



Drought conditions and management strategies in Montenegro

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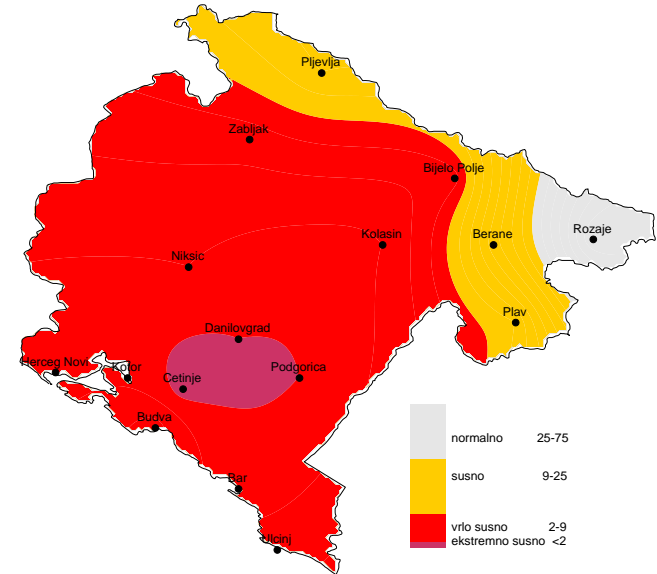


Ministry of Agriculture and Rural
Development



Drought monitoring status

- **Before the project IPA DMCSEE:**
 1. no permanent drought monitoring
 2. sparse analysis of the drought
 3. Intensity of precipitation deficit based on percentile analysis
 4. vulnerability assessment not existed
 5. In 2003 – an initiative to calculate SPI was unsuccessful
 6. Evident - insufficient knowledge and urgent need for trainings
- **During and after the DMCSEE project:**
- Permanent drought monitoring based on SPI



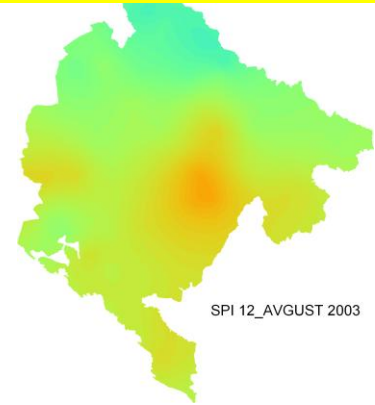
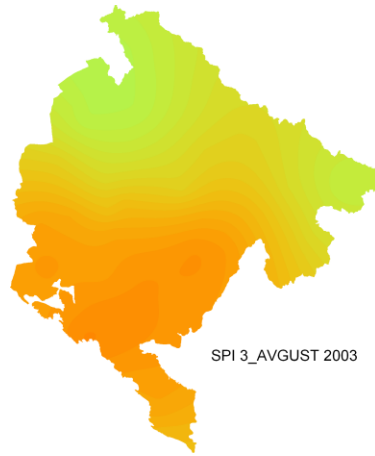
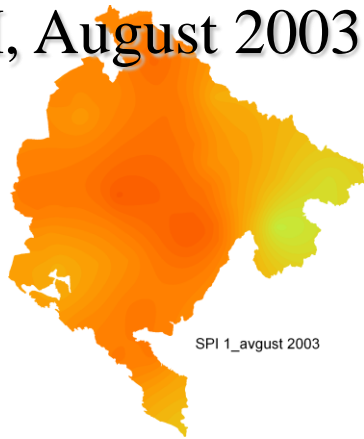
Analysis of percentiles-precipitation conditions in Autumn 2011

- Drought impact archive - created
- vulnerability – assessed
- Trained staff for SPI monitoring, drought vulnerability and risk assessment

