

Assessing the economic importance of water uses in the context of climate change and WFD

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Water Framework Directive and Climate Change

The main aim of the checklist is to compile all stages in WFD implementation where climate change impacts may play a role.

For each implementation stage (setting objectives, status assessment, identifying measures), an attempt is made to point the questions that could be asked in order to make sure that relevant interactions between climate change and river basin planning are taken into account.

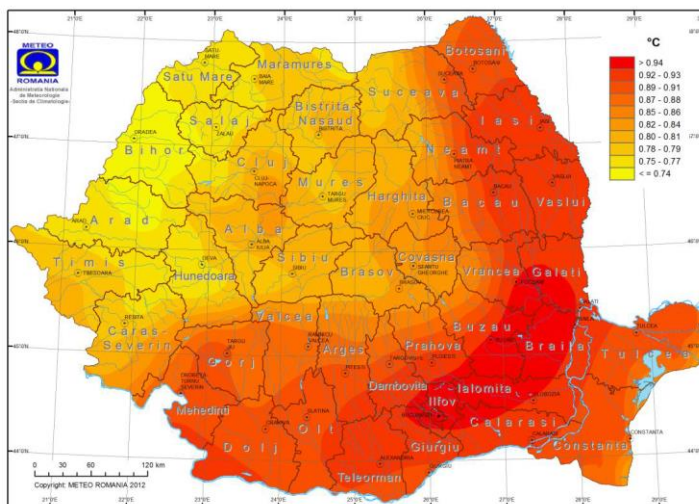
❑ Water use vs Climate change

Examples:

Q: Economic analysis of water use

A: Consider climate change when taking account of long term forecasts of supply and demand and favor options that are robust to the uncertainty in climate projections.

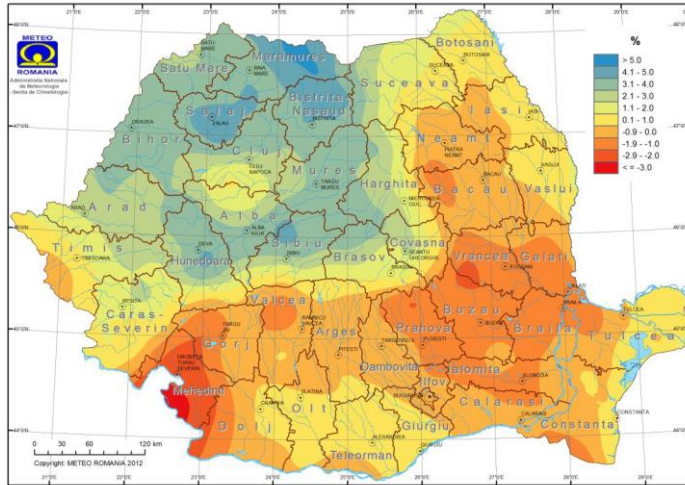
Climate change in the frame of River Basin Management Plan



ADER Project Estimation:

- Between 0,5⁰-1,5⁰ C for 2020-2029
- Between 2⁰-5⁰ C for 2029-2099

Climate change in the frame of River Basin Management Plan



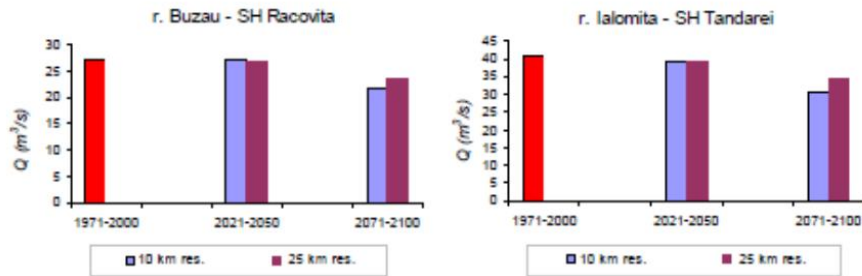
Difference between medium multi annual precipitation (in %) in 2020-2030 and the normal standard (1961-1990)

