Environment and Climate Regional Accession Network ECRAN

Environment and Climate Regional Accession Network (ECRAN)

Report on Expert Training on Risk Assessment and Vulnerability Assessment and Adaptation Planning – Water Management Sector

19-20 January 2014, Ankara

Enviroment and Climate Regional Accession Network ECRAN

ENVIRONMENTAL AND CLIMA REGIONAL NETWORK FOR ACCESSION - ECRAN

WORKSHOP REPORT

Activity No 4.1B

EXPERT TRAINING ON RISK AND VULNERABILITY ASSESSMENT AND ADAPTATION PLANNING – WATER MANAGEMENT SECTOR

19-20 JANUARY 2015, ANKARA, TURKEY

This Project is funded by the European Union

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LIST OF ABREVIATIONS	
CCRA	Climate Change Risk Assessment
CEN	European Committee for Standardization
CENELEC	European Committee for Electro-technical Standardization
DEWS	Disease Early Warning System
DG	Directorate General
EC	European Commission
EEA	European Environmental Agency
EFAS	European Flood Awareness System
ETSI	European Telecommunications Standards Institute
EU	European Union
EURAC	European Academy of Bozen
EWS	Early Warning System
GHG	Greenhouse Gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IPCC	intergovernmental Panel on Climate Change
MMR	Monitoring Mechanism Regulation
MS	Member State
NMHS	National Metrological and Hydrological Service
PPP	Public Private Partnership
SPI	Standardized Precipitation Index
WFD	Water Framework Directive

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I. Background/Rationale

Today, all countries recognise the reality and the challenges caused by global warming and its effects. Two subsequent World Bank 'Turn down the Heat' Reports confirm climate change as a fundamental threat to development.

Many countries are already affected by climate change including the Western Balkans and Turkey. These countries are considered to be highly vulnerable and expected to experience the effects of rising temperatures and disruption to their precipitation regimes, along with more extreme events, including droughts, floods, heat waves, windstorms and forest fires. Water availability and quality will be affected, energy supply disturbed, food production will come under pressure and food prices will rise while biodiversity will decline.

Not in the least climate change effect regard to the water management sector. Floods, water supply and waste water issues affect food- and industrial production, disturb or destroy infrastructure, energy supply and urban life, and call for intensive disaster risk management. Water problems have started to impact severely on the lives of hundreds of millions of people, on nature, and on the economic situation in many countries.

This makes it a must to manoeuvre economic, environmental and social interests and costs to safe havens through adaptation measures. Adaptation in the water sector means anticipating the adverse effects of climate change and taking the appropriate action in order to prevent or minimise the damage that the effects of disrupted precipitation regimes can cause, or taking advantage of opportunities that may arise. Identification of vulnerabilities and risks is at the forefront of adaptation action.

Climate Change vulnerability

There are different ways in which vulnerability and risk can be defined and analysed. Vulnerability is often defined as a function of the character, magnitude, and rate of climate variation and change to which a system is exposed, together with its sensitivity and adaptive capacity. Humans can increase their vulnerability by e.g. urbanisation of coastal flood plains, by canalisation of rivers, deforestation of hill slopes or by constructing buildings in risk-prone areas.

In the framework of the UNFCCC seven criteria are distinguished to identify key vulnerabilities:

- magnitude of impacts;
- timing of impacts;
- persistence and reversibility of impacts;
- likelihood (estimates of uncertainty) of impacts and vulnerabilities and confidence in those estimates;
- potential for adaptation;
- distributional aspects of impacts and vulnerabilities;
- importance of the system(s) at risk.

Key vulnerabilities are associated with many climate-sensitive systems, including food supply, infrastructure, health, water resources, coastal systems, ecosystems, global biogeochemical cycles, ice sheets and modes of oceanic and atmospheric circulation.

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During the regional ECRAN Adapt Seminar in Skopje in July 2014, the ECRAN beneficiaries (Albania, Bosnia and Herzegovina, Croatia, the Former Yugoslav Republic of Macedonia, Kosovo*, Serbia, and Turkey) have identified the sectors in the Western Balkans and Turkey that are most vulnerable to climate change. Water resources is one these sectors.

Measures have been proposed for vulnerability mitigation. However, the key to adaptation to climate change is the integration of the issue of climate change in the water sector's relevant strategic, planning and programme documents both at national and regional levels as well as the local level.

The EU's Adaptation Strategy provides a framework for a more climate-resilient Europe by enhancing the preparedness and capacity to respond to the impacts of climate change at local, regional, national and EU levels. The Strategy consists of three priorities: (1) Promoting action, (2) Informed Decision making and (3) Climate proofing action.

Proper information about climate vulnerabilities is an important starting point for any form of adaptation action. Detailed understanding of vulnerable areas brings focus to the adaptation priorities and the tools to be used.

ECRAN Support

Within its Climate Component, ECRAN will promote 'climate-proofing' action by further encouraging adaptation in key vulnerable sectors which would in turn, enable planning for a more resilient infrastructure, and would support better informed decision-making by addressing gaps in knowledge about adaptation. ECRAN will address adaptation action by optimizing the coordination of adaptation activities with the European Climate Adaptation Platform (Climate-ADAPT) as the 'one-stop shop' for adaptation information in Europe.

In October 2014 the ECRAN Environment Ministers have been requested by the European Commission to nominate experts to the NATIONAL ECRAN ADAPTATION TEAMS to work together, with the assistance of EU Member States experts on the following:

- Climate Adapt tool – Prioritisation of Adaptation Needs
- Identification of Adaptation Options
- Prioritisation of Adaptation Options
- Policy and Legal Changes

*This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo Declaration of Independence.

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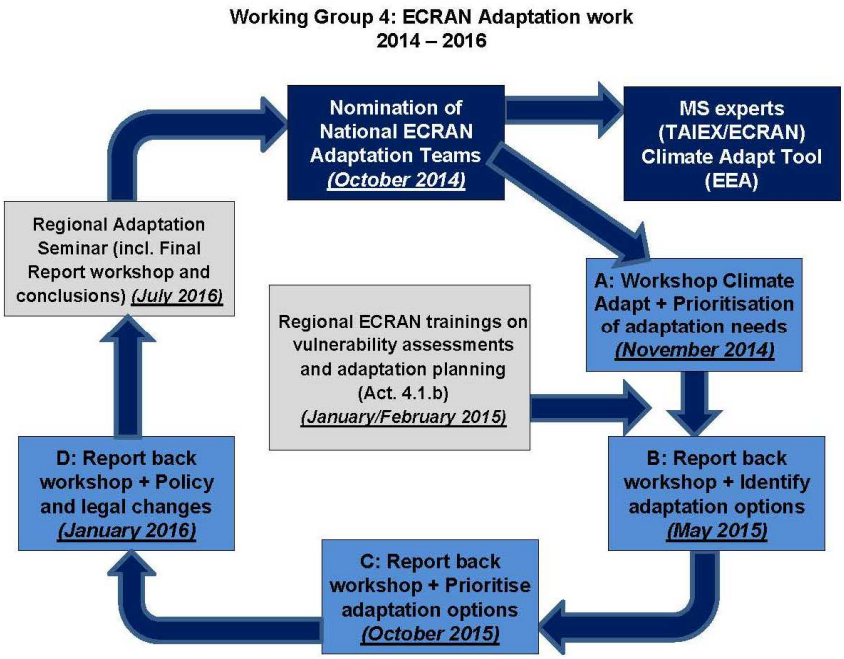

Training and Workshops Programme outline

General considerations

The ECRAN Adaptation Programme includes a series of workshops that will guide the National ECRAN Adaptation Teams through the different stages towards developing national climate adaptation policies and legislation (Activity 4.2). This will be combined with regional technical training sessions that support Beneficiary Countries' experts from selected technical areas to carry out risk and vulnerability assessments and adaptation planning (Activity 4.1.b). The three priority fields that have been selected for this technical training under Activity 4.1 b are:

- Water Management;
- Urban Areas (Physical Planning);
- Energy.

Each of these fields relates to a large variety of other (non-)selected fields, calling for strong cooperation among stakeholders in general and public administration sectors in particular. The overall theme for the training inevitably includes aspects of cooperation and collaboration, mainstreaming, and inter linkages. These are aspects that are key to successful (adaptation) responses to climate vulnerabilities in each of the selected (and other) fields. In this context there is a link with disaster risk management, as disaster risk reduction and climate change mitigation and adaptation share common goals. Both fields aim to reduce the vulnerability of communities and achieve sustainable development. The training will incorporate options for reducing disaster risks related to climate change.

The programme outline is as follows:

Step A	Climate Adapt Tool - Prioritisation of adaptation needs (Act. 4.2)	24-25 November 2014
*Technical experts that will contribute to the step-by-step process carried out by the ECRAN ADAPTATION TEAMS will receive **specific technical training** after Step A. This will enhance Beneficiary Countries' adaptation skills securing a harmonised approach among all participants in*		

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the Teams and thus contribute to adaptation practice coherence and effectiveness.		
***3 targeted training programmes** on vulnerability assessment and adaptation planning (**Water Management**, **Urban Areas** (including physical planning), and **Energy**) will be provided (Act. 4.1.b)*		19-20 January 2015 23-24 February 2015 16 – 17 April 2015
Step B	Report back workshop + Identification of adaptation options (Act. 4.2)	28-29 May 2015
Step C	Report back workshop + Prioritisation of adaptation options (Act. 4.2)	15-16 October 2015
Step D	Report back workshop + Introduction of Policy and legal changes (Act. 4.2)	14-15 January 2016
	Final Report (Act. 4.2) at Regional Adaptation Seminar	28-29 July 2016

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II. Objectives of the training

General objectives

To promote climate adaptation action in the Western Balkan countries and Turkey.

Specific objectives

To enhance the understanding about climate adaptation action in the water sector among a core of Beneficiary countries' representatives, supporting the creation of national climate adaptation policies and planning as a basis for action.

Results/outputs

The expected results are:

1. Strengthened awareness and understanding of climate change adaptation needs and options among water sector experts from Western Balkan countries and Turkey established;
2. Improved understanding of (the applicability of tools for) risk and vulnerability assessment in the water sector, including the applicability of the Climate Adapt Tool;
3. Foundation for improved cooperation and coordination among authorities in Western Balkan countries and Turkey in the area of climate adaptation action established;
4. Awareness of the need to speed up and enhance climate adaptation action planning in the Western Balkan countries and Turkey

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III. EU policy and legislation covered by the training

EU Adaptation Strategy

Extreme weather events like heavy rainfall, hail, violent storms and heat-waves are increasing in frequency and sea levels continue to rise – the effects of global warming and climate change are undeniable. Urban systems are highly vulnerable to these threats. Climate impacts vary significantly from region to region, and can fluctuate within definite geographical areas. Adaptation and resilience management is therefore required both on a regional and local scale to move towards resilient communities.

European Commission adopted an EU strategy in April 2013 on adaptation to climate change which has been welcomed by the EU Member States. The strategy aims to make Europe more climate-resilient by taking a coherent approach and providing for improved coordination, enhancing the preparedness and capacity of all governance levels to respond to the impacts of climate change.

The EU Adaptation Strategy focuses on three key objectives:

- Promoting action by Member States: The Commission will encourage all Member States to adopt comprehensive adaptation strategies (currently 20 have strategies) and will provide funding to help them build up their adaptation capacities and take action. It will also support adaptation in cities through the Mayors Adapt initiative, a voluntary commitment within the framework of the Covenant of Mayors.
- 'Climate-proofing' action at EU level by further promoting adaptation in key vulnerable sectors such as agriculture, fisheries and cohesion policy, ensuring that Europe's infrastructure is made more resilient, and promoting the use of insurance against natural and man-made disasters.
- Better informed decision-making by addressing gaps in knowledge about adaptation and further developing the European climate adaptation platform (Climate-ADAPT) as the 'one-stop shop' for adaptation information in Europe.

EU adaptation actions include mainstreaming of climate change (mitigation and adaptation) into EU sector policies and funds, including marine and inland water issues, forestry, agriculture, biodiversity, infrastructure and buildings, but also migration and social issues.

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a Framework for Community Action in the field of Water Policy – Water Framework Directive

The purpose of the Directive is to establish a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater. It will ensure that all aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands meet “good status”.

The Directive requires Member States to establish river basin districts and for each of these a river basin management plan. The Directive envisages a cyclical process where river basin management

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plans are prepared, implemented and reviewed every six years. There are four distinct elements to the river basin planning cycle:

- Characterisation and assessment of impacts on river basin districts:
- Environmental monitoring;
- The setting of environmental objectives;
- Design and implementation of the programme of measures needed to achieve them.

Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the Assessment and Management of Flood Risks

The Floods Directive aim is to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. The Directive requires Member States to first carry out a preliminary assessment in order to identify the river basins and associated coastal areas at risk of flooding. For such zones they would then need to draw up flood risk maps and establish flood risk management plans focused on prevention, protection and preparedness by 2015. The Directive applies to inland waters as well as all coastal waters across the whole territory of the EU.