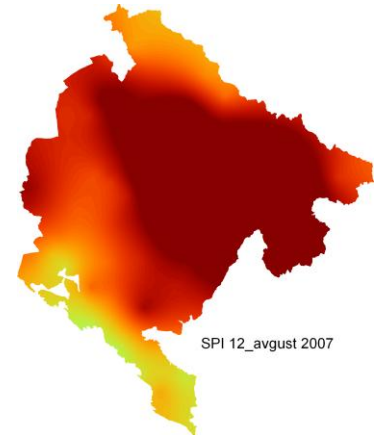
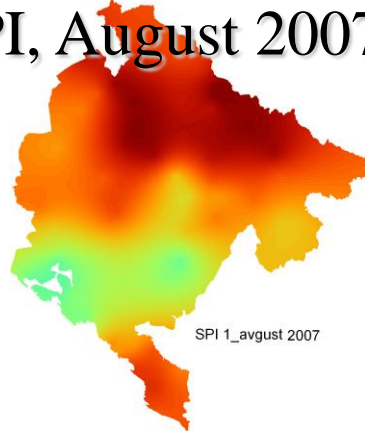


EXAMPLES OF SPI 1, 3,6,12

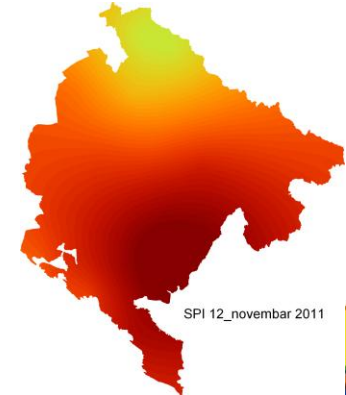
SPI, August 2003



SPI, August 2007



SPI, November, 2011



Climate indicators most in use

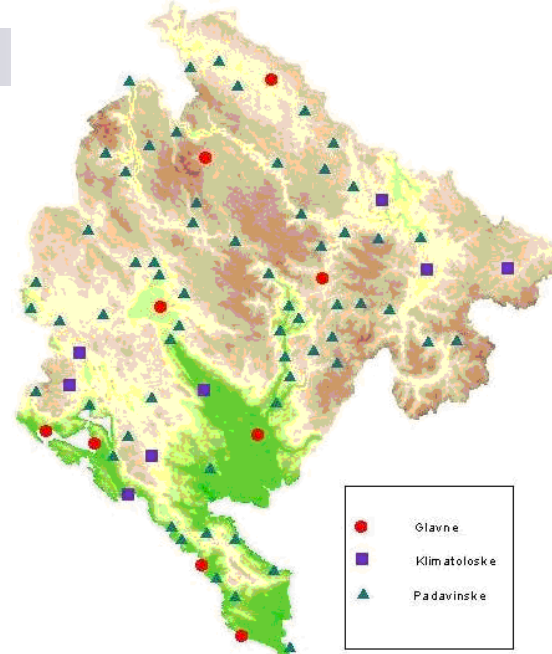
Temperature	Temperature anomalies with respect to the 1961-1990 base period (in °C) or expressed as percentiles, Heat Wave Duration Index (HWDI), number of days with temperature over 75th percentile and precipitation below 25th percentile
Water	Consecutive Dry Days (CDD), SPI12, anomalies of water level
Soil	-
Socioeconomic	Air quality assessment, losses in agriculture, losses in energy production



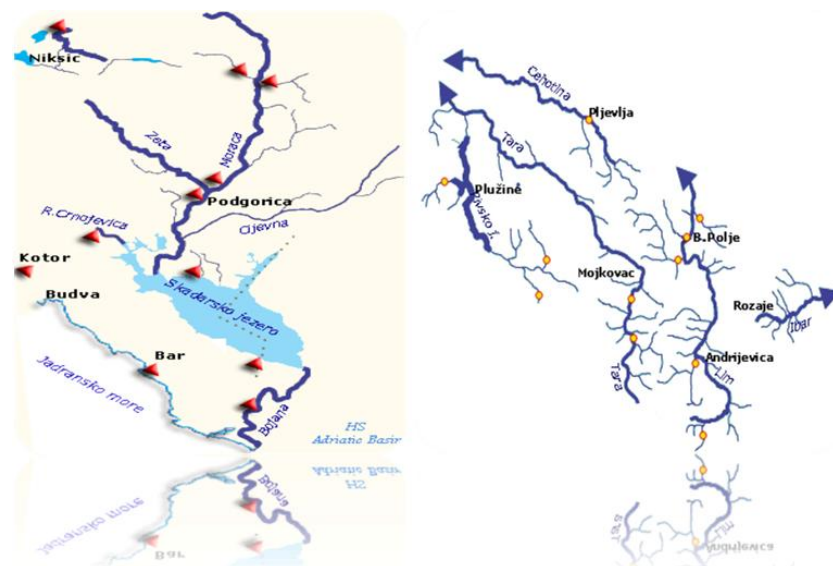
Network of meteorological and hydrological stations

