Global Water Partnership
Central and Eastern Europe

WMO OMM

5 – 6 October 2012, Bratislava, Slovakia
Integrated Drought Management Programme in Central and Eastern Europe
A GWP and WMO initiative: Regional Workshop Agenda

5 October 2012

Drought management: current status and future regional perspectives, water management and agriculture sectors perspectives

Water scarcity and climate uncertainty; what do we know on droughts in Europe

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Outline

- Water scarcity and drought concepts
- Water scarcity, drought and CC - policy framework
- Knowledge base and information exchange on CC and drought – technical and scientific platform
- Climatic conditions in Europe – current status and projected changes
- Potential impacts of CC on the status of water resources in drought conditions
- What are the main sources of uncertainty on CC and drought impact ?
- Examples of information networks on DROUGHT
- Drought management and adaptation options – IDMP
- Conclusions

Water scarcity and drought concepts

- ***Water scarcity is a man-made caused phenomenon. It is a recurrent imbalance that arises from an overuse of water resources, caused by consumption being significantly higher than the natural renewable availability. Water scarcity can be more aggravated by disturbed meteorological conditions during drought episodes and even more complicated by the water pollution which is associated with lack of resources (reducing the suitability for different water uses);***
- ***Drought is a natural phenomenon. It is a temporary, negative and severe deviation along a significant time period and over a large region from average precipitation values (a rainfall deficit), which might lead to meteorological, agricultural, hydrological and socio-economic drought, depending on its severity and duration (EU definitions on WS&D Report, 2007).***

		TIME SCALE		
		Short-term (days, weeks)	**Mid-term (months, seasons, years)**	**Long-term (decades)**
Causes	**Natural**	**Dry spell**	**Drought**	**Aridity**
	Man-made	**Water shortage**	**Water scarcity**	**Desertification**

Timescale and causes of water scarcity, drought and related concepts

Source: Gap Analysis of the Water Scarcity and Droughts Policy in the EU, European Commission Tender ENV.D.1/SER/2010/0049

August 2012

Water scarcity, drought and CC – policy framework

⇒Related on water scarcity and droughts policy, several **EU policies and initiatives contribute to efforts for adaptation to climate change impact on water resources management**; examples :

⇒**EU Water Framework Directive** (WFD/2000/60/EC) and the **Water Scarcity and Droughts EU Policy** (EC 2007b) refers :

- to protect and restore the water environment across Europe by 2015 and to ensure the long term sustainable use of water;
- to development of adaptation measures and sets out of a number of policy options for addressing impacts of water scarcity and droughts in next decades.

⇒ **The Blueprint to safeguard Europe's water resources** is a communication to be released by the end of 2012 that will address the evolution of water resources, including water's vulnerability to climate change and anthropogenic pressures (i.e. land use management). It will focus on different water resource management aspects that are related to adaption (land use management including forests, indicative water efficiency targets, economic instruments, innovation, governance and knowledge base).

WATER SAVING SHOULD BECAME THE PRIORITY.

Drought Management Plans must be the first set of policy options for future action

Knowledge base and information exchange on CC and drought – technical and scientific platform

⇒**The White Paper of the European Commission** "Adapting to climate change: Towards a European framework for action" (COM/2009/147) issued in April 2009 sets out a framework to reduce the EU's areas vulnerability to the water scarcity and drought.

⇒Starting with March 2012, the **European Climate Adaptation Platform** (CLIMATE- ADAPT) is a publicly accessible web-based platform designed to support policy-makers at EU, national, regional and local level in the development of climate change adaptation measures and policies;

⇒The CLIMATE-ADAPT have been developed with the support of the European scientific and policy making community, and will help users to access, disseminate and integrate information on:

- Expected climate change in Europe
- The vulnerability of regions and sectors at present and in the future
- National, regional and transnational adaptation activities and strategies
- Case examples of adaptation and potential future adaptation options
- Online tools that support adaptation planning
- Adaptation-related research projects, guideline documents, reports information sources, links, news & events.

