation to deal with climate scenarios uncertainty and CC was not developed or was not robust enough
	<ul style="list-style-type: none"> • strategic risk assessment was not consistently applied • redundancy systems were not developed and sub-systems interoperations were disinvested • Operating assets management was neglected and caused an increase in expenses • Abstraction systems were not adapted to new situations and were not shifted in due time
	<ul style="list-style-type: none"> • measures to encourage an efficient use of water were not implemented • reduction on loss of supply systems were not implemented and high losses continued to be registered
	<ul style="list-style-type: none"> • water treatment high standards were neglected due to lack of money to investment in water treatment products and new solutions • Treatment system can not deal with the decrease of water quality in their origins • The National Health Authority suggests inhabitants to boil water before consumption and corporation water utilities good image is broken

Debriefing

- What happened between now and 2025? (describing a possible timeline of events)
- Did they already occur? /Are they currently present at the research site?

- Beside fears/risk perception pushed to its extreme expression, **nightmare scenarios** were also supported/*inspired by several extreme past events* (1941 hurricane; several floods; 1992/93 drought) and by the PT “crisis ambience” recent experience
- Main **nightmare issues** concern *not being able to accomplish already existing solutions and/or good practices orientations* (i.e discontinuity of already existing practices and/or not being able to implement existing guidelines and plans; decision and investments consistency; delays in anticipating solutions and/or developing and implementing alternative/new solutions)
- Main **dream challenges** concern mainly (i) to *planning and organizational focus, ability and assertiveness*, and (ii) to *ensure both technical and governance ambitions feasibility*

Challenges & Backcasting Designs

- What are the main impressive/constant topics /challenges to be addressed according to produced dream/nightmare scenarios?
- Do they pose a real threat?
- What should be done to prevent and/or mitigate the negative effects from the risk? (New ideas?)
- How are /should main challenges/critical paths be addressed? (ideation)

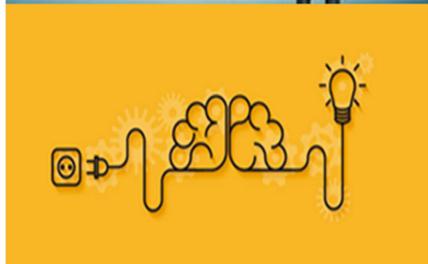
Participants chose to explore solutions and possible roadmaps to success based on the dream scenarios topics and treats identified in the nightmare scenarios:

Available water in quantity and quality



- A. Investment on non-hydroelectric energy production
- B. Explore alternatives to current water production solutions
 - Monitoring of river beds
 - Population awareness of sustainable use of resources
 - Wastewater treatment guaranteed to a higher level
 - Investment in water quality monitoring
 - Taxes
 - Use of less water-consuming crops
 - Efforts placed in reducing transport losses - increase efficiency
 - Diversify water sources
 - Invest in means and technologies to guarantee new abstractions

Strategic visioning and guidelines in action



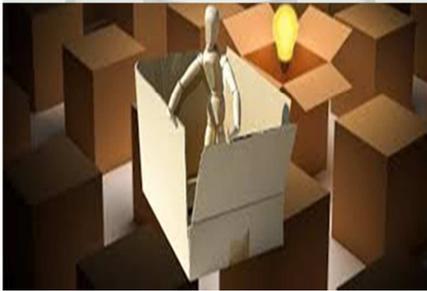
- A. Better clarification of what one wants as a strategy
 - Political commitments or regime pacts independent of governments
 - Articulate between sectors actions/measures
 - Implementation of the user-payer principle (mandatory counting)
 - Selection of measures by cost-benefit analysis including environmental dimensions
 - CAP (agriculture stakeholder) oriented to increase crops more adapted to the soil and clima
 - Maintain the incentive system for the efficient use of water in agriculture (economic, controlled implementation)
 - Incentives to reduce losses in the supply systems (payment of taxes on tariff ...)
 - Rules for urban construction design targeting efficient water use and water reuse
 - Circular wastewater system at city level (reusing gray water)
 - Hydric Resources Taxes are used for improving water bodies