The Directive shall be carried out in coordination with the Water Framework Directive, notably by flood risk management plans and river basin management plans being coordinated, and through coordination of the public participation procedures in the preparation of these plans. All assessments, maps and plans prepared shall be made available to the public.

Member States shall furthermore coordinate their flood risk management practices in shared river basins, including with third counties, and shall in solidarity not undertake measures that would increase the flood risk in neighbouring countries. Member States shall in take into consideration long term developments, including climate change, as well as sustainable land use practices in the flood risk management cycle addressed in this Directive.

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IV. Highlights from the training workshop

Reference is made to Annex I for the agenda, and Annex III for the presentations. Hereunder an outline summary is presented of the presentations.

Day 1 – Ankara, Turkey, 19 January 2014

EU adaptation Strategy and the ECRAN Network - Rob Bakx

- The workshop started with several examples of floods in the Balkans in the last five years; the city of Shkoder (Albania) completely flooded in 2010, city of Sveti Nikola (the Former Yugoslav Republic of Macedonia) in 2013, and there was a disastrous flood (Bosnia and Herzegovina, Croatia, and Serbia) in 2014. May 2014 was the warmest month ever recorded, with 15.54 °C, which is 0.74 °C above the average mean of 20th Century.

- In such cases, applying the mitigation action is not sufficient and proper adaptation actions that will provide for and reinforce the mitigation actions need to be implemented. Mitigation and adaptation are both necessary and complementary. For example, 1 euro invested in flood protection, saves up to 6 euros of damage costs. So far, 17 EU MS have adopted national Adaptation Strategies, several countries have developed Action Plans and vulnerability assessment, while the monitoring and evaluation is at starting point.

- The overall objective is to contribute to more climate-resilient Europe, having three priority issues that need to be developed:
  - Priority 1: Promoting Action by Member states:
    - **Action 1: Encourage MS to adopt Adaptation Strategies and Action Plans** – Guideline needs to be provided on adaptation strategies, as well as adaptation preparedness scoreboard;
    - **Action 2: LIFE funding, including adaptation priority areas** – It is important to develop cross-border floods and coastal management, urban environment, mountain and island areas, as well as drought-prone areas;
    - **Action 3: Promoting action by cities along the Covenant of Mayor initiative** – The objective is to support local authorities in taking coherent action on both mitigation and adaptation as part of integrated approach.
  - Priority 2: Better informed decision-making:
    - **Action 4: Knowledge-gap strategy** – It is important to identify and prioritise knowledge gaps and provide better interfaces for policy. This can be included into Horizon 2020 program.
    - **Action 5: Climate – ADAPT** – Development of interfaces with other databases and climate services and inclusion of Copernicus climate services.
  - Priority 5: Climate –proofing Action:
    - **Action 6: Climate proofing the Common Agricultural Policy, Cohesion Policy, and the Common Fisheries Policy** – Provision of guidance and capacity building.
    - **Action 7: Making infrastructure more resilient** – Mapping standards through CEN/CENELEC/ETSI and project development.
    - **Action 8**: **Promote products and services by insurance and finance markets** – Promotion of green paper insurance of disasters and stakeholders dialogue.

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- The Environment and Climate Regional Accession Network ECRAN Climate Working Group was introduced. The kick-off meeting was in October 2013, and presents a follow –up of the RENA project, building on RENA Climate results. Active engagement of public sector expertise is organised through TAIEX for eight beneficiary countries. ECRAN Climate has four sub-groups:
    - Working Group 1: Climate Policy;
    - Working Group 2: GHG Inventories and MMR;
    - Working Group 3: Emission Trading System (ETS);
    - Working Group 4: Adaptation.

- The ECRAN activities in the period from 2013 to 2016 will focus more on information sharing through practical work. It is necessary to ensure that capacity is built truly at the beneficiaries, as well as to increase involvement from other sectors with direct relevance to climate work. Regarding Adaptation policies, the EU strategy on Adaptation to Climate Change was adopted in April 2013. Emphasis was put on adaptation options that are low cost, good for the economy and for climate resilience. All these considerations are transposed into ECRAN work plan for adaptation. The ECRAN Adaptation Seminar was held in Skopje in July 2014, and certain conclusion regarding further steps were brought, such as the need to develop public awareness, enhancing public administrations' knowledge and the need for enhanced cooperation and coordination with EU Member States and between ECRAN beneficiaries.

Risk and Vulnerability Assessment and Adaptation Planning: Water Management Sector – Imre Csikós

- The ECRAN Working Group 4 focusing on three priority issues from the EU Adaptation Strategy, mainly actions 1, 4, and 5.

- The European Climate Adaptation Platform (Climate – ADAPT) supports governmental policy and decision makers developing and implementing climate change adaptation strategies, policies and actions. It is complementary to both national and sectoral platforms, launched in 2012 by DG CLIMA and the European Environmental Agency (EEA). The Climate Adapt site was visually shown in brief, showing the most important parts such as, EU adaptation policy pages, Adaptation Support Tool, Case study search tool, etc. Information and maps from various projects are available, even by sectors, as shown by the presenter, water stress examples can be seen on the map as well. Reference is made to http://climate-adapt.eea.europa.eu/

- To support adaptation action in European cities and towns the European Commission has launched the Mayors Adapt - the Covenant of Mayors Initiative on Climate Change Adaptation. Since more than 75% of the population in Europe lives in urban areas, DG CLIMA launched "Mayors Adapt" initiative in 2014, with more than 100 cities, in order to foster urban adaptation on local level. As part of this initiative, the Urban Adaptation Support Tool has been developed and it provides practical guidance and knowledge support to its signatories as well as to any other interested cities, towns or stakeholders in Europe and beyond The Urban Adaptation Support Tool complements the support and guidance on urban adaptation that is provided by EU MS at the national level and is of special importance for urban areas in those countries, where there is a lack of national level tools and support.

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- The aim of the Adaptation Support Tool is to assist users in developing climate change adaptation strategies and plans by providing guidance, links to relevant sources and dedicated tools. The European Commission has issued EU guidelines on developing adaptation strategies as one of the components of the EU strategy on adaptation to climate change, with the aim to support EU Member States in the process of developing, implementing and reviewing their adaptation strategies. There are six steps in developing an adaptation strategy:
    - Step 1: Preparing the ground for adaptation;
    - Step 2. Assessing risks and vulnerabilities to climate change;
    - Step 3. Identifying adaptation options;
    - Step 4. Assessing adaptation options - Prepare a strategy document and get political approval;
    - Step 5: Implementation - Develop an action plan;
    - Step 6: Monitoring and evaluation.

- Risk and vulnerability assessments are available from 22 countries in the EU, and diverse methods for the conduct of risk or vulnerability assessments exist. For example, Germany has a multi-method approach including the use of literature review, while in Denmark, a dialogue-based approach was developed, involving the private sector and industry. In the United Kingdom (UK) a mapping exercise was implemented, following a multi-criteria scoring system, and further development of existing frameworks. Climate Change Risk Assessments (CCRA) in UK is done every five years. The results of the first CCRA were used as the base for the development of British National Adaptation Programme 2013 – 2018.

- Assessing risks and vulnerability to climate change has four steps:
    1. Analysis of how past weather events have affected the country;
    2. Undertake a climate change risks and vulnerability assessment;
    3. Take trans-boundary issues into account;
    4. Develop an approach for addressing knowledge gaps and for dealing with uncertainties.

- Vulnerability assessments synthesize and integrate scientific information, quantitative analyses, and expert-derived information in order to determine the degree to which specific resources, ecosystems, or other features of interest are susceptible to the effects of climate change. Before beginning a vulnerability assessment, it is necessary to evaluate what information already exists and also to identify knowledge gaps that may occur. Since not all vulnerability assessments are equal, the assessment should address specific resources of concern, be applied at an appropriate scale, consider budgets, timelines and intended applications.

- According to the Intergovernmental Panel on Climate Change (IPCC), the vulnerability framework is defined as a function of exposure, sensitivity and adaptive capacity.

  $$V = f(E, S, AC)$$

  Where E = Exposure, S = Sensitivity, AC = Adaptive Capacity.

  But also, it can be expressed as:

  $$\text{Vulnerability} = (\text{exposure}) + (\text{Resistance}) = \text{Resilience}$$

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- The Vulnerability Sourcebook was briefly presented. The Sourcebook provides a standardised approach to vulnerability assessments covering a broad range of sectors and topics as well as different spatial levels and time horizons. It was commissioned by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and developed jointly by Adelphi and the European Academy of Bozen (EURAC). More information can be found on www.adelphi.de.

- The ECRAN Adaptation programme was presented as identified during the Step A workshop in Tirana, Albania, on 24-25 November 2014. At the workshop, beneficiary countries agreed to implement 3 tasks:

    - Task 1: Position paper on modelling activities (climate models, impact models) performed in their respective countries. Deadline: 1 February 2015.
    - Task 2: Carry out a qualitative vulnerability assessment of 2 sectors in their respective country (Water resources and links to DRM and cross border aspects) and the second sector of their choosing. Method: Use the Adaptation Support Tool. Deadline: 2 April 2015.
    - Task 3: Prepare a position paper identifying the adaptation needs based on vulnerability assessment of the two sectors. Method: Use the Adaptation Support Tool Deadline: 1 May 2015

Potential Vulnerabilities in the Area of Water Management – Ad Jeuken

- The presentation started with the introduction to Deltares, an independent institute for applied research in the field of water, subsurface and infrastructure in the Netherlands. Their main focus is on deltas, coastal regions and river basins. Managing these densely populated and vulnerable areas is complex, which is why they work closely with governments, businesses, other research institutes and universities at home and abroad. Deltares units include:
    - Subsurface and Groundwater Systems;
    - Geo-engineering;
    - Hydraulic Engineering;
    - Scenarios and Policy Analysis;
    - Marine and Coastal System;
    - Inland Water System;
    - Deltares Software Centre.

- These units are spread through five spheres of Deltares themes:
    - Flood Risk;
    - Availability of Water and Soil Resources;
    - Delta Infrastructure;
    - Healthy Water and Soil Systems;
    - Sustainable Delta Planning.

- 97% of water on Earth is contained in seas and oceans, that is, salt water, and only 3% on the continents. Out of that 3%, 70% is held in glaciers, ice caps and permafrost, and only 30% is liquid water. Concluding that only 0.9% of water on Earth is available as liquid, non-salt water.

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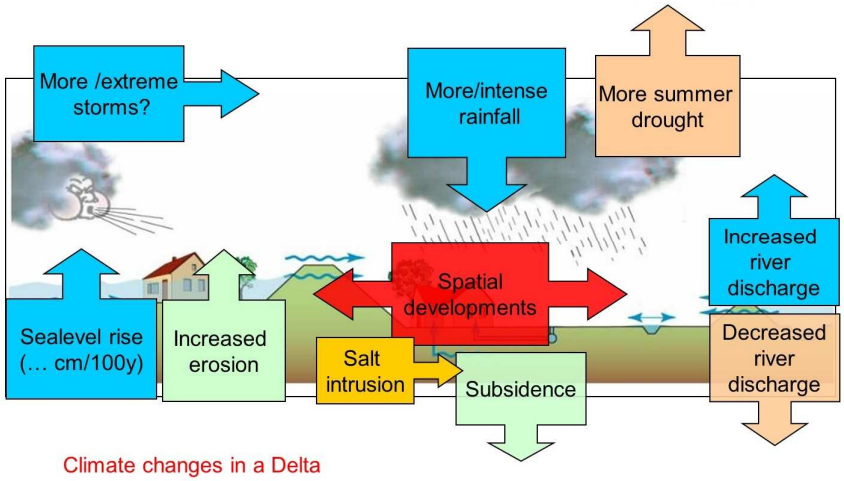
- According to IPCC Article 5, adaptation is the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. However in some natural systems, human intervention may facilitate adjustment to expected climate and its effects. Thus, there is a mutual interaction between society and environment, and there is no doubt that there will always be maladaptation, making the future of water management uncertain.

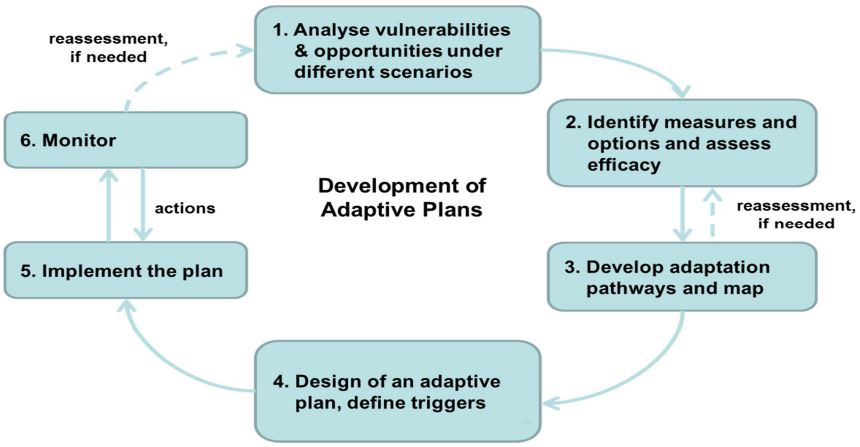
- Climate changes and the water cycle were graphically presented:



Climate changes in a Delta

- Three types of climate change impacts are distinguished here, in the manner of water supplies:
  - Gradual – such as rise of sea level;
  - Stochastic effect – such as increased storminess and heavier rain showers;
  - Tipping point – such as disappearance of permafrost.

