Drought Management Centre for Southeastern Europe Vulnerabilities, risks and policy recommendations

Gregor Gregorič
Environmental Agency of the Republic of Slovenia
Meteorological Office
gregor.gregoric@gov.si

Jointly for our common future

SOUTH EAST EUROPE Transnational Cooperation Programme

DMCSEE Drought Management Centre for Southeastern Europe

Programme co-funded by the EUROPEAN UNION

DMCSEE - From initiative to operability

- 1998 need for Balkan subregional center
- 2004 Center initiative – "top-down" approach

  (International Commission on Irrigation and Drainage (ICID) adopted a declaration which expressed the need to establish this centre to alleviate problems caused by drought in the area "Balkan Drought Workshop" in Poiana/Brasov (RO), co-sponsored by the UNCCD)
- 2006 **triangle approach**: UNCCD focal points, permanent representatives with the WMO + observers from UNCCD and WMO)

  (Workshop for national experts and representatives of National Meteorological and Hydrological Services where they agreed on DMCSEE within context of UNCCD)
- 2006 **decision on DMCSEE host institution** (procedure led by WMO).
- 2007 – 2009 **advocacy** , management, steering committee, active institutions in consortium.
- since 2008 **first drought monitoring products, fund raising,** cooperation with JRC (Eurogeoss project and EDO portal)
- April 2009 – May 2012 **Transnational cooperation programme project**

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DMCSEE – TCP-SEE project

The DMCSEE TCP project is envisaged as **"bridge project"** phase aiming at development of functions of the centre.

Transnational Cooperation Programme for SE Europe
www.southeast-europe.net

15 partners from 9 countries

Total project budget 2.2 M€

Not all countries participate!

(not all countries are eligible)

EARS Environmental agency of Slovenia *(SLOVENIA)*

IHPS Slovenian Institute of Hop Research and Brewing *(SLOVENIA)*

VITUKI Environmental Protection and Water Management Research Institute *(HUNGARY)*

OMSZ Hungarian Meteorological Service *(HUNGARY)*

ATIKOVIZIG Directorate for environmental protection and water management of Lower Tisza District *(HUNGARY)*

ISSNP Pushkarov Institute of Soil Science *(BULGARIA)*

NIMH National Institute of Meteorology and Hydrology *(BULGARIA)*

Georama - Regional Development Organization *(GREECE)*

AUA Agricultural University of Athens *(GREECE)*

DHMZ Meteorological and Hydrological Service *(CROATIA)*

UNSFA University of Novi Sad, Faculty of Agriculture, Department of Water Management *(SERBIA)*