□ Water use vs Climate change. Ro Approach

4 studies regarding the impact on climate change on water use has been achieved for 4 River Basins : Buzău, Ialomița, Argeș și Mureș

❑ Water use vs Climate change. Ro Approach

Changes in mean annual flow due to climate change in Buzău și Ialomița

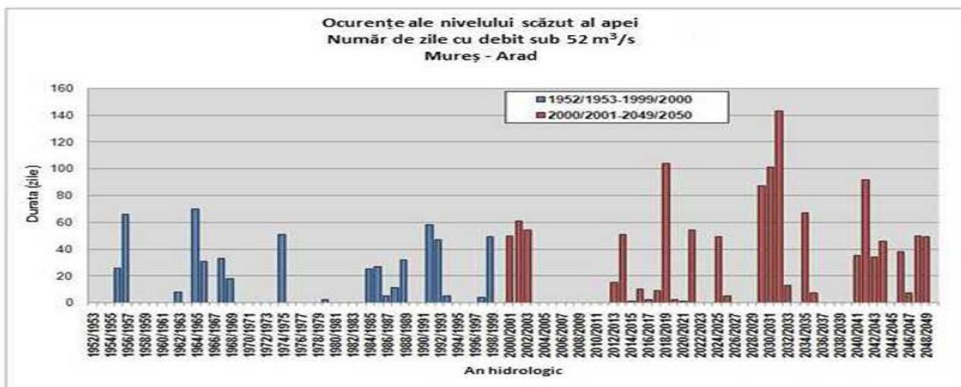


Ialomița Buzău River Basin
Reducing the mean annual flow

- 15-20 % for 2021-2050
- 30-40 % for 2070-2100

❑ Water use vs Climate change. Ro Approach

Frequency of low water level in Mureș-Arad



Mureș River Basin
Reducing the mean annual flow

- 10-15 % for 2021-2050

Sensitivity/Vulnerability of water use taken into account the climate change

- Potential deficit with water supply for households agriculture, industry in summer periods
- The higher temperature during the summer will lead to increasing in evapotranspiration process, and implicitly to an increasing demand in agriculture in the same period. The irrigation sector will be firstly exposed
- Groundwater supply for rural area will decrease due to decreasing of groundwater level (in connection with aquifer supply)

Sensitivity/Vulnerability of water use taken into account the climate change

Sewerage /Waste water treatment

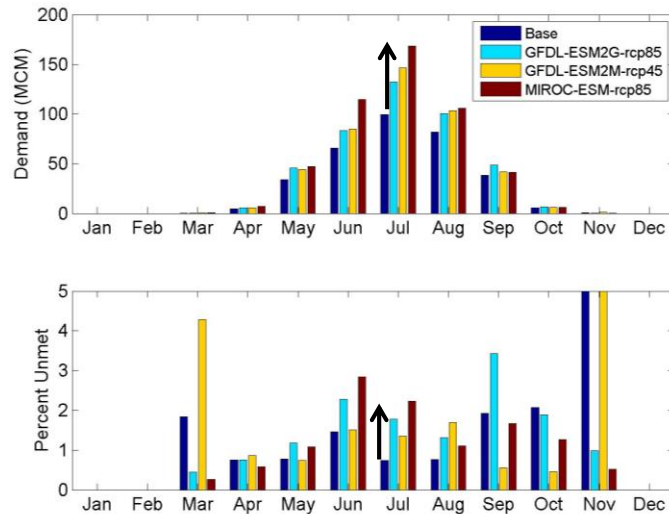
Problematic issues could be expected in waste water treatment due to increasing of pluvial water in sewage network

Hydropower:

Production of hydropower during the summer time will be negatively impacted in drought years. For this reason the operation rules should be revised in order to maintain maximum energy production in condition of ensuring the water for irrigation and water supply. Hydropower plant will have also to cope with increase of frequency and extent of floods and in this respect the reservoirs should act more to accumulate more water during flood