- But the question to be asked is whether it is better to wait or to adapt to climate change. If one wants to be prepared for climate change, key vulnerabilities must be known, as well as the probability of hazardous events. A policy planning framework, as used by Deltares, is a circle with six steps, as shown on the following picture:



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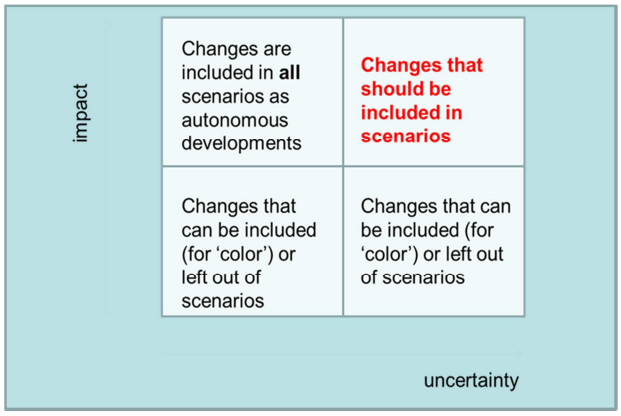
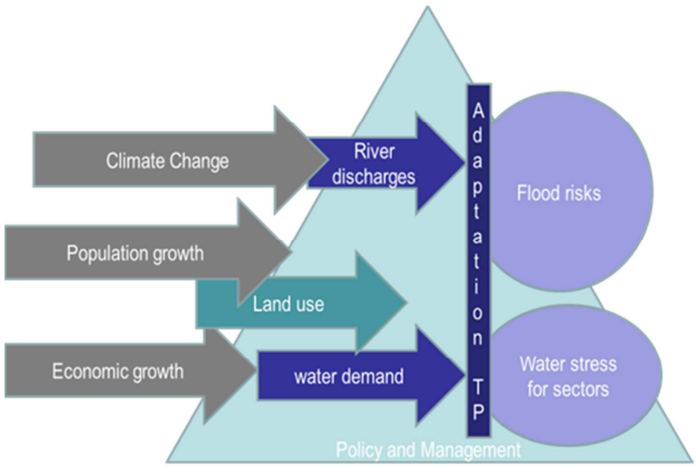
- Strategy development should start with vulnerability analysis under different scenarios. Scenario in the context of adaptation planning and assessment should provide an impact and uncertainty table, where it is determined whether some changes should be included in the scenarios.



- North-west Europe has an increase in precipitation and river flow. The Mediterranean area has a decrease in annual precipitation and hydropower potential, but an increase in demand for agricultural water and an increased risk of forest fire. Regarding water management, there is an autonomous erosion trend, where an increased number of reservoirs in major rivers is reducing the amounts of sediments available for the coast. According to some researches, water level in the Netherlands will increase up to 0.5 meters by 2050, and 1.0 meter by 2100.

- As a conclusion, as a result of economic and population growth, and greater influence of climate change, in order to comply with water demand, adaptation is necessary for the prevention of flood risks and water scarcity in near future. Scenarios are necessary to explore future vulnerabilities, while clear policy and management objectives will help to prioritise and determine which key vulnerabilities should be assessed in order to provide a proper analysis with further steps to be taken.



Identifying Climate Vulnerabilities in the Water Sector – Laurene Bouaziz

- Floods are one of the most devastating global natural hazards. Global economic losses from floods were almost 20 billion dollars. This is one of the reasons why the EU launched the EU Floods Directive that now requires MS to assess if all water courses and coast lines are at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk. The Floods Directive focuses on

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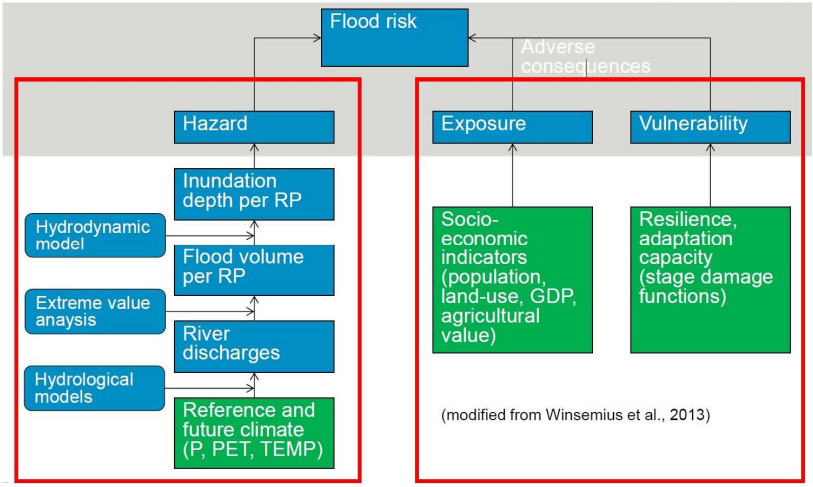
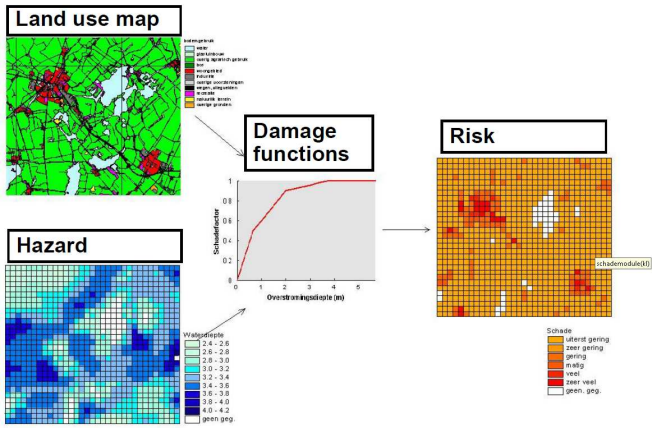
the reduction of potential adverse consequences of flooding with regard to human health, the environment, cultural heritage and economic activity. In order to define flood risk, it is necessary to know the potential hazardous activities and its adverse consequences, which are exposure and vulnerability. Systematisation of flood risk was schematically shown:



- Regarding hazard assessment, flood maps are required to be made. Flood maps will include flood risk management plans, land management, emergency planning and raising public awareness, but should also include the private sector. Data requirements involve collection of both static and dynamic data, where dynamic data covers both historical and future issues.

- Adverse consequences include exposure and vulnerability assessment, as previously mentioned. Exposure covers economic assets, objects, environment, people affected and social indicators, while vulnerability includes flood-proof buildings, local awareness, evacuation plans in place, building restrictions in flood prone areas, and forecast early warning systems.

- Flood risk assessment relies a lot on flood risk mapping. Risks can be viewed through different perspectives via scales, thus there are local scales, basin scales, global scales, etc. However, types of flood risk maps regardless the scale, are combined from land use maps and hazard maps. The damage function derives the data into risk, as shown n the following picture.



- Risk reduction strategies must include flood risk management and its cycle. The cycle contains three measures:
  - Measures to prevent floods;
  - Measures to control floods;

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  - Measures to reduce flood impacts and enhance recovery.
- Adaptation solutions are also available on climateapp.org, where adapted measures based on flood and site type can be found.

Group Exercise I – Rob Bakx

- The afternoon session started with a group exercise on "Identification of vulnerabilities in the water sector" in the beneficiary countries. Here, participants were divided into four groups as follows:
  - Albania – Kosovo*;
  - The former Yugoslav Republic of Macedonia – Croatia;
  - Serbia – Montenegro;
  - Turkey.

- Groups were discussing the needs in their countries, vulnerabilities in the water sector and potential solutions. Representative from each country presented to the participants their conclusions. The boxes below summarises the issues addressed by the groups.

Montenegro

- The need to have a unified monitoring of waters;
- The need to increase production of drinking water according to the demand;
- Make a land registry and water sources protection measures;
- Intensify the use of bottled water, thus using unexploited therapeutic waters;
- Build village water supply systems;
- Provide adequate channelling and purification of waste waters;
- Achieve and maintain "good ecological and chemical status" of waters in Montenegro;
- Accumulations should be made wherever possible in accordance with the requirements of the environment so all the available techno-economic hydro-energy potentials should be used;
- Border water potentials should be used (lakes Skadar and Bilecko, rivers Bojana and Piva, etc.);
- Skadar lake water level needs to be regulated;
- Define measures against river bed degradation;
- Conduct regular protection from floods and erosion;
- Form a registry of torrents and apply standardized solutions for protection against torrents;
- Development of tourism along water facilities;
- İnsufficient organization of tourist and travellers sailing, nautical tourism and recreation;
- A good adaptation measure is the construction of modern soil improvement systems

Turkey

- Integrated management of water resources at river basin level;
- Reusing of treated wastewater in agriculture and industry;
- Rehabilitation of irrigation systems, shift from open channel irrigation to pressurized irrigation;
- Renewing of water infrastructure to prevent losses in municipal water use;
- Determine appropriate water pricing;
- Awareness-raising for water users.

Albania

- Preparing up to date strategy and programs on rehabilitation and restructuring of Irrigation and Drainage systems;
- Physical rehabilitation and improvement of the I&D infrastructure (irrigation schemes and drainage systems;
- Rehabilitation of the protective embankments' of rivers and seas;
- Developing and application of software for assessment and using the water resources.

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FYR of Macedonia

- Construction and modification of physical infrastructures is necessary;
- Maintenance and improvement of existing water supply system;
- Use of renewable resources (with the emphasis on small hydropower plants);
- Preparation and implementation of İntegrated river management plans and flood risk management plans;
- Modernisation and improvement of the existing monitoring network;
- Awareness raising campaign.

Serbia

- Increase the density of the observation network (meteo&hydro);
- Protection from water (EWS, Flood protection plans, rise the flood protection level);
- Drought and water quality monitoring;
- Finishing of the existing dam construction projects;
- Optimisation measures for water usage (industry, irrigation, etc.);
- Water transportation infrastructure (move water from areas with water surplus to areas with water deficit);
- Raise the awareness of water usage and water pollution.

Croatia

- Finalisation of existing flood protection systems;
- Modernization of farm irrigation systems;
- Renovation of water infrastructure in the cities to prevent water losses in water supply;
- Better water management in cases of scarcity and surplus of water;
- Adoption of Strategy for sustainable development;
- Sharing of knowledge and awareness of climate change among all levels of population (children, students, industry, agriculture, etc.).

Kosovo*

- Restriction of settlement/building development in risk-prone areas in Municipalities of Podujevo, Shtime, Istog, Klina, Kacanik Peje and Gjakove;
- Deepening of summer bed in Municipalities of Podujevo and Rahovec;
- Upgrade and/or raise dykes to prevent flooding in Municipality of Podujevo, and some implementation and planning in Municipalities of Istog and Mamusha;
- Landscape planning measures to improve water balance (e.g. change of land use, reforestation, reduced sealing of areas);
- Water recycling and re-use, e.g. use of grey water, treated sewage and industrial water, implementation in Municipality of Rahovec and advanced planning in Municipality of Shtime and medium planning in Municipality of Podujevo.

Flood Risk Management – Jakob Doetsch

- Mr Doetsch is the Project Manager on Climate Change Adaptation in Western Balkans 2012 – 2018 project supported by GIZ. The objective of the project is to improve adaptation to climate change in the Western Balkans in the fields of flood and drought risk management. There are

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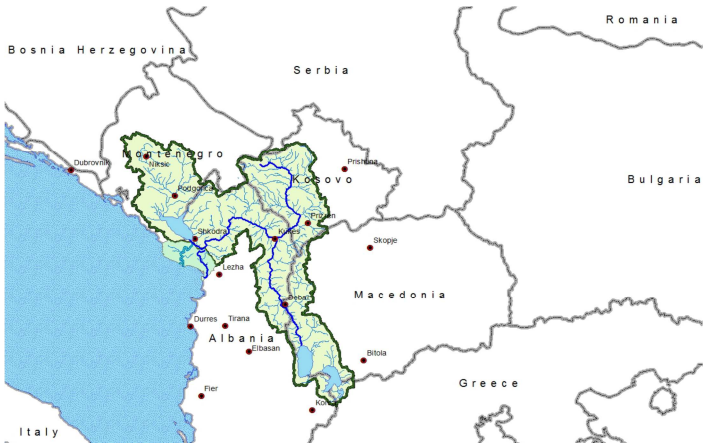
five beneficiary countries: Albania, Kosovo*, the former Yugoslav Republic of Macedonia, Montenegro and Serbia.

- Photos were shown from the floods in Albania and Montenegro in 2010, and again in Albania from 2013, as well as Kosovo* climate variability charts and graphs. A drought management plan for water utility in Kosovo*, divided into stages according to the Standardised Precipitation Index (SPI), was also prepared.

