Drought-smart approach in Slovenian agriculture

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Training course on drought risk assessment
Budapest, Hungary, 6-8 November 2018
Drought reality in Europe and Slovenia

European droughts 2002–2017

Agricultural droughts in Slovenia 1963–2017 expressed in summer water balance [mm]


Source: EEA, 2012; EEA, 2017
Changes of drought patterns (earlier droughts in spring);
- Water deficits will increase, summer agricultural droughts (like in the years 2003 and 2013, 2017) will affect all country;
- Increased evapotranspiration;
- Increase of air temperature is causing increase of soil temperature;
- Prolonged vegetation period;
- Spring phenological development is earlier, risk of spring frost exists.

Warmer in vegetation season - yearly T change according to 3 RCP scenarios

Decline of yearly temperature trends in Slovenia from 1981-2010

http://meteo.arso.gov.si/met/sl/climate/change/

Earlier– up to 20 days earlier spring phenology, warmer spring, higher evapotranspiration = early spring drought
Decision support system for farmers
Agrometeorological forecast – info related to drought

Link: http://meteo.arso.gov.si/met/sl/agromet/forecast/

CONTENT:
- Daily agro/meteorological information,
- 1- to 10-day forecasts of different agrometeorological parameters:
  - Air temperature
  - Soil temperature
  - THI index
  - Wind
  - Surface water balance (daily; seasonal accumulations)
  - Evapotranspiration

15 regions in Slovenia
Decision support system for farmers
Agrometeorological forecast – info related to drought

Surface water balance accumulated from start of the vegetation season

**Vodna bilanca v vegetacijskem obdobju (od 1.4. do 30.9.)**

<table>
<thead>
<tr>
<th>Akumulacija</th>
<th>01.04. - 30.09.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Padavine</td>
<td>739</td>
</tr>
<tr>
<td>$\text{ET}_0$</td>
<td>644</td>
</tr>
<tr>
<td>Vodna bilanca</td>
<td>95</td>
</tr>
</tbody>
</table>

**Meritve: Ljubljana**

<table>
<thead>
<tr>
<th>Voda padavina v obdobju vegetacije</th>
<th>Voda evapotranspiracije v obdobju vegetacije</th>
<th>Vodna bilanca v obdobju vegetacije</th>
</tr>
</thead>
</table>
Irrigation forecast for farmers based on IRRFIB model

Real and forecasted crop water balance (potato var. Jelly) – Krško field (SE Slovenia)

RR = 172 mm; ETP = 527 mm. Crop water use 360 l of water. Sprinkler irrigation – 10 times/ total 200.0 mm.

OPTIMAL CROP WATER SUPPLY

FORECAST: 17.7.2017

<table>
<thead>
<tr>
<th>date</th>
<th>RR [mm]</th>
<th>ETo [mm]</th>
<th>ETr [mm]</th>
<th>irrigation [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017-07-17</td>
<td>5.3</td>
<td>4.2</td>
<td>0.0</td>
<td>0.0</td>
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<tr>
<td>2017-07-18</td>
<td>5.7</td>
<td>4.6</td>
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<td>0.0</td>
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<tr>
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<td>0.1</td>
<td>4.8</td>
<td>3.8</td>
<td>0.0</td>
</tr>
<tr>
<td>2017-07-20</td>
<td>0.2</td>
<td>6.8</td>
<td>5.4</td>
<td>20.0</td>
</tr>
<tr>
<td>2017-07-21</td>
<td>0.4</td>
<td>4.3</td>
<td>3.5</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Agricultural drought risk assessment

Matrix representation of risk - method defined by civil protection
## Agricultural drought risk assessment

Matrix representation of risk - method defined by civil protection

<table>
<thead>
<tr>
<th>CLASS</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of impact</td>
<td>&lt;0.3% GDP (&lt;100M€)</td>
<td>&lt;0.6% GDP (&lt;220M€)</td>
<td>&lt;1.2% GDP (&lt;440M€)</td>
<td>&lt;2.4% GDP (&lt;880M€)</td>
<td>&gt;2.4% GDP (&gt;880M€)</td>
</tr>
<tr>
<td>Probability of occurrence - return level</td>
<td>&gt;250 years</td>
<td>100 - 250 years</td>
<td>25 - 100 years</td>
<td>5 - 25 years</td>
<td>&lt;5 years</td>
</tr>
</tbody>
</table>
Agricultural drought risk assessment

Impact data - Statistical office (for years drought was declared as natural disaster) - in M€

![Bar chart showing impact data in mio € over years 2000 to 2013. The data points are as follows: 78.7 mio € in 2000, 41.6 mio € in 2001, 128.4 mio € in 2003, 49.7 mio € in 2006, 56.5 mio € in 2012, 106.2 mio € in 2013.]
Agricultural drought risk assessment

Probability data - based on surface water balance (RR-ETP).
Example: station M. Sobota in E Slovenia
left: values of max. deficit per year. right: return levels
Agricultural drought risk assessment

Matrix representation of risk - final result
Early drought warning in Slovenia/SEE region – User oriented service (CAgM goal 1)
- active countries participation in existing platforms/technical capacities (global, regional – EDO, DMCSEE), exchange information inside/outside the countries, harmonized data collection, methodologies (impact & risk level);

Partnership & common projects – Fit for purpose service (goal 1)
- WMO CAgM partners, GWP/IDMPDMCSEE and consortium partners;
- searching for funds for specific common objectives of met. services together with stakeholders – GWP/IDMP, DRR, Tromp foundation etc.;
- project calls (enlarge DriDanube, mirror projects, new initiatives?).

Change of management paradigm / policy – Work smarter (goal 5)
- missing policy; DriDanube project has intention to increase technical capacities and elaborate more targeted drought management policies taking into account water scarcity and droughts (DriDanube Strategy);
- Drought Directive/Initiative?;

Public awareness/capacity building / networks – Close the gap on service (goal 4)
- trainings/roving seminars/workshops/secondment of staff at DMCSEE;
- drought news/impacts information sharing, media;
- guidelines, manuals, publications, reports, help desk (IDMP), leaflets.