A water collaborative governance system in action



- A. Full adaptation of all actors in society to climate change
- B. Cooperation and permanent adaptation
 - Awareness of the gap between the various actors
 - Dialogue between the different Portuguese national actors in the advisory councils (CNA, CRH, CNR, etc.)
 - Promotion of integrated management between various actors
 - Activate the AUDPH and EFM assemblies (where the various water management sectors are represented)
 - Ensure integrated and participated management
 - Economic increments and more € invested in water resources management (by the public admin)

	<ul style="list-style-type: none"> • Awareness campaigns designed to inform the civil society and support adaptation practices to climate change
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<p><i>Water efficient use as mainstream</i></p>	
 	<ul style="list-style-type: none"> A. Water efficient use (WEU) B. Energy efficiency C. Dealing with shortcomings <ul style="list-style-type: none"> • Development of WEU awareness and consciousness near citizens • Redistribution of crops by type of soil • Apportionment of water distribution in agriculture • Development of efficient irrigation techniques • Conservation / maintenance of water transport structures (efficiency) • To explore new technological solutions to water distribution • To produce energy based on dams' discharges in Sorraia river • Compensation tanks

Summing up Debriefing (are we prepared?)

- Are strategies / measures enough / adequate?
- How easy / difficult is to implement those strategies/measures? (feasibility)
- What are the primary causes/consequences for failure? / What are the primary causes/consequences for success?
- Going on exploring the critical paths...

In general terms, the workshop participants (i) identified already existing relevant technical recommendations and measures; (ii) recognized already existing good practices orientations in sectoral and corporation strategic plans regarding CC adaptation that could be implemented; (iii) expressed themselves reasonable comfortable and confident on their potential outcomes if moved to practice, but also (iv)

showed interest in exploring brand new and/or alternative solutions that could speed and/or robust CC adaptation strategies.

However *the big obstacle that participants identified has been the practical difficulty to “move” from those already existing solutions and orientations “to practice”*. And the reasons that have been pointed and discussed were less centered in technical issues, but rather in (i) the political and corporation decision making process; ii) the (non)existing financial opportunities to put plans in practice; and (iii) the lack of information/communication on the topic.

Summing up on main causes to success/failure pointed to:

... about the decision making process

- Real political will and clear orientations (more than just “vague/confusing statements” and/or just “regulations/penalties”!)
- “Sense of Urgency” about CC challenges shaping both political and corporative priorities and decisions
- Orientations and decisions not trapped (imprisoned) by “short term” visions and results (able to develop “long term” visioning and larger roadmaps)
- Ability to “move to practice” by developing an integrated and collaborative governance solution
- Quality and effective status of strategic plans (mainly in what concerns their implementation design; their real influence/orientation to more coherent and feasible inter-sectoral solutions; and their real support to corporative decision process) -

... about the (non)existing financial support to put plans in practice

- Learning with recent “crisis” experience and negative impacts
- Ability to distinguish between measures that are heavily dependent on investment and those that can be also impacting and implemented but less costly
- “Sense of Urgency” about CC challenges shaping “short term” and “long term” investments

... about the lack of information/communication on the topic

- Keep going on CC adaptation strategies research and knowledge production

- Ensuring that data, information, learnings and knowledge are shared with the great diversity of stakeholders and common citizens in an “easy way”
- Invest on moving from “knowledge to action” (improving research and non-researches interactions; working on how to move from “ideal models” towards “feasible models”; ...)

Additional Comments

Taking into account that WSM15 was the third enlarged stakeholders’ meeting in Tagus Basin some topics and relevant/ difficult dimensions have been confirmed, deeply explored and reinforced, such as:

- a) global concerns with extreme events and climate changes challenges
- b) the pressure in the agriculture sector: topics as saline intrusion; crops and water availability; agriculture efficiency and local ecosystem characteristics and inter-dependencies
- c) concerns in water services: with existing abstraction and distribution infra-structures and with resilience efficiency
- d) pressures to engage common citizens and develop their awareness
- e) interest and openness to explore alternative and new technical solutions to strength adaptation strategies to CC

and (mainly reinforced!)

