



The European & Global Drought Observatories

- a short introduction -

Jürgen Vogt
and the Drought Team



Outline

1. **Background**
2. **Policy Framework**
3. **The European and Global Drought Observatories:
Towards Dynamic Drought Risk Monitoring**



Why? Droughts are ...

- increasing in frequency and severity in many parts of the world, including parts of Europe.
- a transboundary problem.
- a global hazard with significant economic, societal and environmental impacts (~3 billion Euros/year in Europe).



What?

- European and global early warning, monitoring and forecasting of droughts & temperature extremes and their impacts.
Using satellite data, hydro-meteorological modelling, in-situ observations and the assessment of exposure and vulnerability.
- Research in indicators, risk assessment methodologies, past trends, future projections, impacts in different sectors, online tools, ...



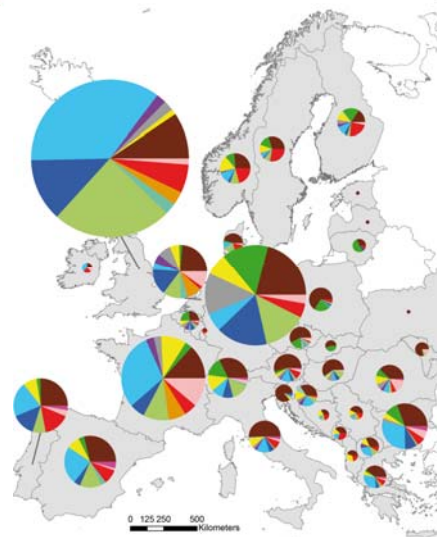
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European Drought Impact report Inventory (EDII)



Reported Drought Impacts in Europe

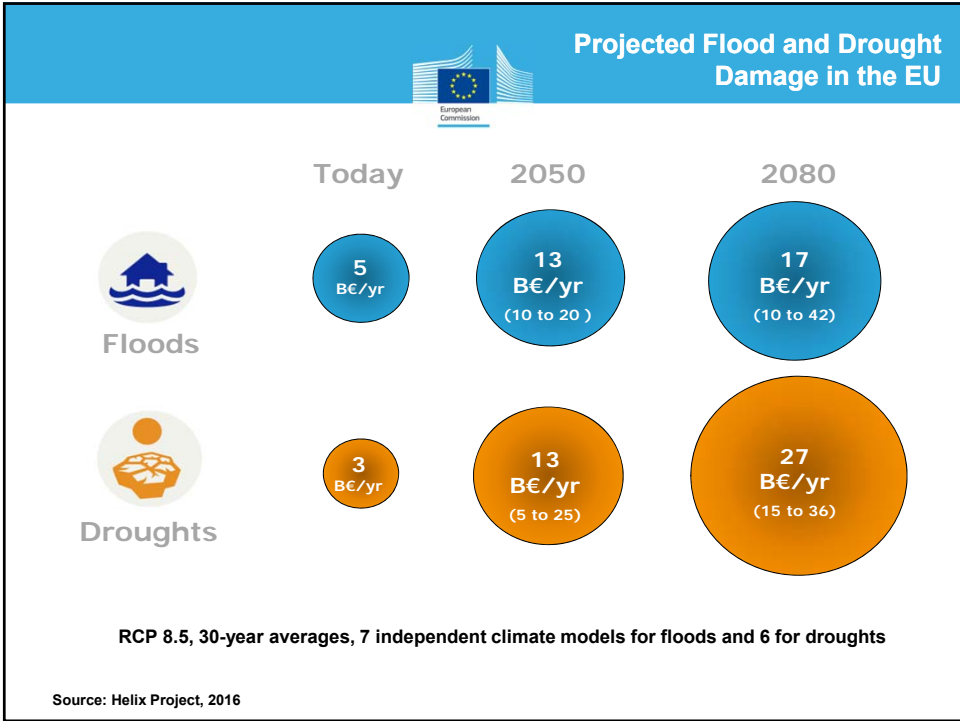
	Agriculture & Livestock farming
	Forestry
	Aquacultures & Fisheries
	Energy & Industry
	Waterborne Transportation
	Tourism & Recreation
	Public Water Supply
	Water quality
	Freshwater Ecosystems
	Terrestrial Ecosystems
	Soil System
	Wildfires
	Air Quality
	Human Health & Public Safety
	Conflicts