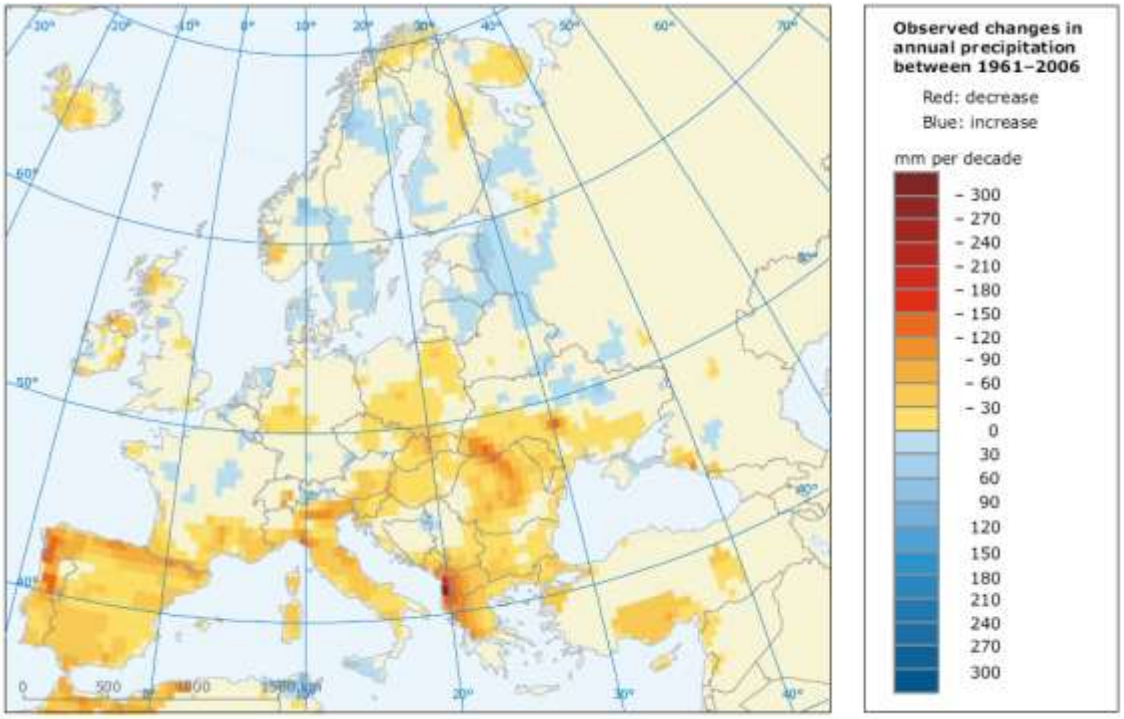
http://climate-adapt.eea.europa.eu/

Why is water use a concern in Europe?

- Balance between demand and availability has reached a critical level in many areas of Europe (water scarcity)
- More and more areas are affected by weather changes, in particular less rain (droughts)
- Climate change will almost certainly make the situation worse
- More frequent and severe droughts expected across Europe and the neighbouring countries
- Total water abstraction in EU 247 billion m^3/year:
  - 44% for energy production,
  - 24% for agriculture,
  - 17% for public water supply
- Agriculture is currently accountable for 85% of the global water consumption, and irrigated areas are expected to rise by a factor of 1.9 by 2050, globally in the highest percentages where water-scarcity is most intense, namely South Europe Countries.
- For this reason, the need for improved water management practices, soil and crop, particularly in light of climate change, is growing.

Source: Martindale W., 2010. Food supply chain innovation. Aspects of Apll. Biol., 102, 1-6.

Climatic conditions in Europe – current status



Observed changes in annual precipitation between 1961-2006

Over the past thirty years, droughts have dramatically increased in number and intensity in the EU, the number of areas and people affected by droughts increasing by almost 20% between 1976 and 2006.

Source: EEA, Impacts of Europe's changing climate - 2008 indicator-based assessment (2008).