- **Meteorological:**
- Density of the stations 6.88/1000 km² up to 2010;
- 9 main, 18 climatological, 67 rainfall (in 2010);
- Rapid decrease of precipitation station from 2011 – around 20 currently in function.

- **Hydrological:**
- 51 stations for water level;
- Part of them automatic on the main rivers of Adriatic and Black sea catchment.



Network of meteorological stations



Network of automated hydrological stations



Most vulnerable sectors and groups

- Sectors:
 - Agriculture, food and milk production
 - Water supply
 - Electricity production
 - Environment (forest and olives)
- Groups:
 - Small farmers (wheat, ray, barley, oats and maize producers), producers of olives, figs, citrus, raspberries and grapes, potatoes, cabbage and pepper
 - Small ranchers and milk producers
- Regarding the public health affected by forest fires smoke:
 - Those with respiratory problems, heart disease and children



EXAMPLE OF DROUGHT IMPACT ARCHIVE

Year	Category	Drought impact
2000	Economic	Drought reduced yields of spring culture for 30%
2003	Economic	Reduced purchase of milk
1.6-10.9.2003	Economic	Long Forest fires season in coastal, karstic and Zeta-Bjelopavlici region (Ucinj, Bar, Budva, Tivat, Kotor, Cetinje, H.Novi, NIKŠIĆ, Danilovgrad)
1.07-1.9.2003	Social	Water deficit; Restrictions and exclusions of water were applied mainly in the coastal region and in some area of central, northernmost and eastern region (i.e. Bar, Budva, Kotor, H.Novi, Cetinje, NIKŠIĆ, Plav, Pjeverlja respectively)
1.7-5.9.2003	Economic	Forest fires
25.07-1.10.2003	Economic	Sand mining from the river Moraca and Cijevna was stopped
	Environmental	Survival of animal species in river Moraca and Cijevna was affected
1.8-1.9.2003	Economic	Forest fires in National Park "Durmitor" (northern mountainous region)
do.26.08.2003	Economic	Sawing were affected in Kolasin, Bijelo Polje, Plav, Berane, Pjeverlja, Cetinje
2004	-	Drought was not registered
20.6-21.6.2005	Economic	Forest fires affected grass and vegetation in vicinity of Podgorica town
29.6.2005	Economic	Forest fires in vicinity of Kotor (coastal region)
15.7.2005	Economic	Forest fires affected grass and vegetation in vicinity of Podgorica town
9.9.2005	Economic	Forest fires in vicinity of Herceg Novi (coastal region)
1.7-1.8.2006	Economic	Forest fires in coastal region, Zeta-Bjelopavlici region and karstic region
1.11-23.11.2006	Social	Water deficit in the middle of Autumn affected Niksic (karstic region) Restriction in water use.
28.11.2006	Ecological	Famous lake Biograsko Lake in Kolašin (northern mountainous region) was affected



Emergency relief and drought response

- Organized delivery of water in affected areas (cisterns with water)
- Support to farmers (fruit and vegetable export, milk producers, import fodder) by the Ministry of Agriculture and Rural Development

Mitigation Practices in agricultural sector	Mitigation Practices in hydrological sector	Drought management	Drought Master plan
Irrigation - fragmented	Drainage system, reservoirs, dans	no	no

Synoptic table on mitigation practices
In drought period

GAPS:

- Lack of drought management and Drought Master Plan
- No policy / strategy related to drought
- No drought authority
- Drought monitoring should be more integrated and coordinated between final beneficiaries and IHMS

NEED knowledge and skills:

1. Team work - learning to work and act together
2. managing the water needs
3. Skills in drought management – individual and institutional level



THANK YOU