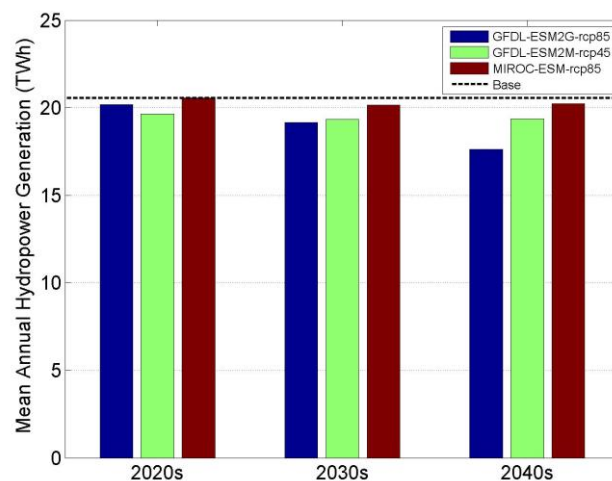
Unmet Irrigation Demand: Romania totals in baseline and 2040s
Examples World Bank Project

- Demands increase considerably from base levels under the three climate scenarios
- The percentage of total demands that are unmet remains low, at approximately 1 to 4% of total demands



Hydropower Generation: Overall Changes (TWh)
Examples World Bank Project

- Largest reduction is approximately 17%
- Large fraction of production and impacts are on Danube



Economic value of water in the context of climate change

- The impacts of climate change on the economic value of water resources is based on the development of adaptation strategies with regards to the sustainable management of regional and national water resources.
- The modeled changes in water use by sector will strongly reflect differences in the economic value of water in each sector. But in each case a significant increase of economic value for water resource is expected

Economic value of water in the context of climate change

Economic Value of water			Climate change influence
Benefit Class	Benefit Category	Types of benefits and examples	
Use values	Direct use	Market (Commercial: water supply navigation, tourism)	Increasing due to CC related measures costs (eg. Reducing leakages, BAT for water savings)
		Non-market (Recreational: water skiing, fishing, swimming, boating, photography)	Present reled studies (Contingent Evaluation Method) indicated a small increase
	Indirect use	Amenity value derived from a nice environment	discrepancy in spatial assesement
		Benefit extracted from someone else using the environmental good(not assessed
	Option value	General ecosystem support (preserving the food chain to support fishing)	increasing due to the increasing value of Ecosystem services
		Value derived from preserving potential direct or indirect use values in future, which depends on uncertainty over future demand and supply.	not assessed
Non-use values	Existence	Biodiversity, heritage and cultural values	Present reled studies (Contingent Evaluation Method) indicated a small increase
	Bequest	Preservation of water quality for family and future generations	increasing due to conservation and adaptation measures costs

Economic value of water in the context of climate change

Incentives instruments for:

-Economic analyses play a critical role in consideration of climate change policies. Identifying, assessing and communicating the implications of economic uncertainty and knowledge gaps remains a major challenge – for example - in characterization of long-term technology change and valuation of non-market impacts.

-Seasonal tariff variations can be very effective to provide higher incentives for saving water in periods with high scarcity only (e.g. increase

How to integrate water recommendations in the CC strategy on the basis of the outcomes of the water use sectoral rapid assessments?

The Integrated Water Resources Rapid Assessment report provides recommendations in two categories:

–**No-Regret Actions**: where needs are serious and benefits are obvious and significant

–**Recommended Actions for Prioritization** : where further economic and technical analysis is needed

Proposed of No-Regret Actions (Examples)

- Assess water demands and supply reliability for all the main WSS utilities of Romania, taking into account the expected climate change impacts.
- Establish regulations to ensure that large industrial water users are provided through utility supplies, instead of private groundwater wells
- Conduct quantitative assessments for water needs of various ecosystems

Recommended actions for prioritization and sequencing

Water supply and sanitation

- Investments in infrastructure to ensure WSS provisions for municipalities having more than 10,000 inhabitants, by 2015, and by 2018 for more than 2,000
- Support utility investments aimed at reducing system losses in water distribution networks
- Assess feasibility of desalinization for provision of drinking water supplies in water-scarce coastal basins
- Promote wastewater reuse in industrial sectors