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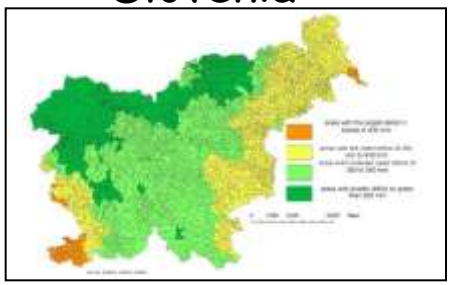
Drought situation and related risks in CEE countries

Slovenia

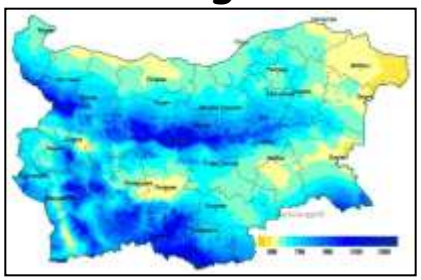


Agricultural drought in summer 2003

Romania

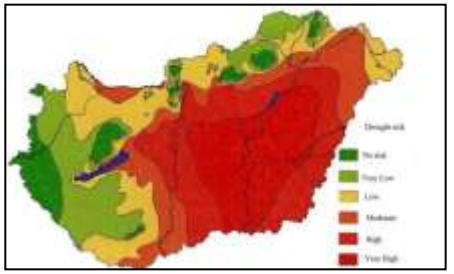
Areas affected by drought

Bulgaria



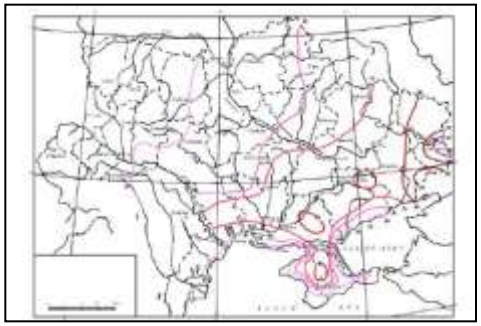
Annual precipitation (mm)

Hungary



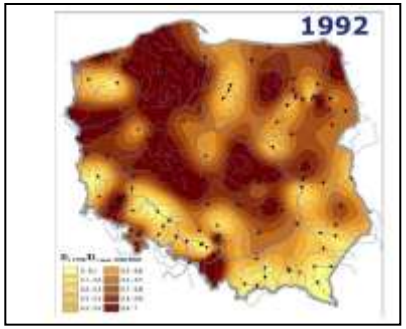
Drought risk zones

Ukraine



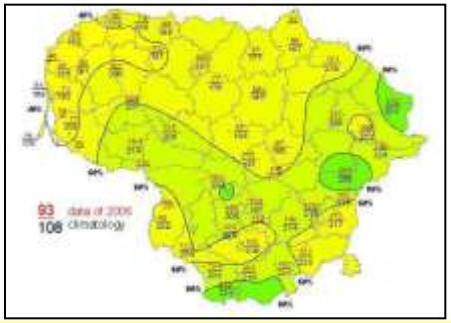
Crop yields in dry (2003) and non-dry (2008) years

Poland



Spatial distribution of water deficit in 1992 year

Lithuania



Precipitation amount for May-July, 2006

Slovakia was affected by extreme droughts in several years: 2000, 2002, 2003, 2006, 2007, 2008 and 2009). Also, the autumn of 2011 was the second driest since 1881.

Climatic conditions in Europe – projected changes

⇒**Drought is one of the most damaging natural hazards through its effects on agricultural, hydrological, ecological and socio-economic systems.**

⇒**For the next two decades a warming of about 0.2°C per decade is projected** for a range of SRES emissions scenarios. Even if the concentrations of all GHGs and aerosols had been kept constant at year 2000 levels, a further warming of about 0.1°C per decade would be expected. Afterwards, temperature projections increasingly depend on specific emissions scenarios.