Source: Drought R&SPI Project (FP7)

Blauhut et al., 2016; Stahl et al., 2015

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Policy Framework

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European Commission: Water Framework Directive (2000)

*... Demands for **River Basin Management Plans**, supplemented by **Drought Management Plans** in areas of drought hazard/risk. → Water Scarcity and Drought Expert Group*

European Commission: Communication on Water Scarcity and Drought (2007)

*Asks for ... a **European Drought Observatory (EDO)** that will integrate data and research results, drought monitoring, detection and forecasting on different spatial scales, from local and regional activities to a continental overview at EU level, and will make it possible to evaluate future events.*

European Parliament: Report on the EC Communication “Towards a Stronger European Disaster Response” (2011)

*... reiterates, ..., the importance of establishing the **European Drought Observatory**, which would be responsible for studying, mitigating and monitoring the effects of drought.*

Decision 1313/2013/EU on a Union Civil Protection Mechanism (2013)

*Asks for ... the development and better integration of **transnational detection and early warning and alert systems** of European interest in order to enable a rapid response*



Post Hyogo Framework for Action: Managing risks to achieve resilience (2014)

*The council stresses the importance of disaster risk management across policies... . Invites the Commission to: (a) identify and share good practise examples of **risk management** ...; (b) promote synergies and exchange of experiences with int. organisations ...; (c) promote ... cost effective transnational risk assessment initiatives ...; (e) encourage development of systems, models ... for collecting and exchanging data on ways to **assess the economic impact of disasters** ...*

Sendai Framework for Disaster Risk Reduction 2015-2030

*Strengthen technical and scientific capacity to ... assess **disaster risks, vulnerabilities and exposure** to all hazards. ... Enhance the development and dissemination of science-based methodologies and tools to **record and share disaster losses** ..., as well as to strengthen disaster risk modelling, assessment, mapping, **monitoring and multi-hazard early warning systems**.*

UN Sustainable Development Goals

*Strengthen **resilience and adaptive capacity** to climate-related hazards & natural disasters ...*



- **Develop transnational monitoring and early warning**
 - including a combination of different scales
- **Develop forecasting** for different time horizons
- **Move from a reactive to a proactive approach**
 - Risk management (analyze & monitor hazard, exposure, vulnerability, impacts)
 - Move from forecasting hazards to forecasting impacts
- **Move from single to multi hazard EWS**
 - Integrate different hazards into a multi-hazard EWS
 - Harmonize risk information between different hazards (how?)
 - Analyze interactions between different hazards (e.g. droughts and heat waves)
- **Adapt to the future**
 - Analyze expected changes in a changing climate and how to adapt to them



WFD CIS: Water Scarcity & Drought Expert Group (2008-2012)

- Member State and River Basin Experts, EC, EEA, Eurostat, Industry Representatives, ...
- Discussed on User needs, Indicators, and best practices & implementation issues
- Developed Fact Sheets for Indicators and tested them
- Forwarded proposal to EU Water Directors for endorsement



COPERNICUS User Forum & Committee (2017 -)

- Member States, Commission DGs, ECMWF, EUMETSAT, ESA, SATCEN,
- Discussion and approval of EMS progress and work programme

EDO User & Expert Meeting (2017 -)

- Discuss recent developments, needs, expectations
- Develop priorities and strategies to move ahead
- Network





The European Drought Observatory

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The European Drought Observatory (EDO)