Recommended actions

Hydropower

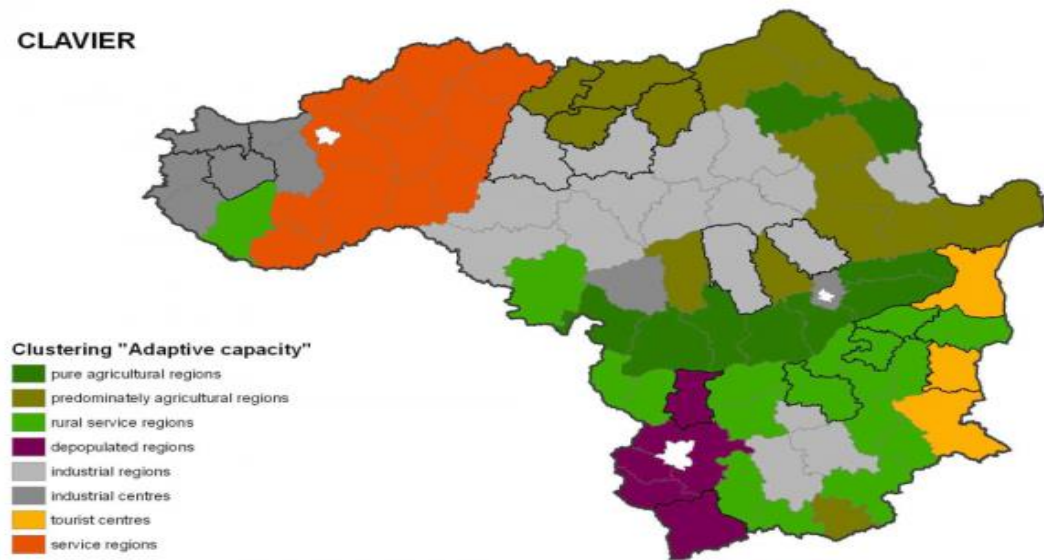
- Improving the turbine technology
- Re-asses the operational programs
- Improve the flow forecast in the reservoir area
- Use the turbine -pumps for hydropower

Recomended actions

Agriculture

- Improve irrigation technology
- Reduce the losses on open channels
- Change the crops and introduce crops with low water requirements
- Changing the water supply sources

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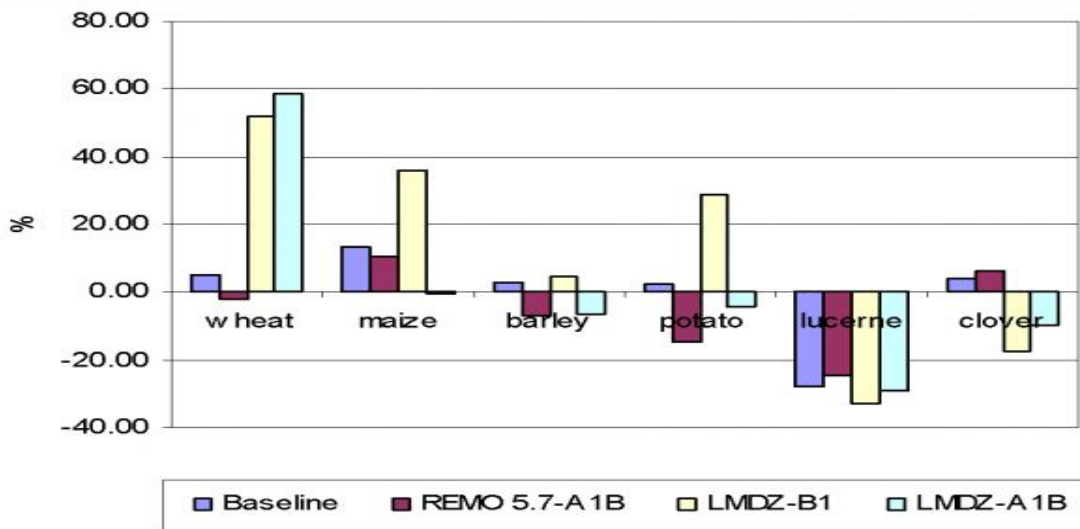