⇒ Drought prone areas and regions affected by heat waves are considered likely to increase in extent. **In Southern Europe especially climate change is projected to worsen conditions** (**high temperatures and drought) in a region that already faces water scarcity and heat waves in a substantial number of areas. In Central and Eastern Europe, summer precipitation is projected to decrease, causing higher water stress** (4-th Assessment Reports of the IPCC, 2007).

http://meetingorganizer.copernicus.org/EGU2012/EGU2012-563-2.pdf
http://ftp.jrc.es/EURdoc/JRC55386.pdf

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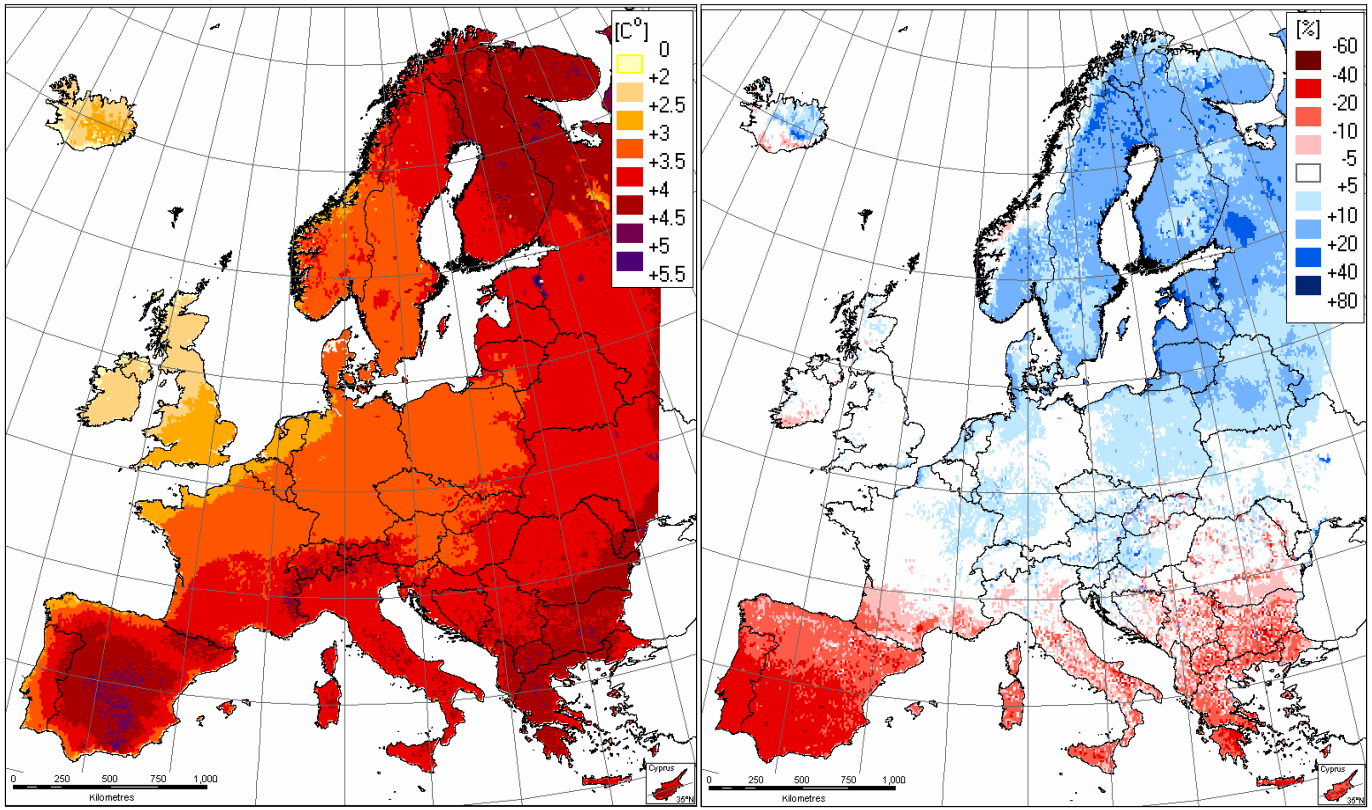
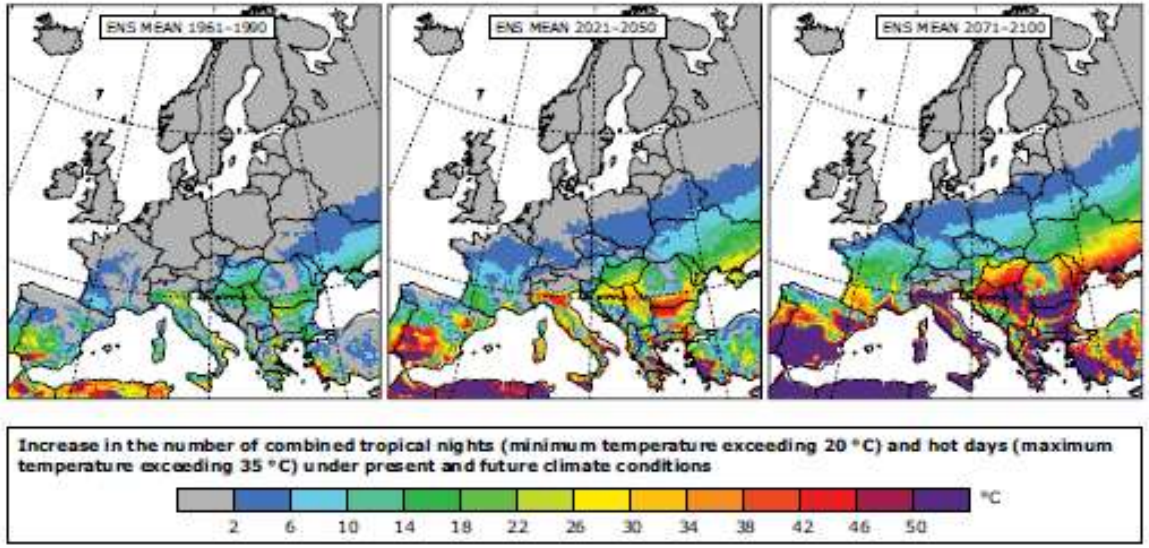
Climatic conditions in Europe – projected changes