- f) the complex, multidimensional and multiscale impacts chain of CC at the Tagus research site
- g) big challenges in addressing adaptation to extreme weather events and CC are related to “human capacity” and to “governance solutions”
- h) the focus on policy and collective action – the Tagus basin is shared with Spain; cooperation (vs competition) based on shared purposes and effective interactions; land planning challenges; management/decision critical points; and collaborative planning challenges

Video testimonials collected? No

Positives/Negatives

In our opinion the most positive aspect of the workshop was the open debate between all participants, mainly around the ongoing research activity and the “nightmare” conditionings, as well as the group maturity and constructive attitude in addressing interdependencies struggles to achieve the desirable scenarios. As a matter of a fact, in terms of CoP, this Portuguese 3rd WS evidenced (a) relevant confidence between participants to share and discuss sensitive topics; (b) a higher comfortable attitude towards WS collaborative approach and ethic code and (c) a very supportive coach to new members integration in ongoing the WS dynamics-. Another very positive issue at this WS was the possibility to refresh the path that is being built/is expected to be achieved with these WS and to accommodate a “BINGO on going activities/data” feedback. This moment has been very refreshing (a) to strength researchers/researchers and researchers/non-researchers inter-actions and mutual understanding, (b) to strength a shared perception around CC framework; (c) to illustrate, with already existing produced data, the BINGO potential; (d) to allow participants to have access to partial add-value results; and (e) to go further on detail both on more “focused” struggles and potential “actionable” roadmaps exploitation.

The most negative aspect of the workshop was the lack of time to go even deeper in exploring potential roadmaps towards dream scenarios in stage 3 - working groups, as participants were really engaged in actionable topics design. Anyway it was suggested to follow the discussion of some of these topics in the Basecamp Platform, which will be experiment during 2017. Also the fact that some participants suggested a shorter workshop shows that the time duration of such workshops should not be extended.

What suggestions do you have for future workshops?

As the next WS will be dedicated to “resetting the scene” – *Yes, we are (prepared!)*, we think that participants could be challenged to continue to go through their “production” of this WS M15 and develop a prototype of an “actionable” roadmap to CC adaptation at the Tagus Basin (detailing implementation struggles and solutions and ensuring a global integrated design). Also, keeping the feedback on BINGO ongoing activities and results should be taken as a routine in next WS agendas. Furthermore, the Portuguese results from this WS_M15 can be the base to write an executive summary meant to support face-to-face contacts with decision makers in order to reinforce their commitment with BINGO activities and “actionable research” purposes.