- As previously mentioned, the purpose of the EU Floods Directive is to reduce consequences of floods on human health, environment, cultural heritage, and economic activity. It is important to follow flood risk management cycle, but more important is that all actors and stakeholders must contribute to this reduction. There are three stages of Flood Risk Management, as stated by Mr Doetsch, and it can take up to 5 years to develop the plan:
    1. Identification of areas with potential significant flood risks;
    2. Creation of flood hazard maps for floods with low, medium or high probability, as well as creation of risk maps;
    3. Creation of floods management plan.

- Case study of the Lower Drin-Buna was presented. Main components of the Climate Change Adaptation Programme in Western Balkans include the Drin-Buna Flood Early warning system, climate change adaptation strategies, as well as local flood and drought management plans. Also included are implementation of defined measures, regional water resources management and climate change adaptation in urban areas. The Drin River Basin is trans-boundary basin with riparian countries Albania, Kosovo*, the former Yugoslav Republic of Macedonia and Montenegro, and it spreads on more than 20,000 km^2. The lower Drin forms in Albania at the confluence of the Black Drin, originating in the former Yugoslav Republic of Macedonia, and the White Drin, the longer headstream stemming from Kosovo*. With a total length of 500 km and an average water flow of 680 m^3/s, the hydrographical basin of the Drin provides livelihood for approximately 1.6 million people who use the waters for various purposes such as hydropower generation, irrigation, fisheries, transport and recreational activities.



- The support in this area focuses on:
    - upgrading of hydro-meteorological networks;
    - hydrological modelling;

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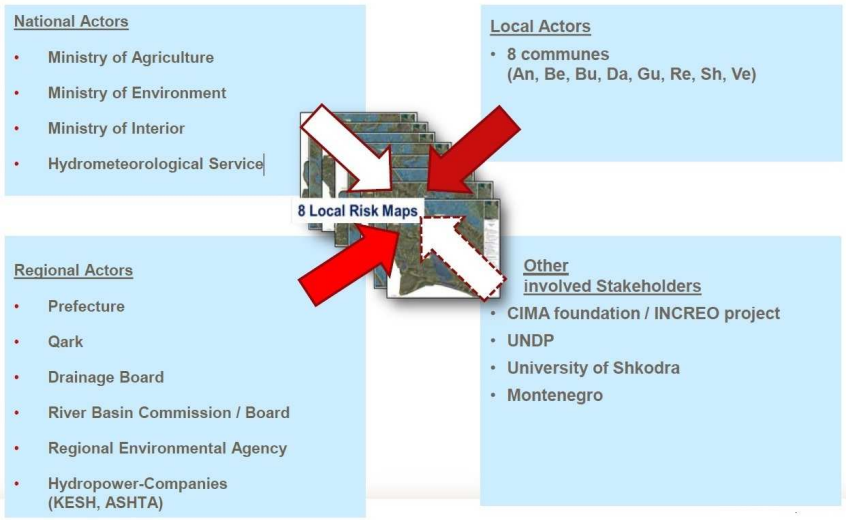
- regional & inter-institutional cooperation and data exchange.

Stakeholders to be involved in this project include local and national public and private institutions from all beneficiary countries:



Economic Aspects: The Cost of Maladaptation – Dionisio Pérez-Blanco

- According to the economic theory, the market competition will balance water supply and water demand through prices. However, market failures often short-circuit this mechanism and generate negative externalities. Moreover, water is a unique good: apart from being essential and finite, water is also fugitive but bulky, private and public at the same time and variable along space and time. It has several roles, environmental, social and financial. Interspersed water bodies are interconnected at a basin level as part of a complex system, and therefore water uses are interrelated and affect each other. In addition and as a result of all the characteristics above, water is a heterogeneous good; this means that we cannot strictly speak about a single water market, but about different water markets, and their complexity make them prone to suffer from market failures.
- The total economic value of an asset can be divided to use value and non-use value. Use value can be either direct or indirect, while the non-use value covers existence value and bequest value, or sustainability through the use of resources of future generations. While markets consider some of these uses (e.g. direct water use from productive activities such as agriculture or industry), others remain outside and therefore are undervalued, when not ignored. Success in water management lies in addressing these trade-offs between market and non-market uses to harness water resources for sustainable economic growth. In order to attain this goal, there are different instruments at our disposal, which can be roughly divided to supply and demand policies.
- Water management challenges are typically addressed with **supply policies**:
  - Dykes, reservoirs and canals
  - Drilling wells
  - Efficiency improvement (e.g. Irrigation modernization)
  - New sources: Desalination, treated wastewater

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- Examples were given of these supply policies through boxes:
  - **Box 1:** Irrigation modernisation in Spain – Project was implemented from 2002-2008 with total investment of more than 7 billion euros, out of which 60.1% was public and the remaining 39.9% private. Expected water savings are 3,662 hm3 per year. However, in many areas this resulted in a Hydrological paradox due to higher consumption, when not a Jevons' Paradox.
  - **Box 2:** Drill rush in Malta – Total demand of water is 50.6 million m3, out of which 17 million m3 is desalinated, which is an expensive technique, thus limiting access to drinking water. But since Malta is an island country, not many locations having good status ground water is available, and these are falling rapidly as a result of over-drafting. The drilling will provide more drinking water from groundwater, with years of payback period.
  - **Box 3:** Idle desalination in SE Spain – So far, 900 million euros were invested in construction and modernisation of desalination plants in the Segura River Basin, a resource that has a production cost of around 1 euro per 1 m3. Subsidised desalinated water prices are 0.36 euro/m3, while the prices of conventional water sources vary from 0 to 0.22 euros/m3. Even though desalinated water is expensive, in this case it can supply 17% of annual water withdrawals and the infrastructure is already available. Building desalination plants for agriculture was not wise, but once built and given the considerable transaction and sunken costs, they may represent an alternative.
  - **Box 4:** Flood management in Italy – Flood loses in Italy during 2008-2012 accounted to 2.2 billion euros. EC suggested for innovative solutions through flood management systems. The strategy in Italy has consisted in *ex-post ad-hoc* state aid to those agents affected by floods, which leads to underestimation of potential risks and insufficient adaptation strategies. Incentives are the missing part of this strategy.

- On the other hand, **demand policies** are based on economic instruments, which promote alignment of individual decisions with collectively agreed goals:
  - Complementary to supply policies;
  - Not panaceas;
  - Streamed into the policy mix to solve water problems.
  - **Box 5:** Water pricing – According to EC, "water pricing policies provide adequate incentives for users to use water resources efficiently, and thereby contribute to the environmental objectives of this directive." With higher prices, water use is reduced and revenue is raised (see the table below for Italy). However, although undeniably useful, this instrument does not guarantee a success from an environmental perspective; water pricing may be ineffective as a water saving instrument in areas where water is a highly productive asset, which in many cases are also those overexploited. *Ex-ante* studies are necessary to address if water pricing will work *per se,* or if other complementary instruments are necessary.

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Potential additional revenues for water-related taxes in Italy, 2016-2025, M€

Tax	Current revenues	2016	2020	2025
Water consumption tax	300	1,858	4,186	4,094
Waste water tax	Not found	197	275	275
Pesticides tax	12	545	1053	1074
Total		**2,600**	**5,514**	**5,443**

Source: Eunomia and Aarhus University, 2014

- **Box 6:** Flood Insurance – EU flood losses reached 4.2 billion euros per year during the period 2000-2012, and this is likely to increase up to 23 billion euros per year. Risk based pricing insurance promotes Disaster Risk Reduction, which is an example of adaptation that also provides positive externalities such as reducing the cost of public flood prevention and compensation policies. In the EU, the public sector is involved in insurance provision and affects its design through PPPs, with the aim to balance affordability, equity, solvency and budgetary concerns. Different policies result in different outcomes, such as:
  - France CatNat, having solidarity approach with flat rate;
  - UK FloodRe, where price incentive is based on risk and tax bands;
  - Netherlands, without flood insurance, but with state aid and engineering.
- **Box 7**: Shaking hands for river restoration in the Lower Ebro (NE Spain) – In this case, reservoirs (hydropower generation) modify flood frequency and magnitude. Instead of opting for a mandatory regulation or a financial compensation that hydropower operators have to comply with, a partnership among the state, hydropower operators and the academia was set to find common interests in the management of water bodies. It was found that *ad-hoc* flushing floods could contribute to improve the status of water bodies while also serving to clean water intakes of hydropower plants at a much lower cost that the mechanical removal technique used at the time. These findings served as a catalyser towards a voluntary agreement for river restoration.

- The conclusion was that economic instruments complement supply policies by managing demand. Their combined use is a precondition for a successful policy mix, especially in those areas where the marginal benefits of supply policies are quickly decreasing. The best way to move forward and come up with a successful policy mix for water management is to learn from other experiences.

Early Warning Systems – Jakob Doetsch

- Early Warning System (EWS) is an effective tool for reducing loss of life and livelihood through improved emergency preparedness and response where National Metrological and Hydrological Services (NMHSs) have a key role in the establishing it through:
  - Multi-hazard approach;
  - Accurate, reliable and understandable warnings in timely fashion;
  - Enabling preventive actions to reduce the impacts of potential disasters;
  - Regional approach in the Western Balkans.
- There are four elements of effective EWS: risk knowledge, monitoring and warning, dissemination and communication, and response capability:

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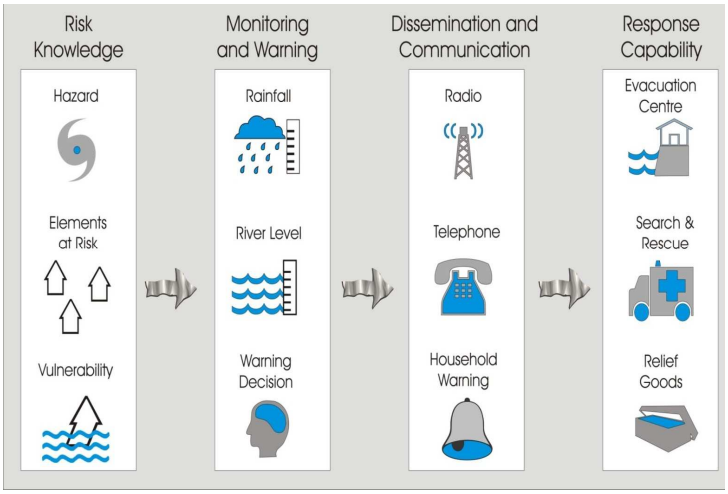
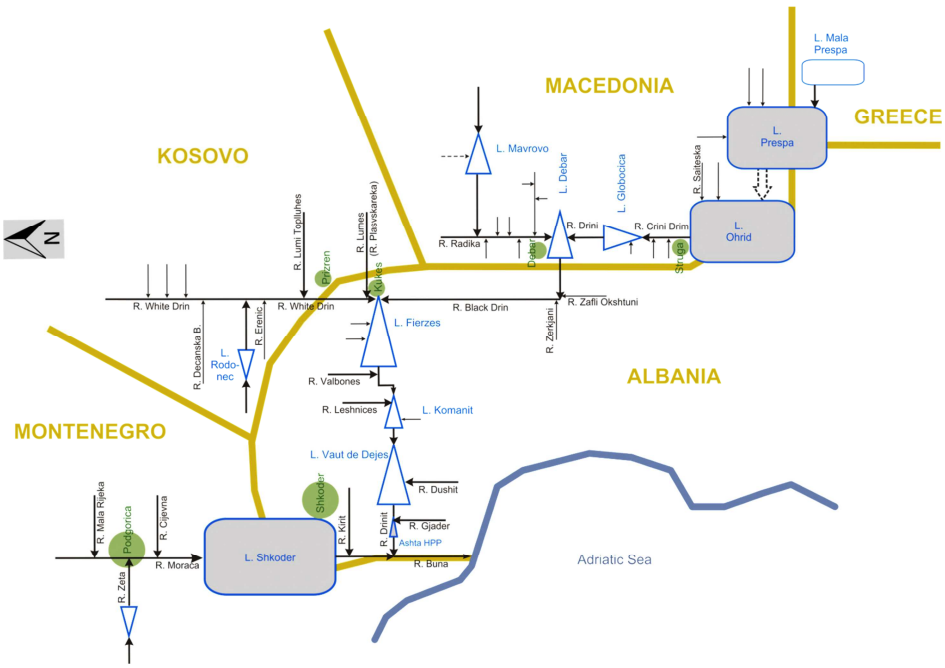


- According to Article 7 of Chapter IV in Flood Management Plans, flood risk management plans shall address above all aspects of flood risk management focusing on prevention, protection, preparedness, including flood forecast and early warning systems, and taking into account the characteristics of the particular river basin or sub-basin. European Flood Awareness System (EFAS) of the Joint Research Centre by the EC was presented. The aim of EFAS is to gain time for preparedness measures before major flood events strike, particularly for trans-national river basins both in the Member States as well as on European level. There is an on-going technical study undertaken by the Joint Research Centre on the capacities of flood early warning and/or monitoring systems for EU (potential) candidate and Eastern/Southern Neighbourhood countries. The initiator of the study is the European Commission Directorate General for Humanitarian Aid and Civil Protection (DG ECHO). The aim of the study is to provide information on flood monitoring/early warning capacities through a questionnaire and possible workshop/study mission at the Joint Research Centre. Once again, a Drin river basin was used as an example of flood EWS, as it can be seen on the following picture:



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- In order to prepare comprehensive Flood Early Warning Systems, it is necessary to define its elements:
    - Hydro-meteorological data – collect and transmit real-time hazard data to national data bases and Disease Early Warning System (DEWS) forecast centre;
    - Data base management – Operate over Drin data base and DEWS, check and correct raw data, fill in the gaps;
    - Quantitative meteorological forecast – combination of available international meteorological forecast with regional information;
    - Quantitative flood forecast – perform hydrological and hydraulic modelling of floods and inundations;
    - Flood early warning – Decide on flood warning, disseminate warning to crisis management groups, public, etc.;
    - Communication and review – Communicate with EFAS, actors and concerned communities, review EWS after flood.