In EUROPE, a mean annual air temperature increase of 2...4,5°C is foreseen by the end of the century, function of the scenarios of green house gas emissions. A 10...30% decrease of the annual precipitation amounts is estimated in the southern part of Europe, and even higher values in the north are expected.

(Source: IPCC, 4AR, 2007)

Climatic condition in Europe – projected changes

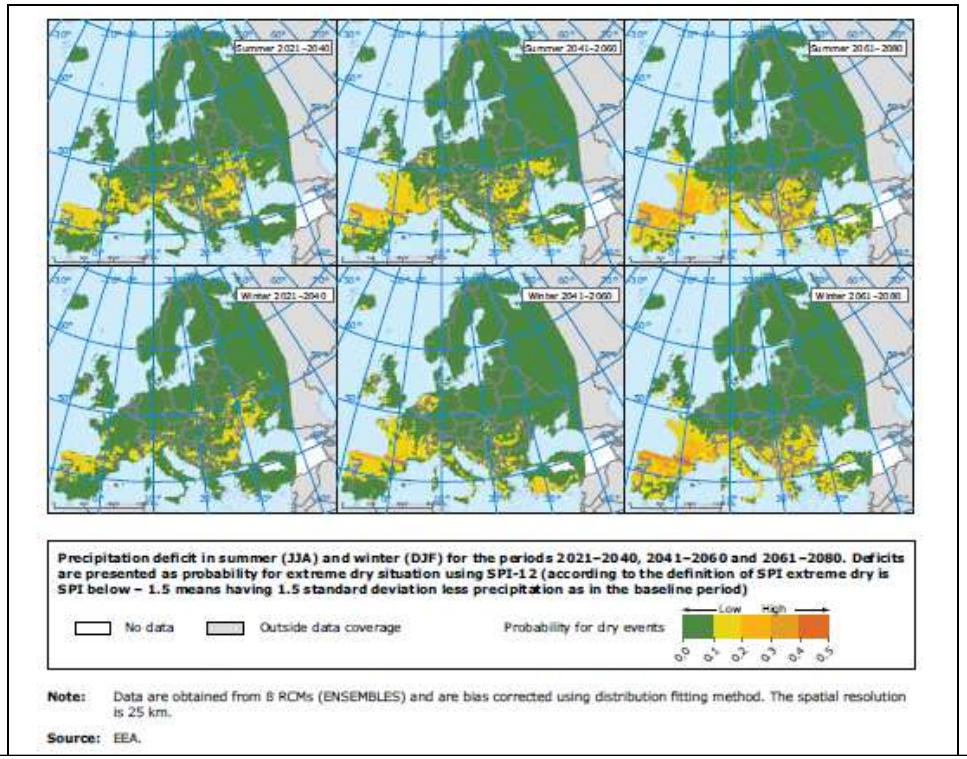


Increase in the number of combined tropical nights (minimum temperature exceeding 20 °C) and hot days (maximum temperature exceeding 35 °C) under present and future climate conditions

Europe has seen an increase in temperature of 0.3°C per decade since the 1970s. At least two summers in the last decade (2003 and 2010) have been the warmest of the last 500 years in Europe. Southern Europe in particular is affected by hot summer days and tropical nights. Projections indicate an increase of the length, frequency and/or intensity of warm spells, or heat waves.

Source: EEA Report, No 2/2012

Climatic condition in Europe – projected changes



Precipitation deficit in summer (JJA) and winter (DJF) for the periods 2021–2040, 2041–2060 and 2061–2080

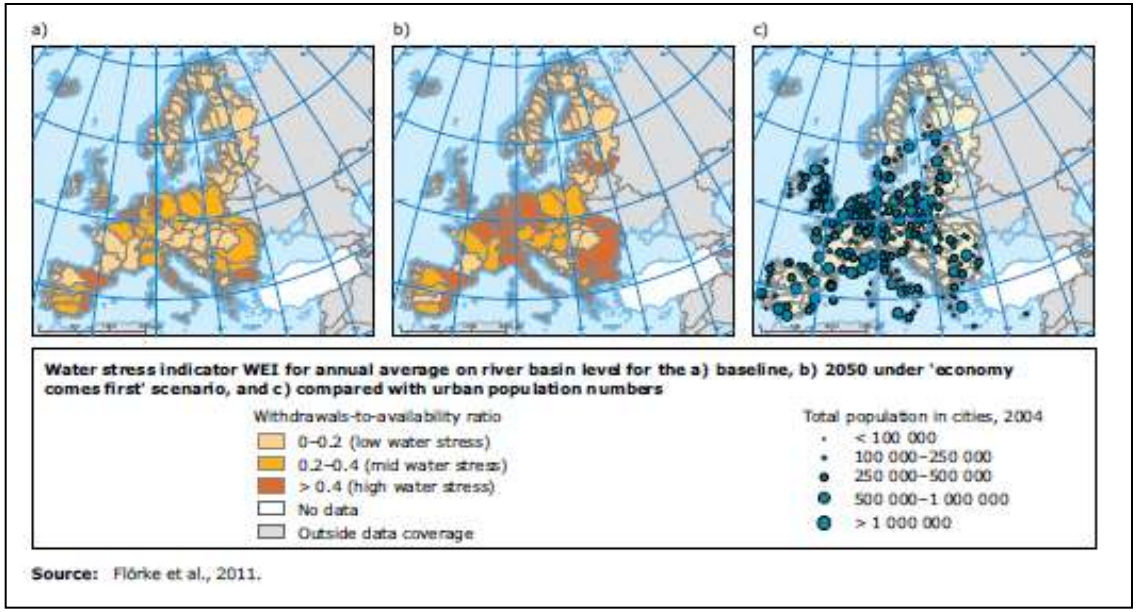
During the 20th century has been a clear trend towards drier conditions, with decreases in rainfall especially in Southern and Eastern European countries. The total area affected by water scarcity and droughts doubled - from 6 to 13 % - during the last 30 years.