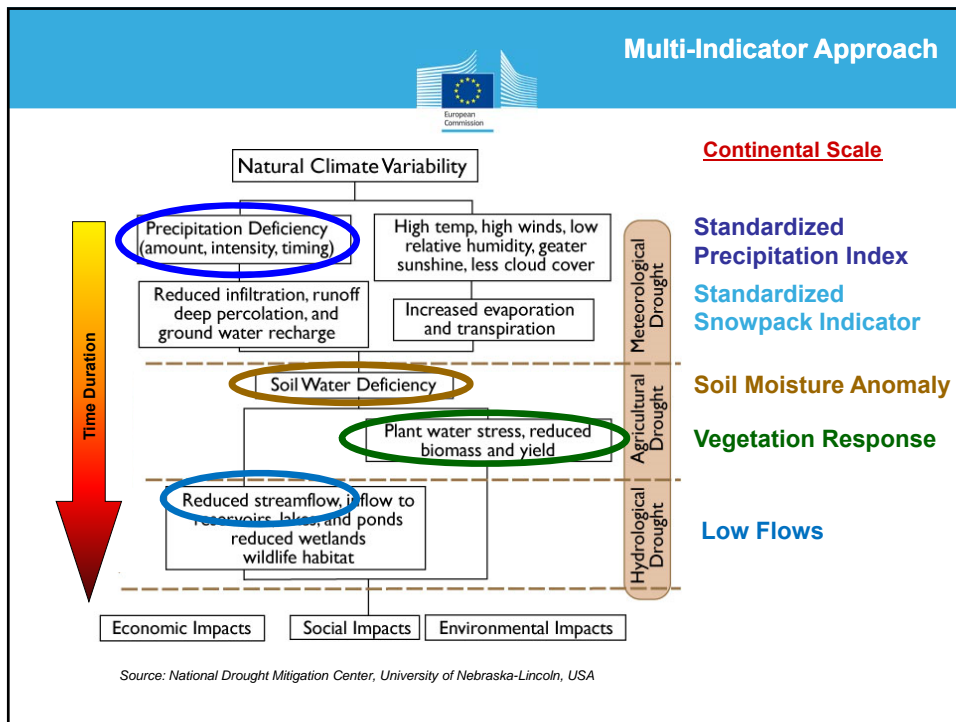
The screenshot shows the EDO website interface. At the top, there is a navigation bar with the European Commission logo and the Copernicus logo. Below the navigation bar, there is a main content area with a map of Europe showing drought indicators. The map is color-coded, with yellow and orange areas indicating drought. A legend on the left side of the map lists various indicators: High soil moisture deficit, Warning soil moisture deficit, Alert vegetation stress following rainfall / soil moisture deficit, Partial recovery of vegetation, Full recovery of vegetation to normal conditions, and Stress-free map. The website also features a 'CURRENT DROUGHTS' section with a 'current DROUGHT information for YOU' box. There are also links for 'LIVE UPDATES', 'RELATED PROJECTS', and 'SUPPORT REPORTS'. At the bottom, there is a 'DROUGHT DELIVERY WIZARD' section.

EDO:

- Internet-based tool
- provides different types of information and tools
- at multiple scales
- through multiple indicators, including high level indicators targeted to decision makers

→ Since January 2018 part of the Copernicus Emergency Management System (EMS)

<http://edo/jrc.ec.europa.eu>




EDO Indicators and Scales

The image shows a screenshot of the EDO (European Drought Observatory) web interface. The interface displays several maps of Europe with different data layers overlaid, representing various drought indicators and scales. The maps are arranged in a cascading manner, showing different views and data layers. The interface includes a sidebar with a list of indicators and scales, and a main map area with a legend and navigation controls. The URL <http://edo/jrc.ec.europa.eu> is displayed at the bottom right.

<http://edo/jrc.ec.europa.eu>

Indicator Factsheets


 European Commission

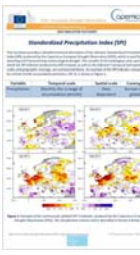
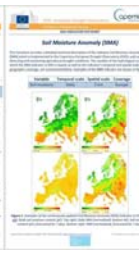



Copernicus EDO / GDO main drought indicators:

- ✓ Standardized Precipitation Index (SPI)
- ✓ Soil Moisture Anomaly (SMA)
- ✓ FAPAR Anomaly
- ✓ Low Flow Index (LFI)
- ✓ Heat and Cold Wave Index (HCWI)
- ✓ Combined Drought Indicator (CDI)
- ✓ Risk of Drought Impact for Agriculture (Rdri-Agri)


For each indicator, an explanatory “factsheet” is provided for users:

- Brief overview of the indicator
- What the indicator shows
- How the indicator is calculated
- How to use the indicator
- Strengths, weaknesses of the indicator
- References


Examples (first page) of on-line factsheets for EDO / GDO indicators, showing common layout:

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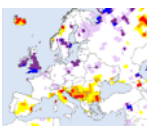