Climate Change and Water Quality Aspects – Rick Wortelboer

- The Water Framework Directive (WFD) was presented in more details, along with its aims, planning and reporting cycle and targets. In the period of 2004-2006, the WFD defined environmental objectives and issues, and in 2006 monitoring began. In 2009, the final River Basin Plan was published and in 2012 it was implemented. WFD implementation starts on the level of eco-regions and watersheds, and then narrows down to water bodies, a water forming a physiographical feature. There are three categories of water bodies:
    - Natural;
    - Heavily modified (hydrology severely impacted by human use):
    - Artificial.
- Reporting to EC regarding WFD is obligatory in every 6 years, whereas main topics of the report contain status and recovery plans. On the other hand, heavily modified waters require additional planning, monitoring and reporting, which increases the costs of implementation.

- Several examples were given on flooding such as the Sava flooding in Serbia, Croatia and Bosnia and Herzegovina in 2014. The case of Somerset Levels (UK) flooding was also presented. At the starting point of the flooding, it was thought that climate change was the main cause of it, that is, too much rain in a short period of time so that waterways are just not capable of carrying so much water. Later on, it turned out that insufficient maintenance was also one of the reasons for flooding, including the small and not regularly dredged waterways. In the end, one more reason became obvious and that was land use. There had been changes in crops species growing, as well as changes in ploughing practices, which all led to high increase in erosion, that silted up the waterways. After taking into consideration all three levels of causes of flooding, a measure that was taken was included the dredging of the waterways regularly. In this scenario, climate change did play a role in flooding, but the water management was not levelled with land use changes and vice-versa, resulting in unsustainable water management, and no application of climate adaptation techniques.

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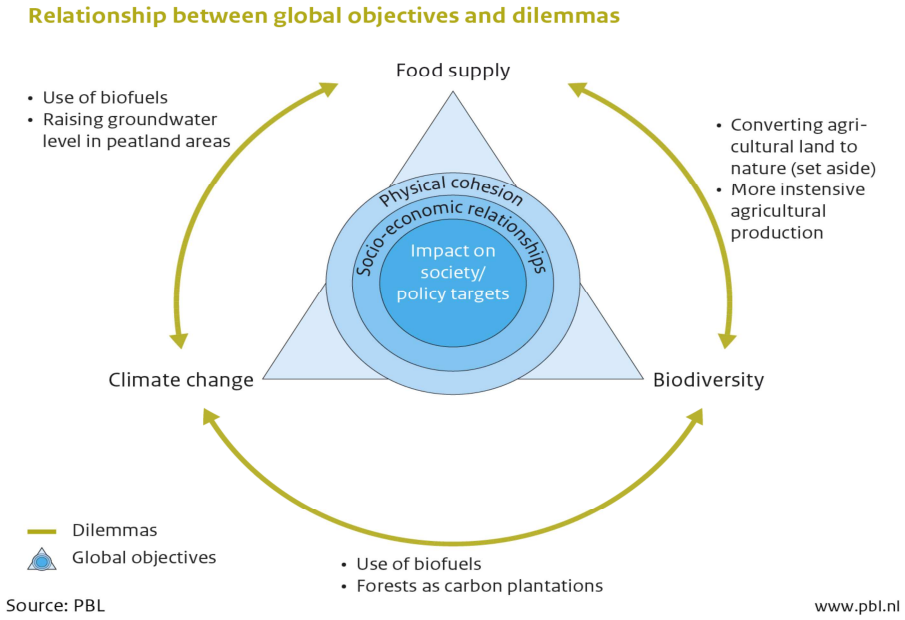
- Water quality is also related to water quantity. High flow often means dilution and lower concentrations of nutrients, level and temperature of which determine blooms of blue and green algae. Over-land flow and flooding decrease the time for the water to reach lakes and the sea, leading to higher fertility in floodplains.

- There is a relationship between global objectives and dilemmas, such as food supply, biodiversity and climate change. The dilemmas, as seen on the following picture, also include water quality, agricultural water, drinking water, and industrial water.



- Regarding ecology, flooding can in some cases be positive. For example, fish uses flooded areas for spawning, and they can use low disturbance areas as shelters. In this way, invertebrates are transported to new areas. However, in some cases populations can be diminished, and floods can set preferable ecological conditions back 5-10 years. Periods of high flow are still very important for hydro-morphology of river systems, for sediment dynamics and stress on vegetation.

- The final conclusion would be:
  - Water quality and Water quantity are interlinked;
  - Ecology can cope with natural flooding;
  - Extensive/Excessive flooding can set ecology back 5-10 years;
  - Adaptation to climate change may change hydrology;
  - Hydrology determines classification for WFD;
  - Adaptation might impact target setting for the WFD;
  - Keep WFD in sight when designing climate adaptation solutions.

Day 2 – Ankara, Turkey, 20 January 2014

Reference is made to Annex I for the agenda, and Annex III for the presentations. Hereunder an outline summary is presented of the presentations.

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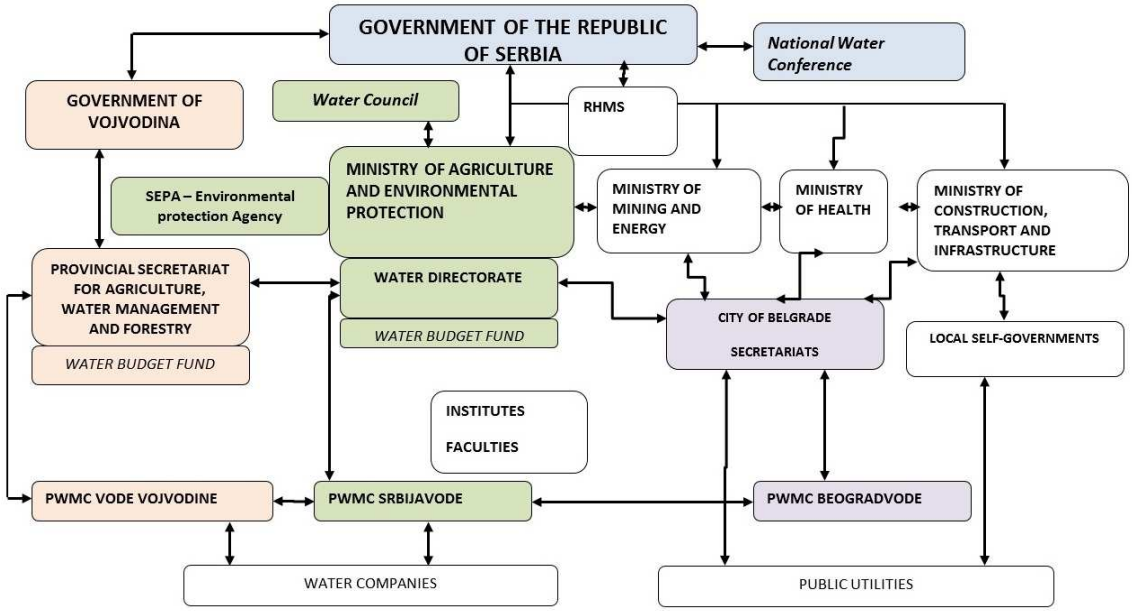
Cooperation and Coordination among Authorities

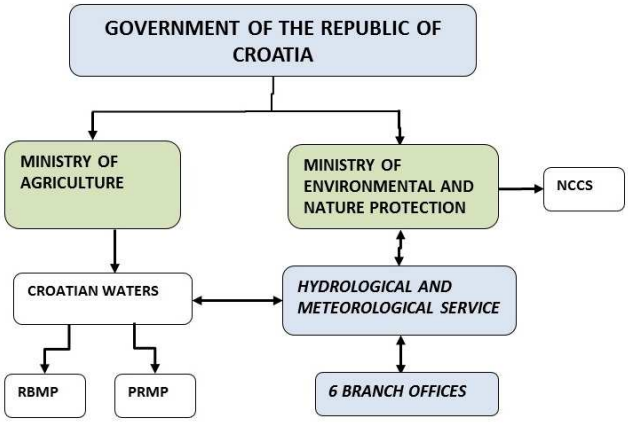
- The morning session was allocated for discussion towards solutions for inter-institutional cooperation, with all relevant actors and models. Conclusion and remarks regarding institutional framework of water sector in each country was graphically presented as follows:

Serbia



- However, there is a problem in "overlapping" of competences in Serbia, especially between the national Government of Serbia and regional Government of Vojvodina. Also, competences are not clearly defined. It is necessary to improve coordination between institutions and to enhance the exchange of information.

Croatia



- In Croatia, The Ministry of Environmental and Nature protection is responsible for Climate Change strategies that are later on approved by the government. As it is the case with Serbia, in Croatia it is also necessary to improve information exchange and establish a coordination structure, so it would be easier to resolve problems when they appear.

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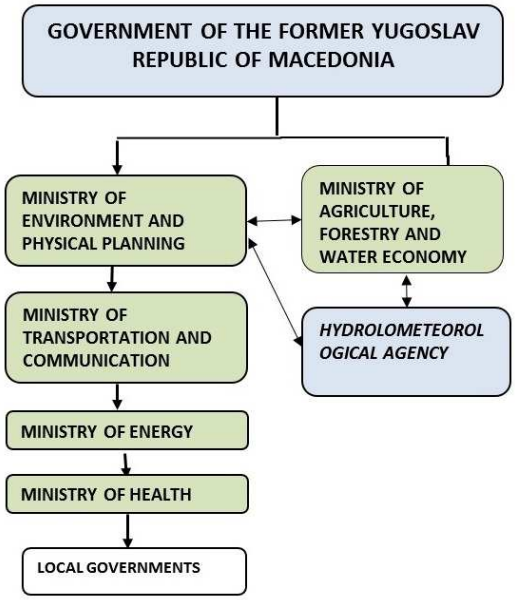
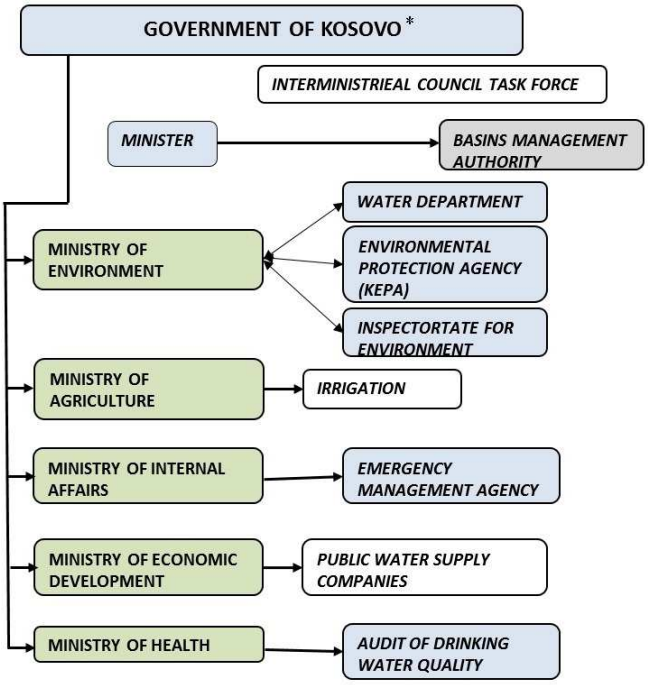
The former Yugoslav Republic of Macedonia



- The former Yugoslav Republic of Macedonia is currently in the process of establishing water agencies. There has been an improvement in inter-institutional information exchange.

Kosovo*



* This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo Declaration of Independence.