RHMSS Republic Hydro-meteorological Service of Serbia *(SERBIA)*

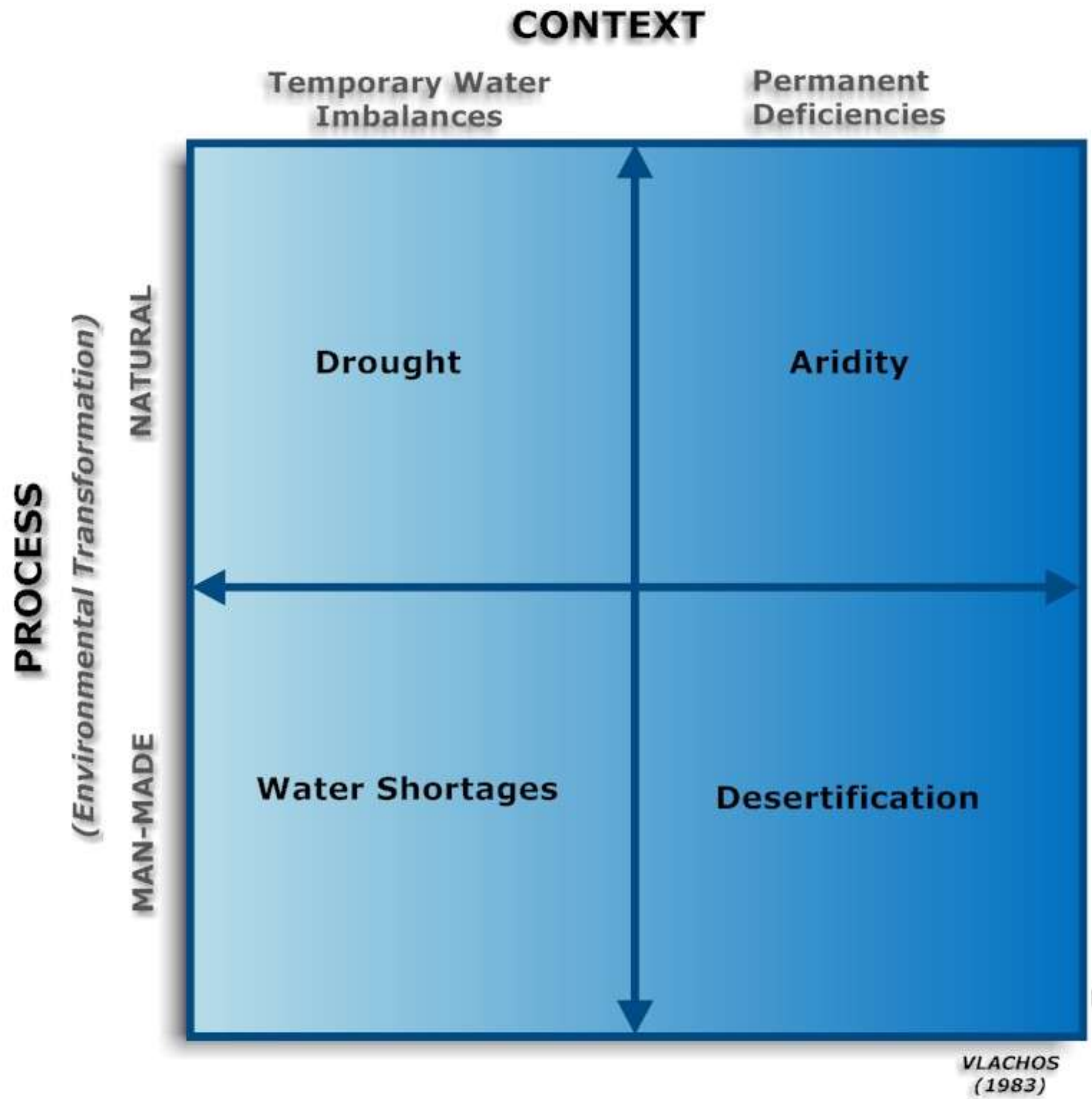
HI-M Hydrometeorological Institute of Montenegro *(MONTENEGRO)*

HMS Ministry for agriculture, forestry and water economy - Hydro-meterological Service *(FYROM)*