Annexes

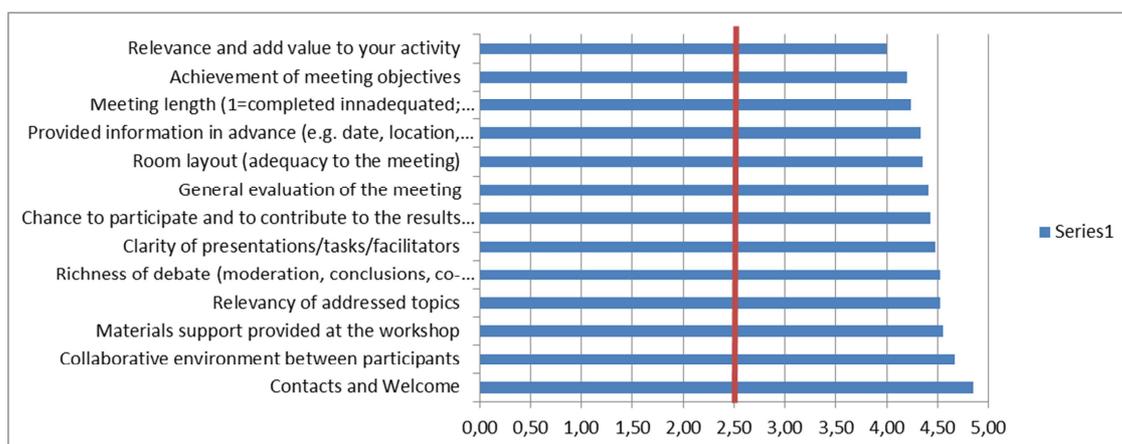
1. List of participants

Name	Organization	3rd TagusWS 25th of October 2016
Helena Alves	APA/ARHTO	X
Patrícia Duarte	APA/ARHTO	X
José Núncio	ARBVS	X
Ana Garcia	CIMLT	X
Ana Esteves	CIMLT	X
Natasha Oliveira	CIMLT	X
Sara Tomé	CIMLT	X
Marta Costa Santos	COTR	X
Alberto Freitas	DGADR	X
Pedro Brito	DGADR	X
Fernanda Fenyves	DRAP-LVT	X
Paula Guerra	DRAP-LVT	X
Itilio Magalhães	DRAP-LVT	X
Maria João Capela	EPAL	X
Basílio Martins	EPAL	X
Carina Arranja	FENAREG	X
Ana Estela Barbosa	LNEC	X
André Fortunato	LNEC	X
Fernanda Rocha	LNEC	X
João Craveiro	LNEC	X
Manuel Oliveira	LNEC	X
Maria João Freitas	LNEC	X
Marta Rodrigues	LNEC	X
Paula Freire	LNEC	X
Ricardo Bernardo	LNEC	X
Rui Rodrigues	LNEC	X
Teresa Viseu	LNEC	X
Sofia Esteves	SPI	X

Overview of the Workshop evaluation by Participants

3rd session – 25th of October 2016
 N° of evaluations: 21 (score scale: 1.00 to 5.00)

Contacts and Welcome	4,85
Collaborative environment between participants	4,67
Materials support provided at the workshop	4,55
Relevancy of addressed topics	4,52
Richness of debate (moderation, conclusions, co-produced results...)	4,52
Clarity of presentations/tasks/facilitators	4,48
Chance to participate and to contribute to the results of the meeting	4,43
General evaluation of the meeting	4,41
Room layout (adequacy to the meeting)	4,35
Provided information in advance (e.g. date, location, schedule)	4,33
Meeting length (1=completed innadequated; 5=adequate)	4,24
Achievement of meeting objectives	4,20
Relevance and add value to your activity	4,00



Summary of written comments by participants:

Positive

- Openness of mind, creativity, harmony
- Exchange of ideas
- Sharing of various ideas and solutions from the various and different stakeholders involved
- Excellent collaborative ambiance between participants
- Sharing and presentation of lots of results already achieved in the project
- Opportunity to know and discuss other entities' approaches to common issues
- Dialogue with other stakeholders allowing to share different approaches
- Good coordination and organization of the meeting
- Relaxed atmosphere. Good opportunities to participate
- Cooperation between participants. Good working ambiance
- Very interesting contents in presentations; Prepared dynamics; Interaction
- Exchange of ideas and experiences among participants
- Sharing knowledge between various areas / entities
- Open discussion and contact ambiance
- Summary of all the work already done, namely the models

Negative

- The discussion becomes somewhat dispersed when the project applies to specific zones and "problems"
- Lack of time to discuss the measures
- I wish there was more time for discussion and / or group work
- Some overhead in the program; Few "external" participants to BINGO
- Scarce time to internalize the issues discussed
- The conclusions didn't unstick from the results of the public participation that took place in the scope of the elaboration of the Plans of Management of Water Resources - 2nd Cycle
- All-day duration makes participation difficult
- Some colleagues didn't participated in the working groups

Suggestions

- Keep going (continue!)
- In an upcoming workshop make possible a presentation of climate change in irrigated agriculture
- Getting the project output to the decision levels and the ENAAC that is being developed
- Try to mobilize more external participation; Maybe use, in addition to emails, personalized phone contacts
- Larger written support to be distributed to participants
- Delivery of previous material
- Morning or afternoon duration
- Provide the list of participants and a detailed agenda of the meeting with the distributed material.
- It would be useful to have the presentations available in individual folders
- Air conditioning is missing in the room