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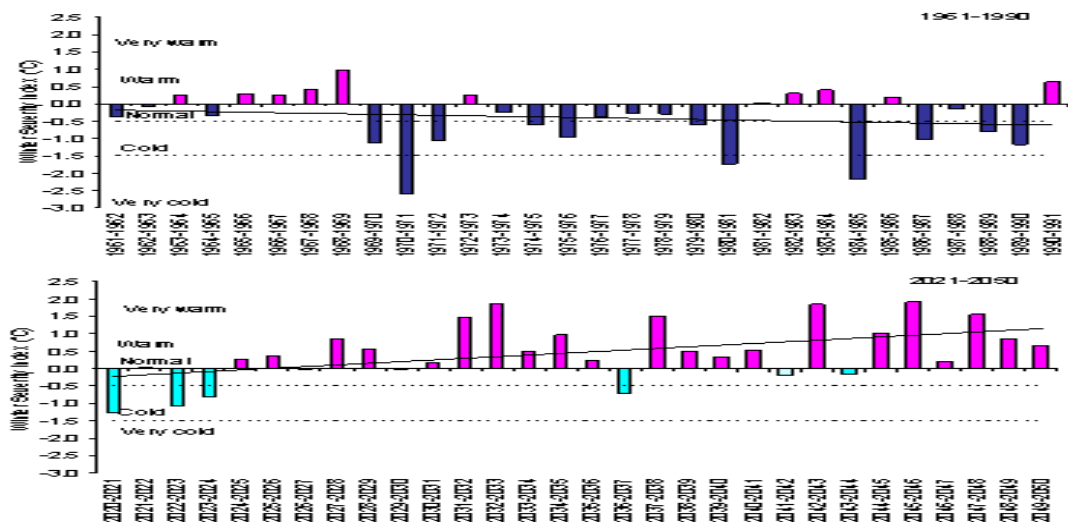
Change in crop yields in the North West region in 2020-2030 compared to 1975-2000 according to different climate scenarios