INEUM Institute for Energy, Water and Environment *(ALBANIA)*

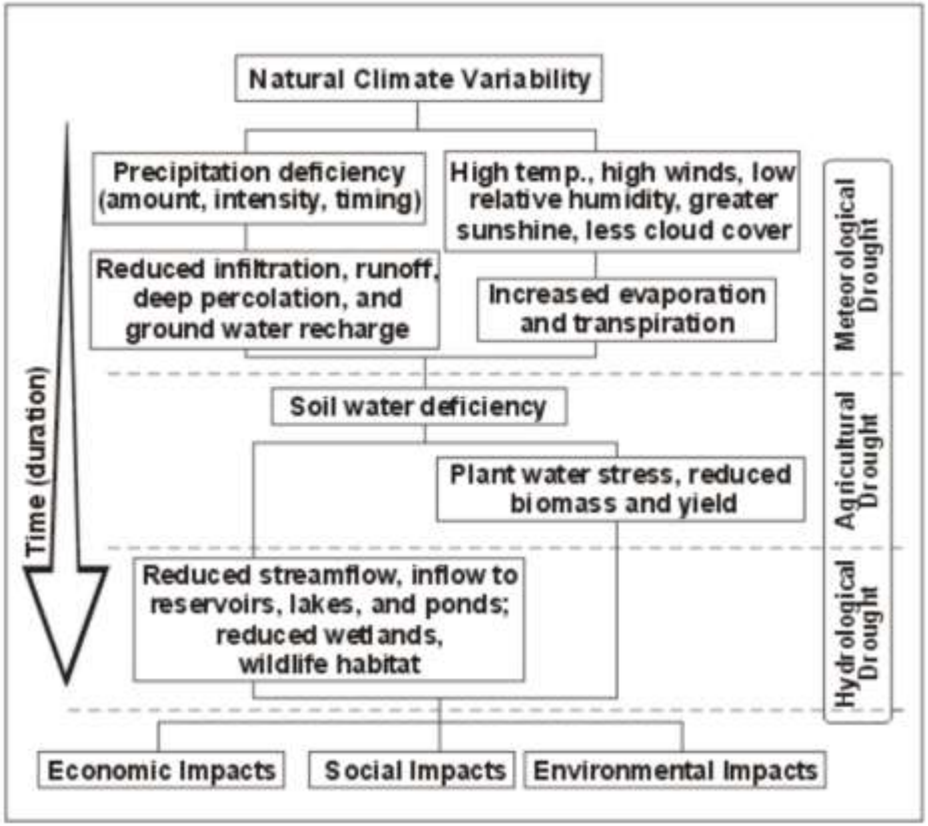
consortium

Jointly for our common future


CONTEXT
Temporary Water Imbalances
Permanent Deficiencies
PROCESS
(Environmental Transformation)
NATURAL
MAN-MADE
Drought
Aridity
Water Shortages
Desertification
VLACHOS (1983)

Monitoring of drought

- No single drought definition
- Artifitial division needed for operational reasons
- Drought indices should vary, depending on current situation

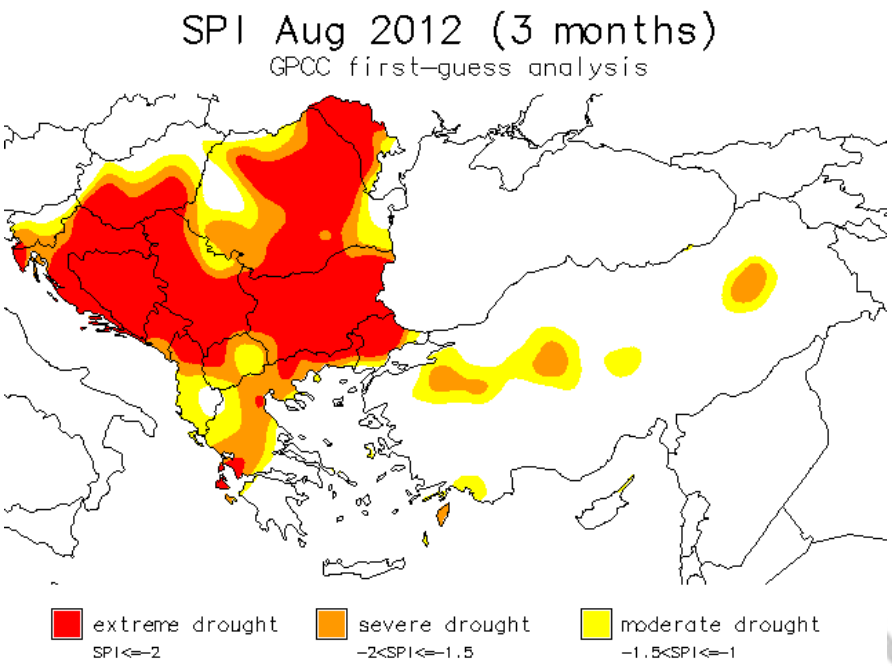


Monitoring of meteorological drought

Implementation of Standardized Precipitation Index (SPI)

Using GPCC data, some preliminary maps of the SPI, Percentiles and Precipitation for the region are prepared.
For period 1951-2000 maps are available.