 Joint Research Centre

**Combined Drought Indicators:
Conceptual Framework**

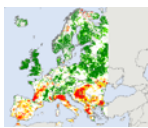

 European Commission

Combined Drought Indicator (CDI) for Agricultural/Ecosystem Drought

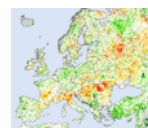
Precipitation Anomalies (SPI)

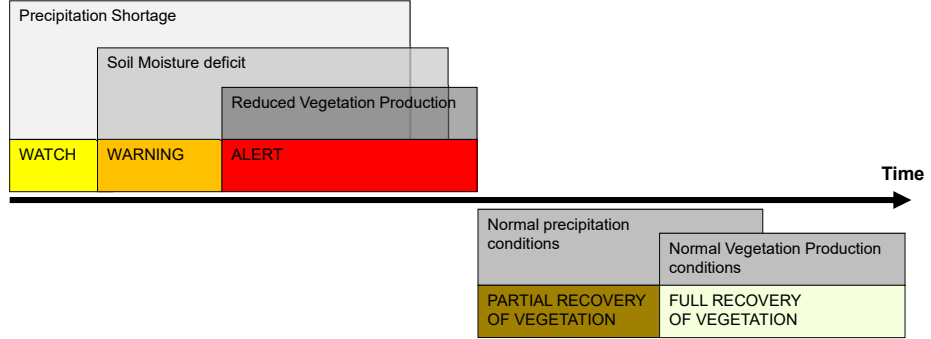


Soil Moisture Anomalies

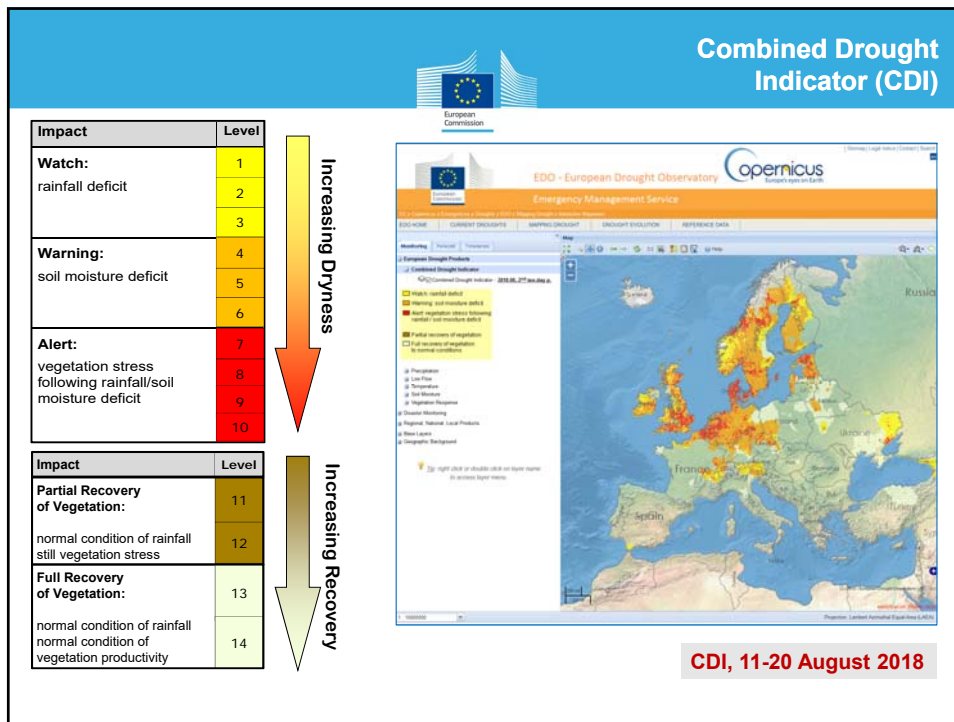


fAPAR Anomalies






The diagram illustrates the temporal progression of drought conditions. It starts with 'Precipitation Shortage' (grey bar), which leads to 'Soil Moisture deficit' (grey bar), and then 'Reduced Vegetation Production' (grey bar). These conditions correspond to 'WATCH' (yellow), 'WARNING' (orange), and 'ALERT' (red) stages. Below this, 'Normal precipitation conditions' (grey bar) leads to 'Normal Vegetation Production conditions' (grey bar), which correspond to 'PARTIAL RECOVERY OF VEGETATION' (olive green) and 'FULL RECOVERY OF VEGETATION' (light green) stages. A horizontal arrow labeled 'Time' points to the right, indicating the sequence of events.



