European and Global Drought Observatories

- timely information on slow onset disasters -

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1. Introduction
   • Drought Impacts in Europe

2. European Drought Observatory
   • Key Elements
   • African and South American counterparts

3. Global Drought Observatory
   • Likelihood of Impact

4. Outlook
• About 15% of the EU territory and 17% of the EU population affected annually.
• Economic impacts in the EU are estimated to at least 100 B€/30 years (3 B€/yr, DG Env).
• Environmental impacts are difficult to quantify and not included!

Source: Drought R&SPI Project (FP7)
The European Drought Observatory (EDO)

- Web-based platform
- Different tools
- Multiple scales (EU, member states, regions)
- Multiple indicators (commonly-agreed products)
- High-level indicator for decision makers
- Long term Archive

Interoperable Data Infrastructure

http://edo.jrc.ec.europa.eu
EDO
Multi-Indicator Approach

Continental Scale

- Standardized Precipitation Index
- Standardized Snowpack Indicator
- Temperature
- Soil Moisture Anomaly
- Vegetation Response
- Low Flow

Source: National Drought Mitigation Center, University of Nebraska-Lincoln, USA
Combined Drought Indicator (CDI) for Agricultural Drought

Precipitation Shortage

Soil Moisture deficit

Reduced Vegetation Production

WATCH

WARNING

ALERT

Normal precipitation conditions

Normal Vegetation Production conditions

PARTIAL RECOVERY OF VEGETATION

FULL RECOVERY OF VEGETATION
### Combined Drought Indicator (CDI)

#### Impact

<table>
<thead>
<tr>
<th>Impact</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Watch:</strong> rainfall deficit</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Warning:</strong> soil moisture deficit</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>6</td>
</tr>
<tr>
<td><strong>Alert:</strong> vegetation stress</td>
<td>7</td>
</tr>
<tr>
<td>following rainfall/soil moisture deficit</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>9</td>
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<tr>
<td></td>
<td>10</td>
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</tbody>
</table>

#### Partial Recovery of Vegetation:

<table>
<thead>
<tr>
<th>Impact</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>normal condition of rainfall</td>
<td>11</td>
</tr>
<tr>
<td>still vegetation stress</td>
<td>12</td>
</tr>
</tbody>
</table>

#### Full Recovery of Vegetation:

<table>
<thead>
<tr>
<th>Impact</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>normal condition of rainfall</td>
<td>13</td>
</tr>
<tr>
<td>normal condition of vegetation</td>
<td>14</td>
</tr>
<tr>
<td>productivity</td>
<td></td>
</tr>
</tbody>
</table>
Drought Observatories for Africa and South & Central America

- Drought Monitoring
- Risk and Vulnerability Ass.
- Forecasts

http://edo.jrc.ec.europa.eu/ado/

http://edo.jrc.ec.europa.eu/scado/
The Global Drought Observatory (GDO)
Select a date

List of affected countries (visible on the map)
What is behind the Likelihood of Impact?

(A) **Drought Hazard**
- Rainfall Anomalies
- Vegetation Vigor
- Soil Moisture Anomalies

(B) **Exposure**
- Population density & Distribution
- Reservoirs
- Agricultural area

(C) **Societal Vulnerability**
- Social Indicators (Age, Poverty, Infant Mortality, etc.)
- Economic Indicators (GDP, Energy Consumption, etc.)
- Infrastructural Indicators (Irrigation, Accessibility, etc.)

*Carrão et al.* [Global Env. Change. 39, 2016]
Report Generation

+ selectable pie charts on land cover types and other surface characteristics in the affected areas
Detailed Indicator Information

Layer tree menu open

Impact menu hidden
Outlook

European Drought Observatory

- EDO is implemented as a multi-scale distributed system.
- Core indicators are complemented by regionally relevant indicators.
- More combined indicators for different sectors will be developed.

Global Drought Observatory

- Soil moisture and temperature indicators to be added.
- Vulnerability and Likelihood of Impact assessments for different sectors (e.g. food security, public water supply, energy production, inland water transportation) and to be made at pixel level
http://edo.jrc.ec.europa.eu

http://edo.jrc.ec.europa.eu/gdo

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