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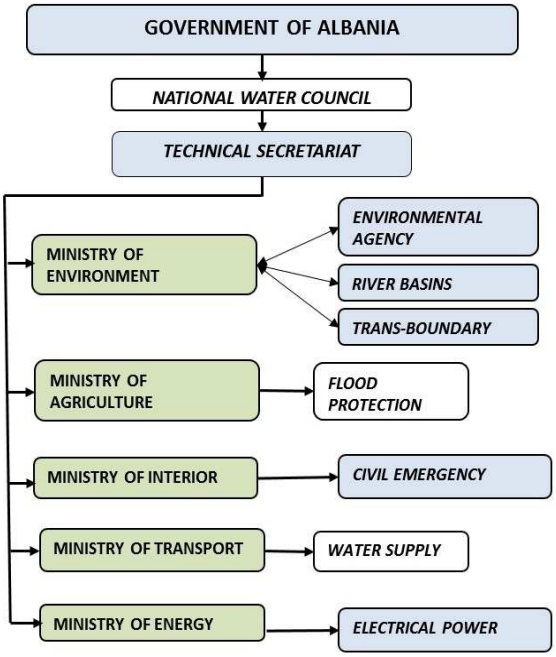
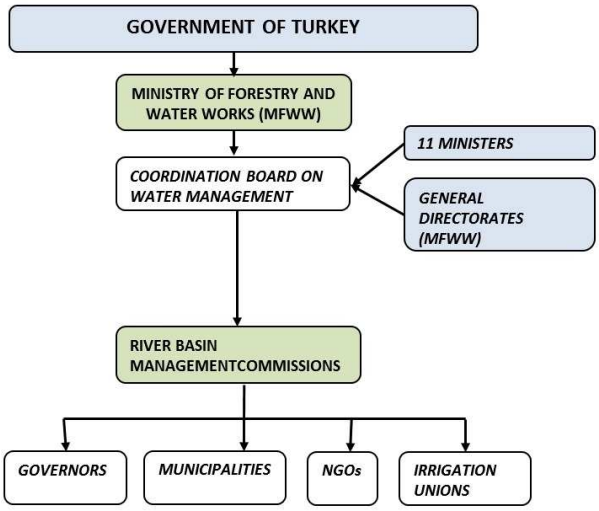
- Kosovo* managed to establish a Basins Management Authority, and the drafting of Management Basin Plans and Climate Change Strategy are in progress. Implementation of water legislation has been improved as well. Hydrological network is in process of renovation.

Albania



- Albania has prepared and is in the process of implementation of educational and training programs on climate change issues for users of water and public.

Turkey



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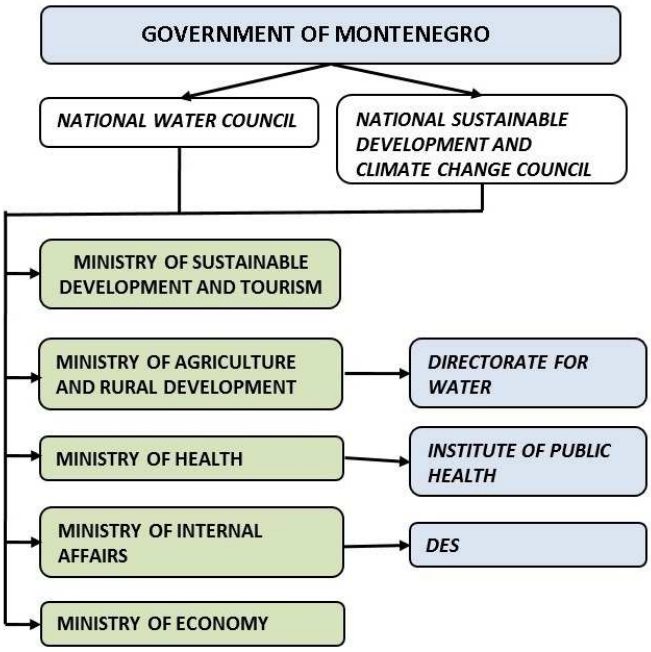
- Coordination Board on Water Management is in charge at the national level, , while the River Basin Management Commisssions are in charge at the local level. Turkey has 25 river basins, but only 81 employees working in these Commissions . The leading River Basin Management Commission is the Marmara region, in Istanbul. River Basin Management Plans are in the process of preparation to be ready by 2020. Four institutions manage coastal issues for the entire Turkey.

Montenegro



- In Montenegro, there are a lot of water supply companies for different municipalities. Water monitoring and environmental monitoring however, present a great problem in the country. Ministry in charge of this is Ministry for Sustainable Development and Tourism. Ministry of Internal Affairs is responsible for water hazard issues. National coordination team consist of Ministries, Institute for Public Health, Institute of Hydrometeorology and Seismology, Red Cross and special services, and emergency service. Coastal area is a responsibility of Maritime Safety Bodies.

Cooperation and Coordination among Authorities – Johan Bogaert

- The structure of the Belgian decision making was presented, as a three tiered organisation. The Federal Government is on the top, and together with the Flemish region, Walloon region and Brussels region presents an upper tier of the organisation. The middle tier are 10 provinces subordinated to all higher authorities. The bottom tier consist of 589 municipalities that are financed and controlled primarily by the regions. Decisions are also made by consensus through Ministerial conferences (environment, energy, health, etc.).

- The Belgian National Climate Change Adaptation strategy consist of five parts:
  - Introduction;
  - Climate Framework;
  - Impacts of Climate Change in Belgium;
  - Adaptation in Belgium;

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- Strategy.

- The Belgian National Adaptation plan is in the final stage of development, focusing on what is lacking at the federal and regional level.
  - Flanders Adaptation Plan – It was adopted in 2013 for the period 2014-2020. It has 76 actions on adaptation in the 11 selected sectors. It is focused on understanding the Flemish vulnerability to Climate Change and Improving Adaptation;
  - Walloon Adaptation Plan - It will be adopted at the end of 2014, as part of Air-Climate-Energy plan. It has seven sectors involved, with the proposal for development of a strong knowledge base and focusing on international collaboration;
  - Federal Adaptation Plan – Currently being finalised and it will cover the period 2012-2020. It has 34 actions spreading across the 10 different sectors. The plan will focus on building capacity to assets risks, increase knowledge, and to anticipate and mitigate risks and maximise the potential benefits of climate change;
  - Brussels Adaptation Plan – The plan will be adopted after public consultation, as a part of the Brussels Air-Climate-Energy plan, covering four sectors: infrastructure, forestry management, water management and natural patrimony.

- With regards to the river basins, the Maas (Meuse) Treaty was signed by France, Wallonia, Flanders, Brussels, Germany, Belgian Federal Government, Luxemburg and the Netherlands in 2002. The objective of the agreement is to achieve long lasting and comprehensive water management of the Maas river basin. Main tasks of the International Meuse Commission is to:
  - coordinate the obligations of the European Water Framework Directive;
  - coordinate the obligations of the European Directive on the assessment and management of flood risks;
  - issue opinions and recommendations to the Parties for the prevention and fight against accidental pollution (warning and alert system).

Assessment of Response Strategies for Water Management – Ad Jeuken

- The presentation addressed response strategies, how to use them, and what their impact is on adaptation practice. A strategy includes a package or series of measures, and promotes a policy to stimulate, enable, enforce a certain adaptation strategy by making plans, providing budgets and enabling legal and financial instruments. However, policies and instruments do not present a guarantee that the strategy will be implemented.

- The adaptation approach starting point is determined according to the desired approach. The classical scenario with top-down approach method starts with climate change. On the other hand, decision as a starting point can be based on adaptive management, adaptation tipping, decision scaling and robust decision making. A system should target to increase resilience/resistance/robustness. Resistance was defined as the ability to function under a certain range of climatological circumstances. Resilience on the other hand, is the ability to recover rapidly and without much permanent damage. Resistance and resilience are both included in robustness. At the end, there is also flexibility, an ability to increase robustness of a system with increasing insights and without much regret, important in the decision making process.

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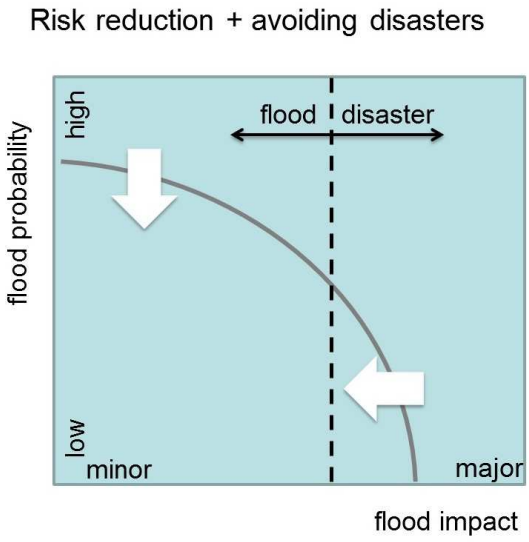
- Measures can cope with uncertainty in several ways:
    - Contribute to resistance – by over dimensioning in general or constructing;
    - Contribute to resilience – by diversification, reduced damage or increased coping capacity;
    - Contribute to flexibility – by expanding, using step wise strategy or having short lifecycle.

- Typology of adaptation measures have usually two sides confronting, thus we have grey versus green adaptation, engineered versus nature based adaptation, structural versus non-structural adaptation, etc. Green adaptation was briefly described, as a tool of using nature for the benefit where one can, and if that is not possible then at least implement traditional adaptation measures in an ecologically optimised way. This approach uses ecosystem functions to enhance safety, food and freshwater security, maintain and strengthen ecosystem functions, and combine classic engineering with natural components.

- Mr Jeuken presented that in most of the cases large scale solutions for adaptation are not desirable, since climate change is as well happening on a global level. It is desirable to focus small scale solutions on local circumstances, such as for fresh water management in a municipality or a region. However, if overviewing climate change and water management issue on a global scale, many local solutions could make a difference. This is possible only with inclusion of all actors in the cycle, the manager, the user and the system.

- Regarding the flood risk from rivers, emphasis was put on flood mitigation and damage mitigation. Flood mitigation can be carried out with reduction of probability and exposure, by providing higher embankments, stronger embankments, providing more room for the river, and by water retention. On the other hand, damage mitigation reduces vulnerability by providing adequate emergency response measures and spatial planning (adapted land use and retreat). A distinction between flood and disaster can be seen according to flood probability and flood impact, as seen in the following picture:



- One of the ways of dealing with floods, is to move towards robust river systems, as previously mentioned, with three different measures:

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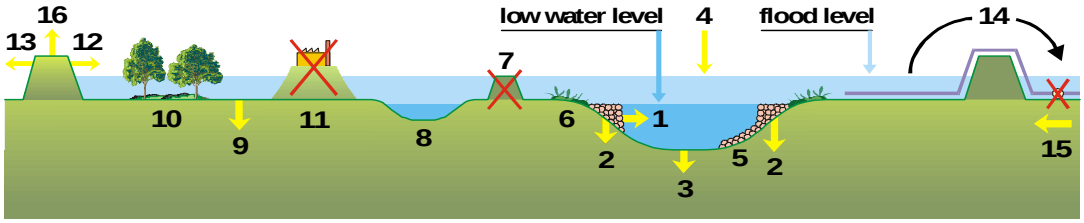
- Raising dikes – increasing resistance and lowering resilience;
- Providing "Room for the river" – increasing both resistance and resilience;
- Unbreachable embankments – lowering resistance and increasing resilience;

- Several options for coastal protection were discussed, together with 16 possible measures for "room for the river" approach, as can be seen of the picture below:



1 - narrowing of main channel
2 - lowering of groyne
3 - dredging
4 - dumping of sediment
5 - permanent layer
6 - natural bank
7 - removing of summer embankment
8 - secondary channel
9 - lowering of flood plain
10 - nature development
11 - removing of high-water free areas
12 - dike reinforcement
13 - dike repositioning
14 - retention
15 - obstruction of lateral flow
16 - dike raising

- Next topic presented was evaluation of adaptation strategies. Evaluation has four assessment methods:
  - Multi criteria analysis (MCA) – the simplest method;
  - Cost effectiveness analysis (CEA);
  - Cost benefit analysis (CBA);
  - Societal cost benefit analysis.
- The Dutch Delta programme assessment framework was given as an example. In the period 2011-2014, the Netherlands was developing five national adaptation decisions in order to adapt to climate change in water management. Two major aims were set, to develop climate proof flood risk management and water supply management. In order to guarantee uniformity and comparability, one set of scenario and one set of assessment models were established, together with one framework for evaluating and comparing strategies. Dutch strategy evaluation framework consists of five main criteria:
  1. Are goals for reducing flood risks achieved?
  2. Are goals for reaching better fresh water supply achieved?
  3. Effects and opportunities for regional development, ecosystems, tourism?
  4. How well can strategy be implemented?
  5. Financing.

- One of the most interesting things was to show economic evaluation of adaptation pathways. Net cost/benefits are calculated as the sum of expected costs and expected benefits, in the function of discount rate, regarding initial investment, recurrent costs, transfer costs, avoided damages and co-benefits. An example of four different actions was given, together with options for transfer of adaptation procedure.