Standard tool for monitoring and early warning of meteorological drought



Standardized precipitation index (SPI), computed from GPCC data

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Monitoring of meteorological drought

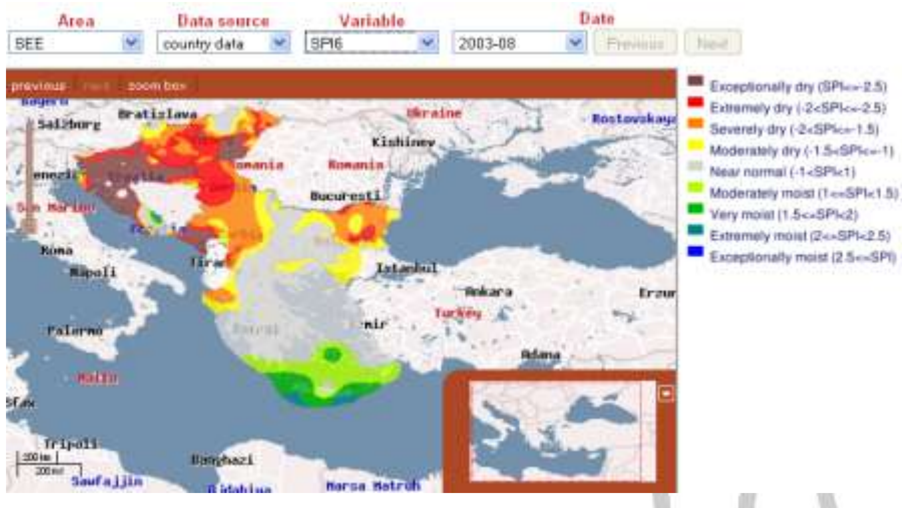
Implementation of [Standardized Precipitation Index (SPI)]

GIS application and Web Mapping Service

Available on www.dmcsee.org/GISapp

Enables DMCSEE partners to upload their products, composits are calculated automatically

Currently available climatological maps (precip. and temp.) and SPI index



Agricultural drought – monitoring and risk assessment

Most important parameter for monitoring agricultural drought is soil moisture.

Natural tools for monitoring soil moisture:
- **Local measurements**
- **Irrigation sheduling models**

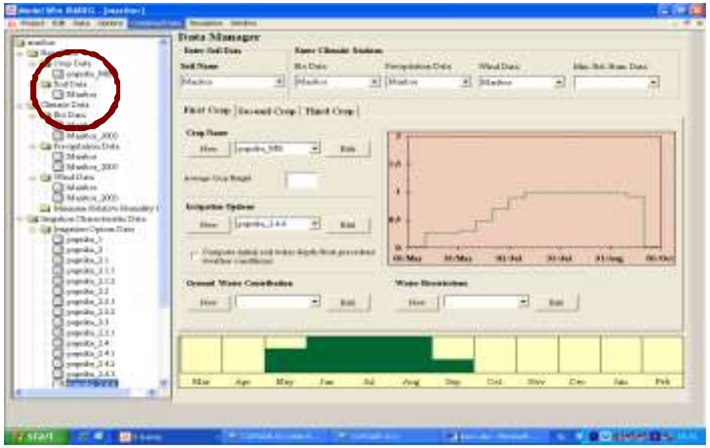
WinISAREG:
water balance model for simulating crop irrigation schedules.
Developed in Technical University of Lisbon (prof. L.-S. Pereira).

Agricultural drought – monitoring and risk assessment

Wisareg model (Pereira et al, 2003)

Irrigation scheduling tool

- large selection of irrigation methods;
- soils divided into several layers;
- results: variety of data



Data requirements

CROP DATA

dates of phenological stages

SOIL DATA

data for different soil layers

CLIMATOLOGICAL DATA

humidity, wind, sunshine...