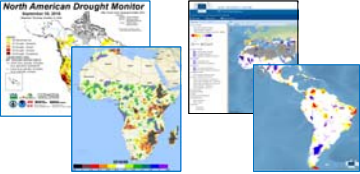

The Global Drought Observatory (GDO)
- Towards Dynamic Drought Risk Monitoring -

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Situation 2015



- **Different organizations/research groups provide individual indicators** (e.g., SPEI Monitor, GPCC DI)
- **Some continental systems exist:**
 - North American Drought Monitor
 - African Flood and Drought Monitor (Princeton)
 - African Drought Observatory (JRC)
 - South and Central American Drought Observatory (JRC)



<https://www.drought.gov/gdm>

GEO: Global Drought Information System (GDIS)

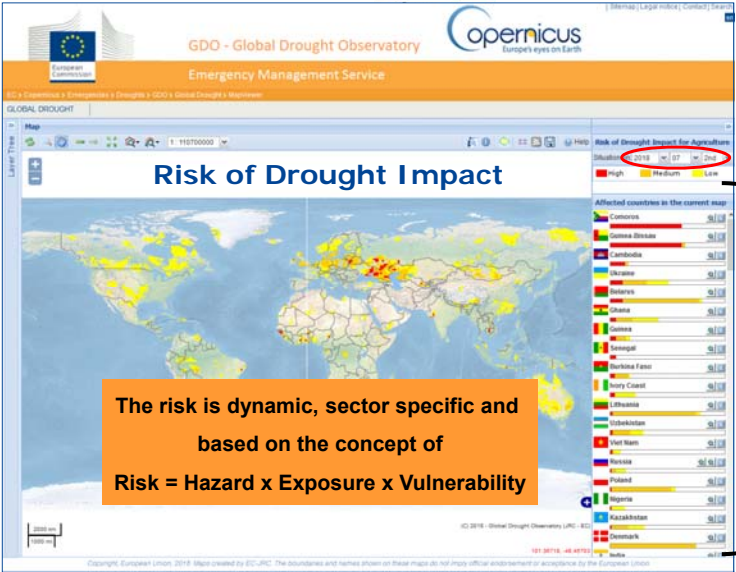
- Hosted by NOAA
- Collaboration of partners from institutions and universities to combine global information and continental drought observatories into a global overview
- Problems of harmonization, large areas missing, very little progress over the last years

→ **No system answered to specific requirements of DG ECHO (ERCC and humanitarian aid) in need of information on drought severity & impacts**

Global Drought Observatory (GDO)

GDO - Global Drought Observatory
Emergency Management Service



Risk of Drought Impact

The risk is dynamic, sector specific and based on the concept of **Risk = Hazard x Exposure x Vulnerability**

Select a date

Hierarchical list of affected countries (visible on the map)

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

Detailed Indicator Information

Layer tree menu open

Impact menu hidden

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Policy Support: Analytical Reports

Analytical Reports on severe droughts and their impacts

→ ECHO, AGRI, ENV, national & regional stakeholders, public



Situation 10/10/2018

Website Activity Monthly Statistics

2018	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Total Page Views	8713	10584	9941	8960	9787	9941	27120	20596	13762	4406	0	0	123810
Total Visits	7022	8804	8098	7109	7592	7756	21142	15650	10994	3110	0	0	97277

Development of Page Views (up to 27/09/2018):

EDO:

2010	66
2011	576
2012	7,762
2013	14,616
2014	24,437
2015	43,468
2016	58,503
2017	81,847
2018	96,730

GDO:

2015	2,018
2016	2,931
2017	4,381
2018	6,785

Downloading Reports:

2012	280
2013	402
2014	465
2015	1,081
2016	1,160
2017	1,625
2018	2,649



<http://edo.jrc.ec.europa.eu>

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

Jürgen Vogt

juergen.vogt@ec.europa.eu

European Commission

Joint Research Centre

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