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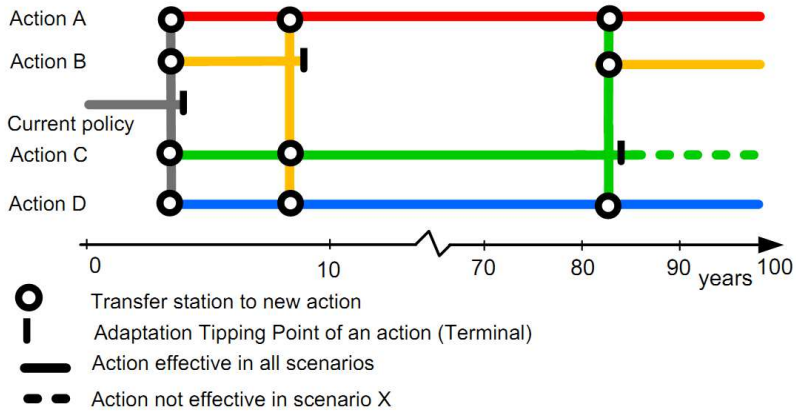

Adaptation Pathways Map

	Path actions	Relative Costs	Target effects	Side effects
1		+++	+	0
2		+++++	0	0
3		+++	0	0
4		+++	0	0
5		0	0	-
6		++++	0	-
7		+++	0	-
8		+	+	- - -
9		++	+	- - -

Scorecard pathways

- As explained, the cost benefit analysis is still difficult since discounting reduces future benefits and it does not recognize the value of having multiple options in the future. This is why commonly used method is multi criteria analysis since it is easier to perform, but it has no final clarity of revenues and investments and often does not include criterion for flexibility.

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V. Evaluation

Statistical Information

1.1	Workshop Session	Task 4.1B: Expert Training on Risk and Vulnerability Assessment and Adaptation Planning – Water Management sector
1.2	Facilitators name	As per agenda
1.3	Name and Surname of Participants (evaluators) optional	As per participants' list

Your Expectations

Please indicate to what extent specific expectations were met, or not met:

My Expectations	My expectations were met		
	Fully	Partially	Not at all
• strengthened awareness and understanding of climate change adaptation needs and options among water sector experts from Western Balkan countries and Turkey established	IIIII IIIII IIIII III (36%)	IIIII IIIII IIIII IIIII III (64%)	
• Improved understanding of (the applicability of tools for) risk and vulnerability assessment in the water sector, including the applicability of the Climate Adapt Tool	IIIII IIIII IIIII III (50%)	IIIII IIIII IIIII II (47%)	I (3%)
• This workshop increased (steps towards) climate adaptation action planning in my country and the region	IIIII IIIII IIII (39%)	IIIII IIIII IIIII IIIII II (61%)	
• awareness of the need to speed up and enhance climate adaptation action planning in the Western Balkan countries and Turkey	IIIII IIIII IIIII IIIII IIIII (69%)	IIIII IIIII I (31%)	

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Workshop and Presentation

Please rate the following statements in respect of this training module:

Aspect of Workshop	Excellent	Good	Average	Acceptable	Poor	Unacceptable
1 The workshop achieved the objectives set	IIIII III (22%)	IIIII IIIII IIIII (42%)	IIIII IIIII II (33%)	I (3%)		
2 The quality of the workshop was of a high standard	IIIII IIIII II (33%)	IIIII IIIII IIII (39%)	IIIII IIIII (28%)			
3 The content of the workshop was well suited to my level of understanding and experience	IIIII IIIII III (36%)	IIIII IIIII IIII (39%)	IIIII II (19%)	II (6%)		
4 The practical work was relevant and informative	IIIII IIIII (28%)	IIIII IIIII IIIII I (44%)	IIIII II (19%)	II (6%)		I (3%)
5 The workshop was interactive	IIIII IIIII IIIII III (51%)	IIIII IIIII IIII (40%)	III (9%)			
6 Facilitators were well prepared and knowledgeable on the subject matter	IIIII IIIII IIIII I (44%)	IIIII IIIII IIIII I (44%)	IIII (12%)			
7 The duration of this workshop was neither too long nor too short	IIIII IIIII II (34%)	IIIII IIIII IIIII (43%)	IIIII I (17%)	II (6%)		
8 The logistical arrangements (venue, refreshments, equipment) were satisfactory	IIIII IIIII IIIII II (48%)	IIIII IIIII II (34%)	IIII (12%)	II (6%)		
9 Attending this workshop was time well spent	IIIII IIIII III (36%)	IIIII IIIII IIIII II (47%)	IIIII (14%)	I (3%)		

Comments and suggestions

<u>On the workshop sessions:</u>

- Participants commented that the workshop was well organised and contributed positively to their daily work.
- However, some participants also mentioned that more technical detail and knowledge should also have been addressed, eg through a simple qualitative vulnerability analysis and exercises.

<u>On the facilitators:</u>

- Overall, all comments received on the facilitators were positive. It was appreciated that the presentations were informative and the facilitators were well prepared.

<u>On the workshop level and content:</u>

- Comments ranged from very positive ("it was of the highest level") to more critical, requesting more details on the theory of the concepts of vulnerability and impact assessments.

Hereunder the comments received are presented in a consolidated form:

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I have the following comment and/or suggestions in addition to questions already answered:

Workshop Sessions:

- *Very well organized;*
- *Workshop session contributes to our work;*
- *Congratulations for the work and energy. Experts work is difficult to describe and so the meeting was very impressive.*
- *I think instead of group work a simple qualitative vulnerability analysis should be done as an example;*
- *Taking daily subsistence allowance was terrible. Many of participants lost half of afternoon session in second day. The Western Union bank system does not work very well and has a lot of problems sharing the money.*
- *The topics were way too general, they were like "Climate Change Adaptation for Dummies", that was something boring;*
- *In my opinion, we get the best information through exercises;*
- *The first session was too long, parts of some presentations were to general and unnecessary, so all together could be shorter, and ensure more free time collecting per diems;*
- *I didn't think that the breakout sessions were effective and necessary to build capacity. More time could have been allocated to the theoretical background. If breakout sessions are "compulsory", they should have been at the latest session of each day;*
- *It was well organised;*
- *Well organised;*
- *Some of the presenters were not prepared (languages, wording, etc.);*

Facilitators:

- *Excellent presentation with clarifications;*
- *For me the obtained knowledge from this meeting will give an opportunity to contribute to the awareness of the importance of the climate and the assessments to be taken for maintaining a much better climate;*
- *I had problems to take my DSA. I didn't attend the afternoon session of second day because in many banks do not work the Western Union bank system;*
- *They spent tremendous effort which was highly appreciated;*
- *They really spent effort appreciated;*
- *Moderator was very good, my compliments to Rob. I like Ad's presentation very much. They were very informative and mind opening;*
- *In general very good. Compliments to Rob he was good moderator;*
- *Presenters were well prepared and informative;*
- *Were excellent (high prepared);*
- *Thanks very much for our facilitators;*
- *Some of the presenters may use their voice more louder ☺;*

Workshop level and content:

- *It will be better if the per diem can be taken in their country. This time most of participants lose some moments of the workshop because they need to find bank to take the money;*
- *It will be very good if participants to take per diem in their country, because we had problems to take them in bank;*
- *The workshop was the highest level had a fundamental and clear content;*
- *The workshop was the highest level, had a fundamental and content;*
- *Presentations should have limited to 15 minutes;*
- *Parts of presentations were too general, but some of presentations prepared by DELTARES were very good. Knowledge and experience from these presentations can be helpful in preparation of national strategies;*
- *Duration of presentations could have been more and the subject could have been held in more details. I think many experts from beneficiary countries are not clear about the concepts*

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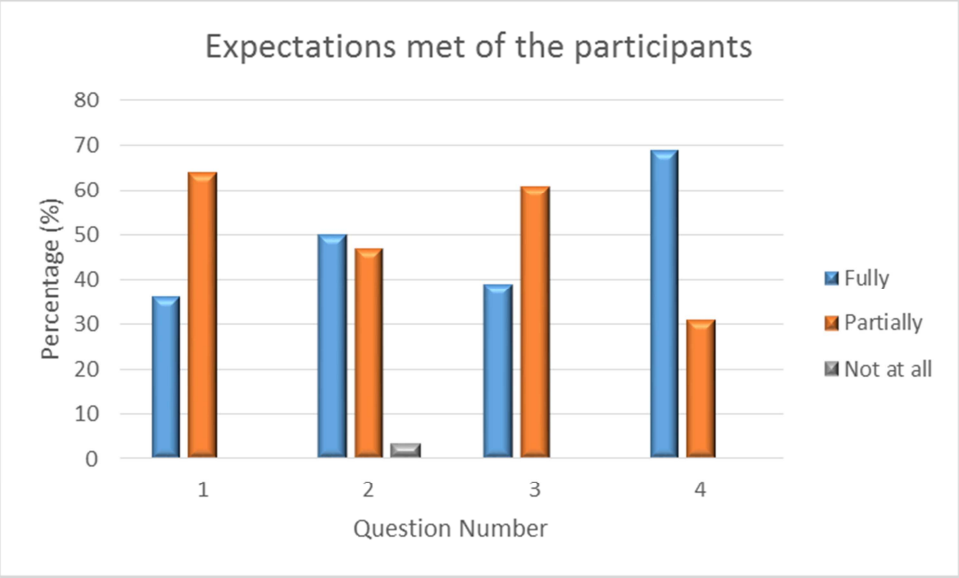
of impact and vulnerability. A (theoretical and detailed) training can be organised on this topics without breakout sessions;

- *Instead of group work, much time should have been allocated to theoretical issues, like vulnerability, impact analysis, model selection, etc. According to me, technical staff don't benefit from the group work, since they usually know what the problem is. We need more theoretical knowledge about adaptation to climate change;*
- *So useful;*
- *It will be better to have practical , concrete use of adaptation tools in the website;*
- *Some of the presentations were very quick, more time for the presentations would be more appropriate;*
- *I hope so, this is only a workshop but I expect it improved participants' awareness on adaptation issues*
- *It has been an average good workshop but still must be improved. EU adaptation strategy 2013 had to be wider, moreover I would like to understand more about water quality management not only of biological quality but also chemical water quality parameters when climate change happens. Climate hydrological (…) issues will be explained with more examples. Mostly need more time☺.*

EXECTATIONS OF PARTICIPANTS

1.	The workshop strengthened awareness and understanding of climate change adaptation needs and options among water sector experts from Western Balkan countries and Turkey established.
2.	Improved understanding of (the applicability of tools for) risk and vulnerability assessment in the water sector, including the applicability of the Climate Adapt Tool.
3.	This workshop increased (steps towards) climate adaptation action planning in my country and the region.
4.	Awareness of the need to speed up and enhance climate adaptation action planning in the Western Balkan countries and Turkey.



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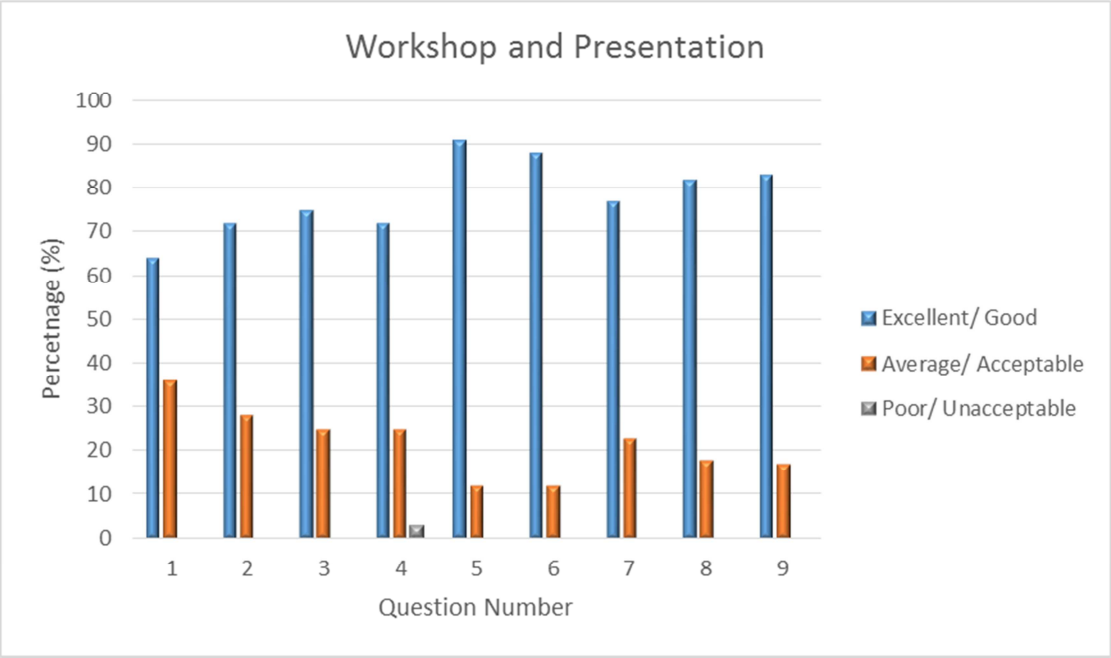
WORKSHOP AND PRESENTATION