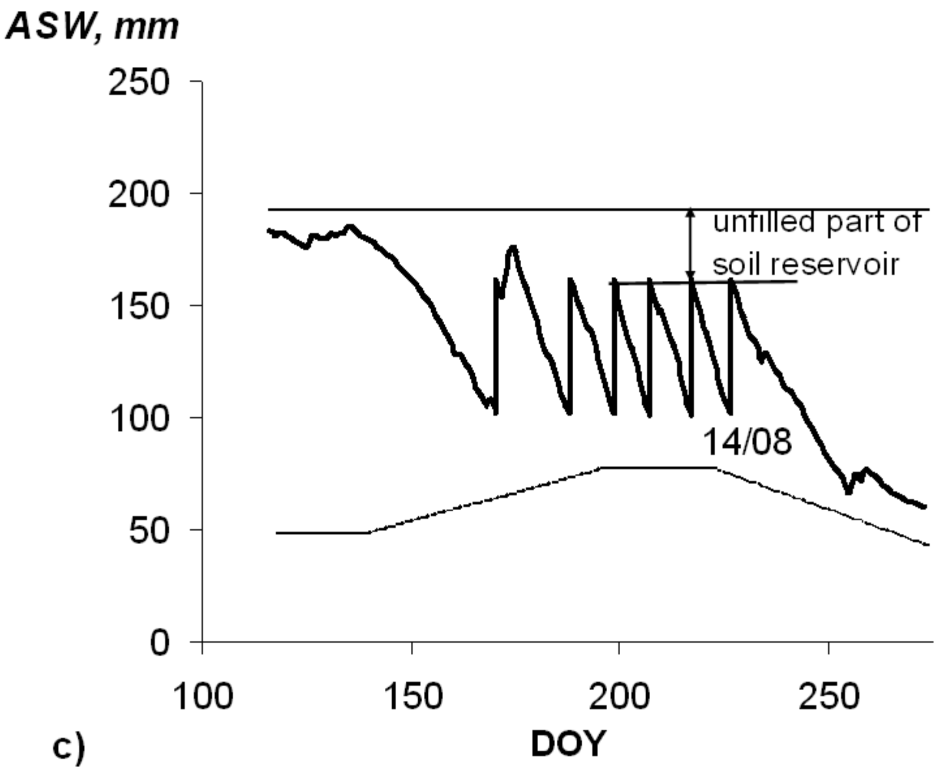
Agricultural drought – monitoring and risk assessment

<u>WinIsareg outputs:</u>

Net irrigation requirement (NIR):

Amount of water needed that plants don't experience water strees (prescribed moisture level).

- ***Daily irrigation values***
- ***Annual sums***



Agricultural drought – monitoring and risk assessment

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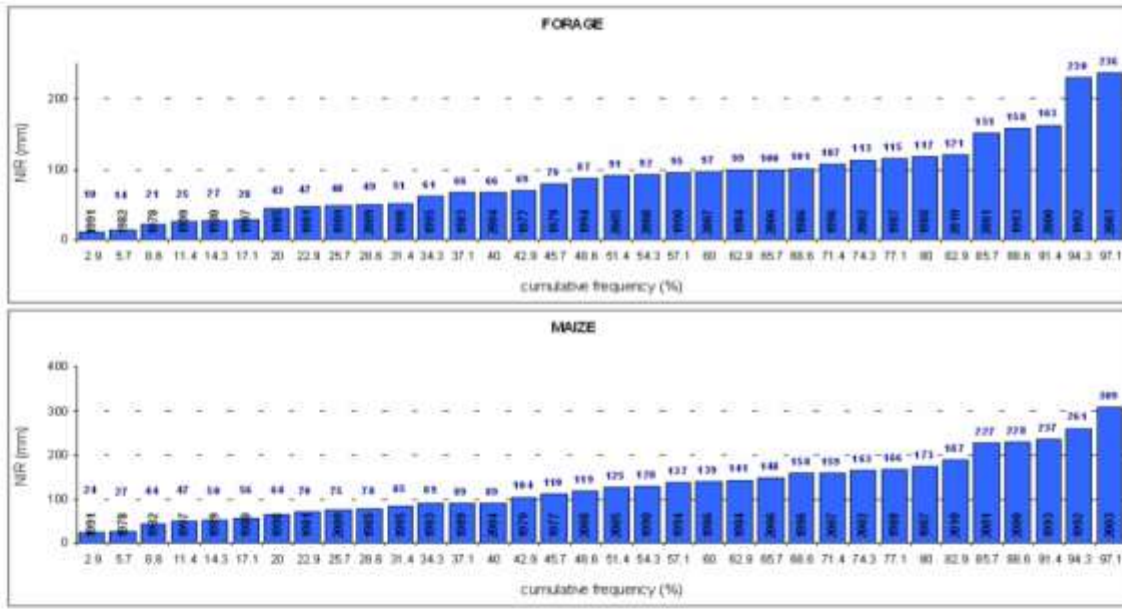

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Agricultural drought – monitoring and risk assessment

WinIsareg outputs:

Shortage of water causes yield decrease.