Future projections shows how the precipitation deficit is projected to change in the future in summer and winter time. In this context, CC is projected to lead to major changes in water availability across Europe with increasing water scarcity and droughts mainly in Southern Europe.

Source: EEA Report, No 2/2012

Climatic condition in Europe – projected changes

The water stress indicator (WEI) describes the ratio between total water withdrawals against water availability. It illustrates to which extent the total water demand puts pressure on the available water resources in a given territory and points out the territories that have high water demand compared to their resources.



Water stress indicator WEI for annual average on river basin level for the a) baseline, b) 2050 under the 'economy comes first' scenario, and c) compared with urban population numbers

The results show that parts of southern and north-western Europe are already under severe water stress. Projected climatic changes shows that the situation worsens and most parts of Europe will be under severe or medium water stress.

Source: EEA Report, No 2/2012

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Potential impacts of CC on the status of water resources in drought conditions

In drought conditions climate change affects the following variables:

- water availability (river flows and groundwater levels)

  Annual river flow is projected to decrease in southern and south-eastern Europe and increase in northern Europe, but absolute changes remain uncertain.
  Climate change is projected to result in strong changes in the seasonality of river flows across Europe (EEA/JRC/WHO, 2008).

- water demand (esp. peak demands during periods of drought)

  Regions in southern Europe which already suffer most due to water stress are projected to be particularly vulnerable to reductions in water resources due to CC. In addition, higher temperatures are expected to lead to increased water demand, especially for irrigation and urban supply. This will result in increased competition for available resources (EEA/JRC/WHO, 2008).

- intensity and frequency of droughts

  The frequency and intensity of droughts are projected to increase in many regions of Europe, as a result of higher temperatures, decreased summer precipitation, and more and longer dry spells. The regions most prone to an increase in drought hazard are southern and south-eastern Europe (EEA/JRC/WHO, 2008).

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What are the main sources of uncertainty on CC and drought impact ?

Uncertainties related on scientific information:

⇒ **Data availability**, particularly with respect to the historical climatic series collected in the relevant database;

⇒ **The lack of common drought indicators –** climatic, agricultural, hydrological, etc;

⇒ **The difficulties in modeling of drought impact** based on climatic conditions and a variety of emission scenarios. The results are interpreted, described and published on a regular basis by the Intergovernmental Panel on Climate Change (IPCC);

⇒ **The spatial resolution of global models** is insufficient for application in impact models and thereby for determining the effects of regional and local climate change. To overcome this limitation, **regionalisation procedures are applied.** By these, the global projections are “downscaled” to smaller grid elements of up to 25 km × 25 km. In individual studies the downscaling is even below this grid size, or adjusted to the locations of individual stations;

⇒ **Quantitative projections of changes in precipitation and the river flows at the river-basin scale are** due to the limitations of climate models, as well as scaling issues between climate and hydrological models. Statistical correction methods have been developed which bring the models closer to a realistic simulation of, for instance, the amount and intensity of precipitation at the scale of river basins and small catchments.

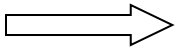
Handling uncertainty

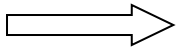
The handling related uncertainties of available scientific knowledge on CC and drought:

⇒In practical terms, decisions related to climate change impacts need to encompass several adaptation options to the climate projections. In other words, **decision makers will have to handle and accept different options based on scenarios and be explicit about uncertainty**.

⇒ **A bottom-up approach** in terms of looking at potential measures and considering how each of these or combinations of them will perform against the range of possible climate futures modeled.

⇒**Research and development projects** can determine which sectors are impacted most severely by climate change and where measures are needed most urgently to prevent severe effects, even if their extent is not yet known.