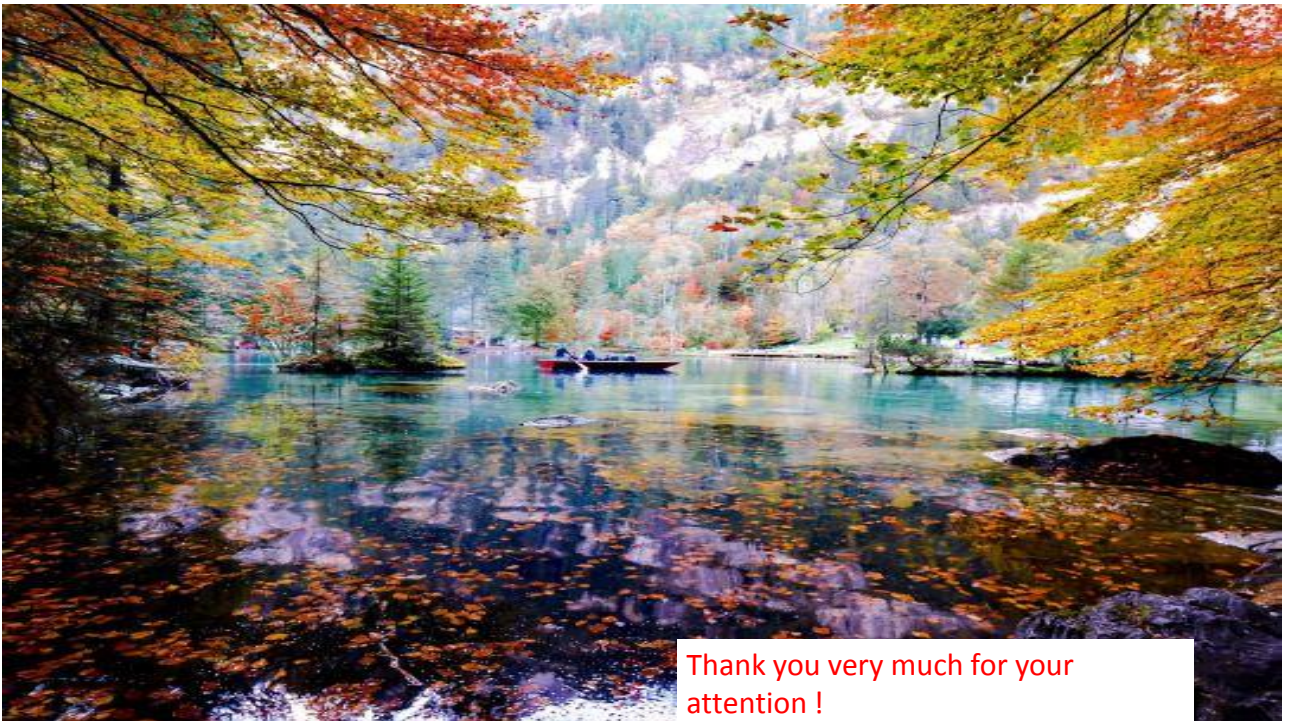
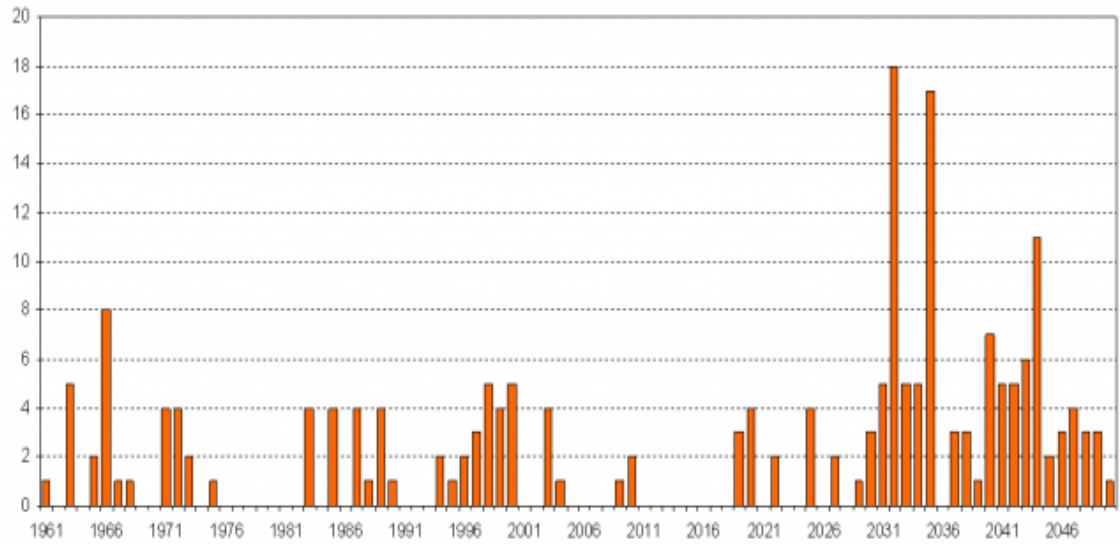
Economic impacts of climate caused crop yield changes on gross agricultural output and total regional output in the North East Regional

	Scenario			
	Baseline	REMO-A1B	LMDZ-A1B	LMDZ-B1
Gross agricultural output [mill. €]	1,340.87	1,495.04	1,651.46	1,595.39
Difference to the baseline scenario [%]		+11.50	+23.16	+18.98
Total regional output [mill. €]	15,598.67	15,902.11	16,214.95	16,102.83
Difference to the baseline scenario [%]		+1.95	+3.95	+3.23

Winter Severity Index in the Prahova Valley-Poiana Brasov area 1961-1990, 2021-2050



Number of days in the May-September interval between 1961-2050 in which more than half of population feels discomfort in Constanta county



Thank you very much for your attention !