Plants in stress transpirate less than optimally irrigated plants:

$$RYD \propto - Ky \times AET/PET$$

RYD – relative yield decrease

AET – actual evapotranspiration

PET – potential evapotranspiration

Ky – linear coeficcient in range 1.2 – 1.8

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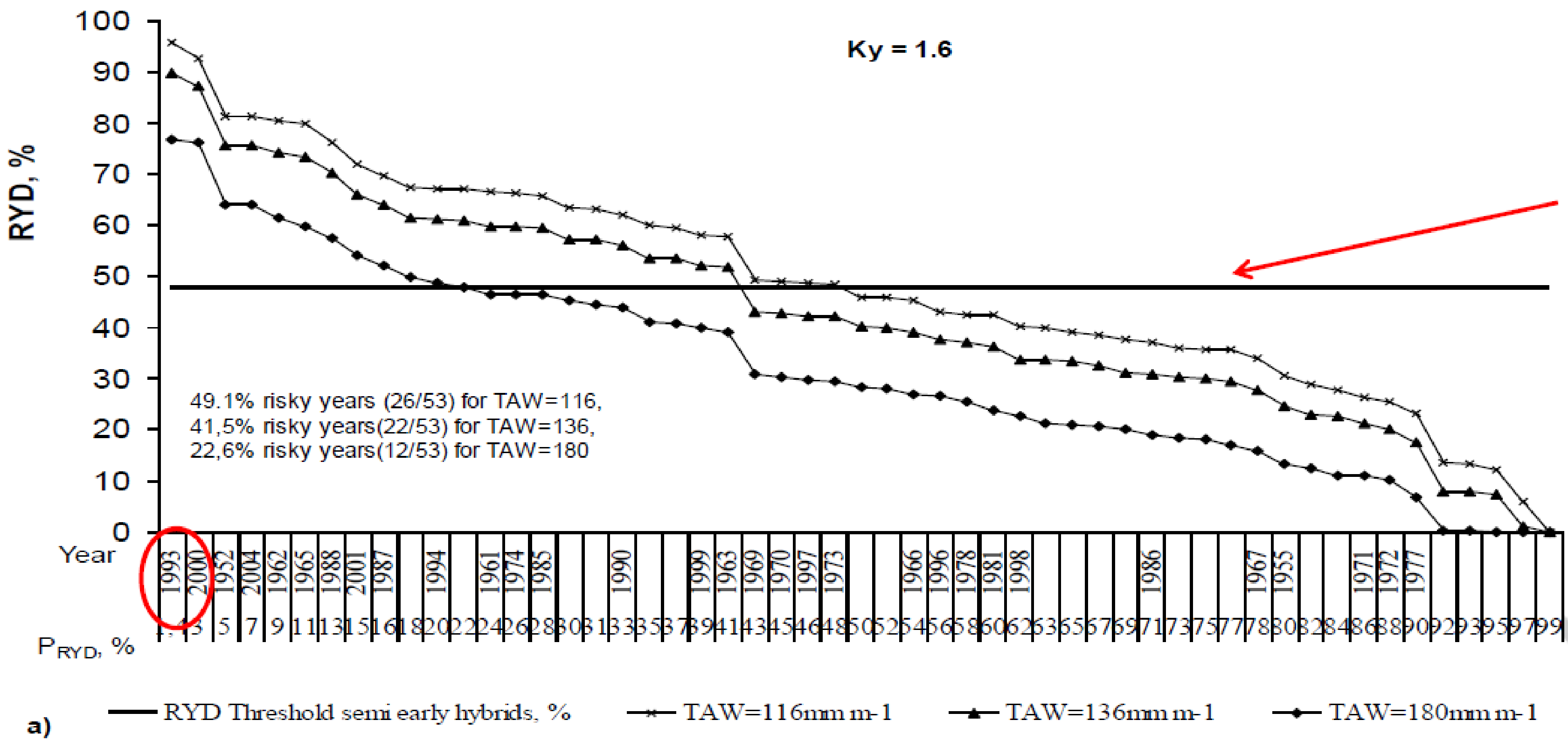