Examples of information networks on DROUGHT

⇒ **At global level:**

- The World Meteorological Organization (WMO)
- UNCCD Convention
- The Global Water Partnership (GWP)

⇒ **in Europe:**

- EC/DG Environment Program "Halting Desertification in Europe
- The United Nations Economic Commission for Europe (UNECE)
- The European Water Partnership (EWP)
- CLIMATE-ADAPT Platform
- ADAM Digital Compendium on Adaptation is a the portal for the dissemination of the trans-disciplinary analysis results carried out in the EU ADAM project
- Research projects:

- Research into climate change scenarios: PRUDENCE, ENSEMBLES, STARDEX, CECILIA, CLAVIER, CIRCA ERA-Net, CCWATERs, etc
- Research on droughts and water scarcity: XEROCHORE, European Drought Observatory (EDO), WATERCoRe, MIDMURES, REDSIM, DESIRAS, I-ADAPT, Desert-net, DROUGHT-R&SPI;
- Research into climate change impacts on the aquatic environment and water cycle: CLIME, KLIWAS, CLIMWATERADAPT, WATCH, CIRCE; WATER2ADAPT,
- Research into mitigation / adaptation options and costs: AquaStress, ADAM, ClimateWater,

Drought management and adaptation options

⇒**The basic Framework to minimize the adverse impacts on the economy, social life and environment when drought occurs, is the development of a specific Integrated Drought Management Plan (IDMP).**

⇒**Guiding principles:**

1. Diagnose the causes that led to drought in the past and/or may lead to it in the future;
2. Monitor current drought conditions in order to detect water deficit early;
3. Develop a comprehensive set of indicators at appropriate temporal and spatial scale in order to predict drought impacts;
4. Diagnose and improve knowledge of water deficit based on past and future trends, incorporating climate change projections;
5. Analyze how predicted changes in mean annual rainfall will affect the socio-economic life and environment;
6. Incorporate climate change adaptation in water management by continuing the focus on sustainability (sustainable balance between water availability and demand).
7. Follow an integrated approach based on a combination of measures (compared to alternatives based on water supply or economic instruments only);
8. Assess other climate change adaptation and mitigation measures on their impact on drought risks.

IDMP initiative as a decisional tool

The outputs of IDMP initiative are:

1. Knowledge base on recorded practices in drought planning and management;
2. Guidance on tools and institutional arrangements to support increased risk responses;
3. Advocacy through regional and country dialogues;
4. Improved early drought warning services, building upon existing regional initiatives.

Recommendations in order to implement the outputs of IDMP initiative:

- to collaborate closely with WMO on the drafting the work plan on IDMP(2013-2015);
- to invite the DMCSEE and the European Drought Centre (EDO) to conduct the proposed activities and seek synergies;
- to invite and inform national secretariats of UNCCD of all CEE countries to contribute to specific case studies dealing with degradation of land caused by desertification;
- to seek an appropriate mechanism and cooperation with agriculture sector at national levels;
- to invite the UNECE and its Task Force on Climate Change Adaptation to coordinate and share achievements in IDMP in CEE region and seek a potential of the program replication in other signatory UNECE countries (specifically those in Central Asia, where GWP has also its partners).
- to establish a web-based *Integrated Drought Management Platform* for:
  - commonly agreed products (e.g. objectively measurable drought indices covering as many contributing parameters as possible);
  - joint comparison and analysis of information;
  - mutual exchange of knowledge & methodologies, and downscaling products;
  - real-time monitoring and forecasting products and services (early warning, preparedness).

Policymakers need good information at the local, regional and European scales to identify priority issues, relevant sectors and economic activities.

Conclusions

- Climate change is likely to exacerbate current pressures on Europe's water resources. Increasingly, much of **Europe will face reduced water availability especially during summer months**, while **the frequency and intensity of drought is projected to increase especially in the South. In the absence of sufficiently strong action, climate change may have also an sever impact on water management resources** (EEA, 2010c).
- Environmental measures need to be implemented in the policies of all sectors affected by water scarcity and drought. To inform decisional makers at the regional and local levels the knowledge base for action needs to be improved. At the regional/local level it is crucial that competent authorities make any **water management decisions** in full awareness of the availability of water resources and in full awareness of the actual needs of all actors. Appropriate methodologies need to be implemented in order to provide effective monitoring and better management planning.

Source: **Towards efficient use of water resources in Europe**, EEA Report No.1, 2012

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Thank You!

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