1	The workshop achieved the objectives set
2	The quality of the workshop was of a high standard
3	The content of the workshop was well suited to my level of understanding and experience
4	The practical work was relevant and informative
5	The workshop was interactive
6	Facilitators were well prepared and knowledgeable on the subject matter
7	The duration of this workshop was neither too long nor too short
8	The logistical arrangements (venue, refreshments, equipment) were satisfactory
9	Attending this workshop was time well spent



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ANNEX I – Agenda

Day 1 – Monday, 19 January 2015

Expert Training on Risk and Vulnerability Assessment and Adaptation Planning – Water Management sector

Chair and Co-Chairs: Robert Bakx, Imre Csikós

Venue: Ankara, Turkey

Start	Finish	Topic	Speaker(s)/Facilitator(s)	Sub topic/Content
09:00	**09:30**	***Registration***		
09:30	09:45	Welcome and Introduction	**Rob Bakx**, moderator	- Introduction participants - Programme outline and logistics
09:45	10:15	EU Adaptation Strategy 2013 and role of ECRAN	**Rob Bakx,** ECRAN	- Outline of EU Adaptation Strategy - Links with adaptation practice
10:15	10:45	Preparing for adaptation; the Climate Adapt Tool	**Imre Csikós**, ECRAN	- EU tool on climate adaptation action - Usage of the Adapt tool in the water sector - Group discussion: 'what to apply how….?.'
10:45	**11:30**	***Coffee Break + administrative concerns (TAIEX)***		
11:30	12:00	Potential vulnerabilities in the area of water (resources) management	**Ad Jeuken**, Deltares, Netherlands	- Experience from climate adaptation, incl. Adaptive Delta Management, Climate Proof Fresh Water Supply, Delta Programme Rijnmond-Drechtsteden, Risk-based approach for fresh water supply - Bottom-up Climate Adaptation Strategies towards a Sustainable Europe
12:00	12:30	How to identify climate vulnerabilities in the water sector	**Laurene Bouaziz**, Deltares, Netherlands	- Quantification of risk reduction of different adaptation strategies - Developing discharge projections – future water safety - Hydrological modelling
12:30	**13:30**	***Lunch Break***		
13:30	15:10	Exercise on 'Identification of vulnerabilities in the water sector'	**Rob Bakx**, moderator **Ad Jeuken**, **Laurene Bouaziz**, Deltares, Netherlands **Johan Bogaert**, Flemish Government, Belgium	- Break out session, findings and conclusions, plenary feedback - Brainstorming, discussion groups - Information sources and tools - Use of online climate information and adaptation tools - Identification of key

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			Jakob Doetsch, GIZ, Germany **Dionisio Pérez-Bianco**, FEEM, Italy	vulnerabilities
15:10	**15:30**	***Coffee Break***		
15:30	15:50	Flood risk management	**Jakob Doetsch**, GIZ, Germany	- Flood and drought risk management in the Western Balkans - Questions and answers, exchange of experience, discussion
15:50	16:10	Economic aspects	**Dionisio Pérez-Bianco**, FEEM, Italy	- Economic consequences of neglecting adaptation options - Questions and answers, exchange of experience, discussion
16:10	16:30	Early warning systems	**Jakob Doetsch,** GIZ, Germany	- Case study from the region - Role, benefits and effects of early warning systems in the water sector - Questions and answers, exchange of experience, discussion
16:30	16:50	Climate change and water quality aspects	**Rick Wortelboer**, Deltares, Netherlands	- Water quality management and climate change adaptation - Role of the Water Framework Directive
16:50	17:00	Wrap-up	**Rob Bakx**	- Conclusions day 1

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Day 2 – Tuesday, 20 January 2015

Expert Training on Risk and Vulnerability Assessment and Adaptation Planning – Water Management sector

Chair and Co-Chairs: Robert Bakx, Imre Csikós

Venue: Ankara, Turkey

Start	Finish	Topic	Speaker(s)/Facilitator(s)	Sub topic/Content
08:45	**09:00**	***Registration***		
09:00	10:30	Cooperation and coordination among authorities	**Rob Bakx,** moderator **Johan Bogaert**, Flemish Government, Belgium	- Presentation and discussion towards solutions for inter-authority cooperation - Models and actions - Break out session, plenary feedback
10:30	**11:00**	***Coffee Break***		
11:00	11:30	Assessment of Response Strategies in the water sector	**Ad Jeuken**, Deltares, Netherlands	- Response strategies: a definition - How to use them - Their impact on adaptation practice
11:30	12:30	Identifying water sector adaptation options	**Johan Bogaert**, Flemish Government, Belgium **Ad Jeuken, Laurene Bouaziz**, **Rick Wortelboer,** Deltares, Netherlands **Jacob Doetsch**, GIZ, Germany **Dionisio Pérez-Bianco**, FEEM, Italy	- Interactive plenary session: combined Q&A, forum discussion, group discussion and brainstorm - Identification of potential adaptation options - Specificities that determine options to be chosen - Feasibility aspects: technical, economic, legal, social - Role of the public and CSOs
12:30	**14:30**	***Extended Lunch Break (to allow participants to collect per diems)***		
14:30	15:45	Exercise: Country action towards robust climate adaptation in the water sector	**Imre Csikós, Rob Bakx**, ECRAN Break out groups moderated by experts	- Break out groups, plenary feedback and conclusions; - Identifying country options for adaptation in the water sector; who contributes and how does that look like? - Options for continued cooperation among Western Balkan countries and Turkey in the (water) adaptation area
15:45	16:30	- Conclusions and wrap-up - Training Evaluation	**Rob Bakx**, moderator	- Conclusions workshop, evaluation - Next workshops - Discussion

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ANNEX II – Participants

First Name	Family Name	Institution Name	Country	Email
Ndriçim	Bytyçi	Ministry of Agriculture	Albania	Ndricim.bytyci@bujqesia.gov.al
Rudina	Cakraj	Ministry of Agriculture	Albania	Rudina.cakraj@bujqesia.gov.al
Luka	Vukmanic	Hrvatske vode	Croatia	luka.vukmanic@voda.hr
Sandra	Sokolić	Ministry of Agriculture	Croatia	sandra.sokolic@voda.hr
Marija	Čulinović Holjevac	Ministry of Agriculture	Croatia	marija.culinovicholjevac@voda.hr
Srđan	Čupić	Hydro-graphic Institute of the Republic of Croatia	Croatia	srdjan.cupic@hhi.hr
Ylber	Mirta	Ministry of Environment and Physical Planning	former Yugoslav Republic of Macedonia	ymirta@gmail.com
Melita	Gochevska	Ministry of Environment and Physical Planning	former Yugoslav Republic of Macedonia	melitagocevska@yahoo.com
Halil	Rexhepi	Ministry of Environment and Physical Planning	former Yugoslav Republic of Macedonia	halilrexhepi@hotmail.com
Daniela	Naumoska	Ministry of Environment and Physical Planning	former Yugoslav Republic of Macedonia	naumoskad@yahoo.com
Arta	Shabani	Ministry of Environment and Physical Planning	former Yugoslav Republic of Macedonia	amanmo@gmail.com
Azemine	Shakiri	Ministry of Environment and	former Yugoslav Republic of	azemineshakiri@gmail.com

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First Name	Family Name	Institution Name	Country	Email
		Physical Planning	Macedonia	
Radmila	Bojkovska Spirovska	National Hydrometeorological Service	former Yugoslav Republic of Macedonia	rbojkovska@meteo.gov.mk
Nezakete	Hakaj	Ministry of Environment and Spatial Planning	Kosovo*	nezakete.hakaj@rks-gov.net
Rizah	Hajdari	Ministry of Environment and Spatial Planning	Kosovo*	rizah.hajdari@rks-gov.net riza2006@gmail.com
Fidan	Bilalli	Ministry of Environment and Spatial Planning	Kosovo*	fidan.bilalli@rks-gov.net
Myrvete	Mulaj	Ministry of Environment and Spatial Planning	Kosovo*	myrvete.mulaj@rks-gov.net
Nijazi	Miftari	EMA/MIA	Kosovo*	nijazi.miftari@rks-gov.net
Letafete	Latifi	Ministry of Environment and Spatial Planning	Kosovo*	letafete.larifi@rks-gov.net
Gani	Berisha	Ministry of Environment and Spatial Planning	Kosovo*	gani.berisha@rks-gov.net
Kujundzic	Olivera	Ministry of Sustainable Development and Tourism	Montenegro	olivera.kujundzic@mrt.gov.me
Lazarela	Kalezic - Trisic	Capital city Podgorica	Montenegro	lkalezic@t-com.me
Sanja	Pavicevic	Institute of Hydrometeorology and Seismology of Montenegro	Montenegro	sanja.pavicevic@meteo.co.me
Slavica	Micev	Institute of Hydrometeorology and Seismology of Montenegro	Montenegro	slavica.micev@meteo.co.me

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First Name	Family Name	Institution Name	Country	Email
Tanja	Mirkovic	Institute of Hydrometeorology and Seismology of Montenegro	Montenegro	tanja.mirkovic@meteo.co.me
Miras	Drljevic	Institute of Hydrometeorology and Seismology of Montenegro	Montenegro	miras.drljevic@meteo.co.me
Nada	Marstijepovic	Ministry of Interior; Directorate for Emergency Management	Montenegro	nada.marstijepovic@mup.gov.me
Marija	Ivkovic	Republic Hydro-meteorological Service of Serbia	Serbia	marija.ivkovic@hidmet.gov.rs
Aleksandra	Krzic	Republic Hydro-meteorological Service of Serbia	Serbia	aleksandra.krzic@hidmet.gov.rs
Ana	Repac	Ministry of Agriculture and Environment	Serbia	ana.repac@eko.minpolj.gov.rs
Orhan	Solak	Ministry of Environment and Urbanization	Turkey	orhan.solak@csb.gov.tr
Diren	Ertekin	Ministry of Environment and Urbanization	Turkey	diren.ertekin@csb.gov.tr
Şule	Erdal	Ministry of Environment and Urbanization	Turkey	sule.erdal@csb.gov.tr
Buket	Akay	Ministry of Environment and Urbanization	Turkey	buket.akay@csb.gov.tr
Dilek	Demirel Yazici	General Directorate of State Hydraulic Works	Turkey	dilekdemirel@dsi.gov.tr
Deniz	Özdemir	General Directorate of State Hydraulic Works	Turkey	dozdemir@dsi.gov.tr

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First Name	Family Name	Institution Name	Country	Email
Ayşe	Yildirim Coşgun	Ministry of Forestry and Water Affairs	Turkey	aycosgun@ormansu.gov.tr
Hülya	Silkin	Ministry of Forestry and Water Affairs	Turkey	hsilkin@ormansu.gov.tr
Mustafa Berk	Duygu	Ministry of Forestry and Water Affairs	Turkey	mbduygu@ormansu.gov.tr
Rahime	Polat	Ministry of Forestry and Water Affairs	Turkey	rpolat@ormansu.gov.tr
Ömer	Öztürk	Ministry of Environment and Urbanization	Turkey	Omer.ozturk@csb.gov.tr
Mehmet	Aşkiner	Ministry of Forestry and Water Affairs	Turkey	maskiner@ormansu.gov.tr
Seçil	Karabay	Ministry of Forestry and Water Affairs	Turkey	secilk@ormansu.gov.tr
Tansel	Temur	Ministry of Forestry and Water Affairs	Turkey	ttemur@ormansu.gov.tr
Bertan	Başak	Ministry of Forestry and Water Affairs	Turkey	Bertan.basak@iocevre.com
Pelin	Polat	Ministry of Food, Agriculture and Livestock	Turkey	Pelin.polat@tarim.gov.tr
Oğuz	Demirkiran	Ministry of Food, Agriculture and Livestock	Turkey	demirkirano@yahoo.com demirkirano@gmail.com
Hakki	Atay	DG Meteorology	Turkey	hatay@mgm.gov.tr
Serhat	Şensoy	DG Meteorology	Turkey	ssensoy@mgm.gov.tr

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First Name	Family Name	Institution Name	Country	Email
Johan	Bogaert	Flemish Government	Belgium	Johan.bogaert@lne.vlaanderen.be
Jakob	Doetsch	GIZ	Germany	Jakob.doetsch@giz.de
Carlos Dionisio	Pérez Blanco	Fondazione Eni Enrico Mattei	Italy	Dionisio.perez@feem.it
Laurene	Bouaziz	Deltares	Netherlands	Laurene.bouaziz@deltares.nl
Adriaan	Jeuken	Deltares	Netherlands	Ad.jeuken@deltares.nl
Rick	Wortelboer	Deltares	Netherlands	Rick.wortelboer@deltares.nl
Robert	Bakx	ECRAN	Serbia	rob.bakx@ecranetwork.org
Imre	Csikos	ECRAN	Netherlands	imre.csikos@ecranetwork.org
Milica	Tosic	ECRAN	Serbia	milica.tosic@humandynamics.org

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ANNEX III – Presentations (under separate cover)

Presentations can be downloaded from:

http://www.ecranetwork.org/Files/Presentations_Adaptation_Water_Workshop,_January_2015,_Ankara.zip

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