Fig.7. Probability exceedance curves of RYD under rainfed maize on the soil of small, medium and large water holding capacity TAW (116, 136, 180 mm m-1), Ky=1.6, at: (a) Sofia for a semi earlymaize hybrid 1951-2004.

Sensitivity and vulnerability to drought

Natural vulnerability: the rate of the reply, if a natural anomaly occurs. This rate is defined by the natural and social environment. E.g. the loss on vulnerable fields will be larger, than on less vulnerable lands.

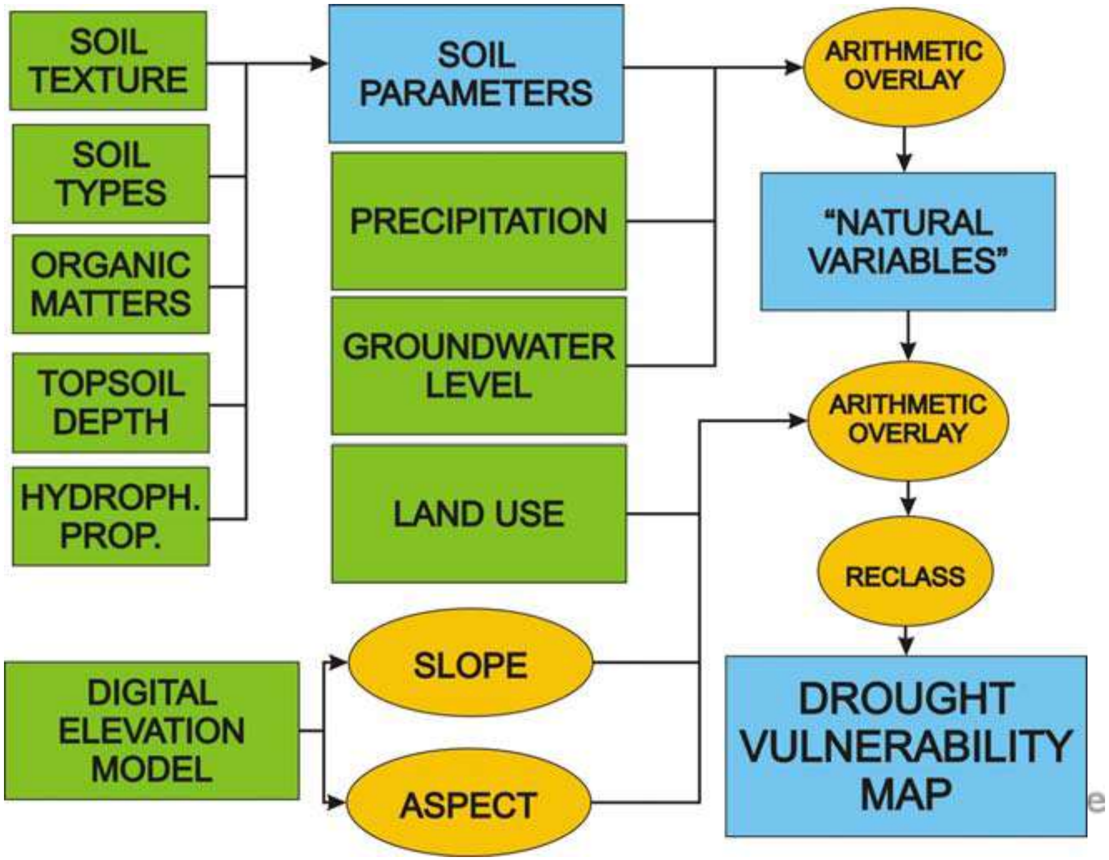
The drought vulnerability maps can be prepared for the whole region using GIS techniques. All relevant impact factors (with available data layers) should be considered and appropriately weighted. Vulnerability is categorized and visualized in relative scale.

Scientific background:

Wilhelmi, O. V. – Wilhite, D. A., 2002: Assessing Vulnerability to Agricultural Drought: A Nebraska Case Study, 2000 — Natural Hazards vol. 25, pp. 37 – 58.

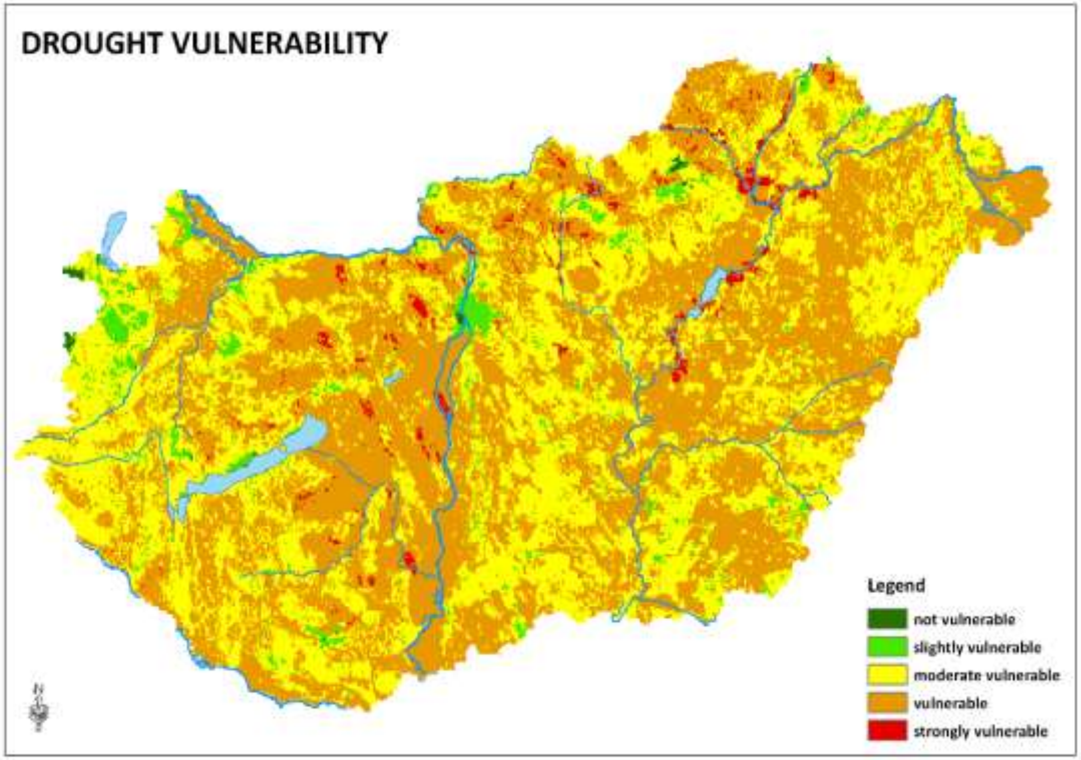
Bella Sz., 2003: Magyarország egyes tájainak aszályérzékenysége – szakdolgozat, ELTE, Budapest, 63 p. (Drought vulnerability of Hungary's each regions – MSc thesis, Eötvös Univerity, Budapest - Hungary)

Sensitivity and vulnerability to drought



Sensitivity and vulnerability to drought

Parameter	Weight
Slope	0.1623
Available Groundwater	0.0518
Sunshine duration	0.3071
Precipitation	0.1180
Land use	0.0858
Soil type	0.2232
Irrigation	0.0518



Policy recommendations

Legal framework – drought management plans (WFD)

- appropriate drought authority (committee?)

- implementation of drought monitoring and early warning - specification of drought declaration

- effective water use

Policy recommendations

Drought preparedness and mitigaton measures

- **Agriculture: Insurance**
- **climatological risk - “weather index insurance”**
- **assistance in risk assessment – NMHSs data policy**
- **insurance subsidy and participation in mutual risk funds**
- **reinsurance options**
- **improvement of resilience**