



Global Early Warning Platforms for Natural Hazards

Southern Africa-Indian Ocean (SA-IO) Disaster Preparedness ECHO and Partners Workshop
Johannesburg, 28 - 30 June 2022

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Joint Research Centre, European Commission

29 June 2022

The Global Disaster Alert and Coordination System - GDACS





GDACS - Global Disaster Alert and Coordination System



Early Warning
(JRC-EC)

Coordination
(VOSOCC OCHA)

Satellite Mapping
(UNOSAT)

GDACS serves to...



Timely alert humanitarian organizations to disasters

50 086 Registered Users

30 415 website
13 406 facebook
6 265 twitter

8 037 662 Alert messages
per year

7 942 445 email
95 217 SMS



Raise awareness of the
need of international
support

Classified events per year:

18 Red

76 Orange

5051 Green



Give a science-based
assessment of the event

85 205 events

79 834 Earthquakes
2 956 Floods
970 Tropical Cyclones
800 Tsunamis
402 Forest Fires
130 Droughts
113 Volcanoes

EARTHQUAKES

TSUNAMIS

TROPICAL CYCLONES

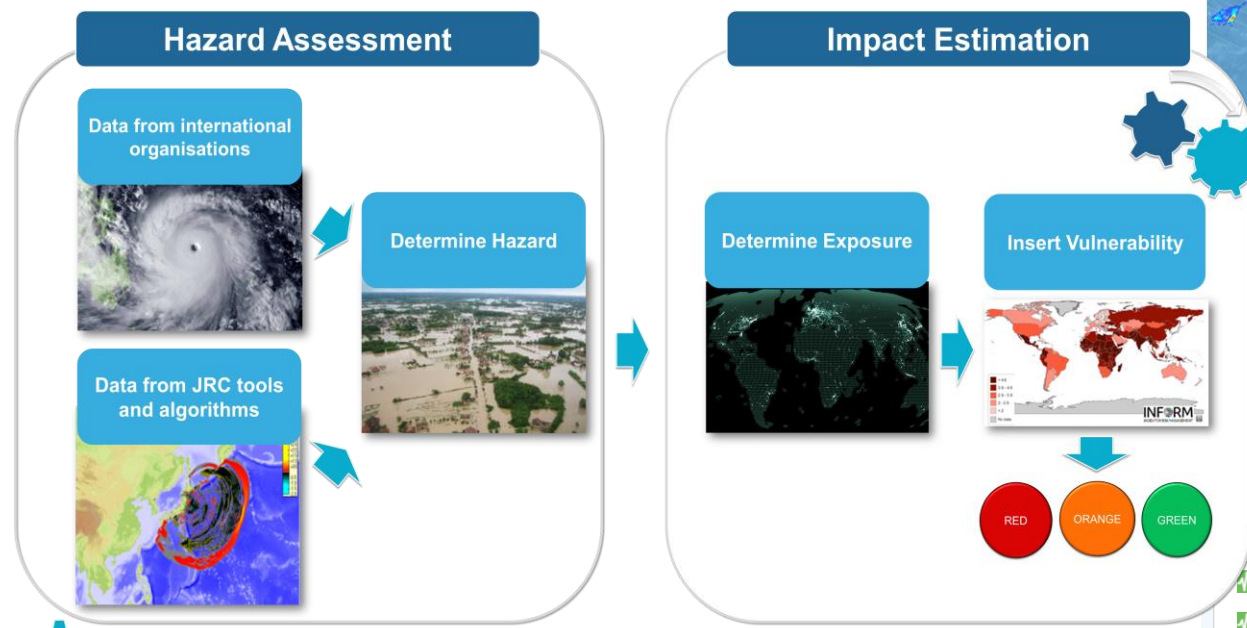
VOLCANOES

DROUGHTS

FLOODS

FOREST FIRES

Risk (Hazard, Exposure, Vulnerability, Coping Capacity)



GDACS
ALERT LEVEL

The GDACS alert levels estimate the probability that **international assistance** will be required to deal with a natural disaster

- RED** **High likelihood** – international system must be ready to respond
- ORANGE** **Moderate likelihood** – disaster can be managed at national level
- GREEN** **Low likelihood** – small or local disaster

GDACS

Global Disaster Alert and Coordination System

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GDACS is a cooperation framework between the United Nations, the European Commission and disaster managers worldwide to improve alerts, information exchange and coordination in the first phase after major sudden-onset disasters.

Latest news → **il services (European Flood Awareness System - EFAS) (ECHO 04 Jun 2021)**

To know more about GDACS

ter alerts in the past 4 days. European Union, 2021. Map produced by EC-JRC. The designations employed and the presentation of material on the map do not imply the expression of any opinion whatsoever of the European Union concerning the legal status of any country, territory or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

events in the list below are the past events before last 4 days.

alerts, all the events listed in the homepage are ongoing events. In bold: i) new events; ii) events where a significant worsening has been detected (+ 0.5 GDACS score or increase in the Alert Level); iii) events where a significant improvement has been detected (- 0.5 GDACS score or decrease in the Alert Level).

Information products are available (Global Drought Observatory Report), Forest alerts, the events are all the ongoing events of class Orange or Red plus the Green alerts with burned area exceeding 10k ha and population within 5 km exceeding 10k.

QUAKES	TROPICAL CYCLONES	FLOODS	VOLCANOES	DROUGHTS	FOREST FIRES
Off Coast Of Oregon (M 5.9) - 04 Jun 08:17	CHOI-WAN-21 (83 km/h) - 05 Jun 12:00	Canada	Nyiragongo (DR Congo) - 04 Jun 2021	Central Asia, Iran, Pakistan-2020 - 32 Weeks	Greece (10148 ha) - 22 May 2021
United States (M 5.9) - 04 Jun 07:52	BLANCA-21 (83 km/h) - 04 Jun 09:00	South Africa	Etna (Italy) - 31 May 2021	California (USA)-2021 - 6 Weeks	Russian Federation (10442 ha) - 17 May 2021
Indonesia (M 5.1) - 03 Jun 10:09	YAAS-21 (120 km/h) - 26 May 2021	Uganda	Fuego (Guatemala) - 07 May 2021	Central Brazil-2019 - 76 Weeks	Russian Federation (15160 ha) - 10 May 2021
Panama (M 5.5) - 01 Jun 2021	ANA-21 (74 km/h) - 24 May 2021	Ethiopia	Great Sikkim (United States) - 26 May 2021	Syria, Iraq, Northern Iran-2020 - 41 Weeks	India (48221 ha) - 29 Apr 2021
United States (M 5.1) - 31 May 2021	TAUKTAE-21 (222 km/h) - 17 May 2021	Algeria	Stromboli (Italy) - 19 May 2021	Madagascar-2020 - 41 Weeks	Nepal (11976 ha) - 29 Apr 2021
Pacific-Antarctic Ridge (M 5.9) - 30 May 2021	THREE-21 (65 km/h) - 14 May 2021	Afghanistan	Picaya (Guatemala) - 23 Apr 2021	Angola-2020 - 37 Weeks	India (12134 ha) - 28 Apr 2021
Japan (M 5.5) - 29 May 2021	ANDRES-21 (65 km/h) - 11 May 2021	Indonesia	Soufriere St. Vincent (Saint Vincent and the Grenadines) - 23 Apr 2021	Central Mexico-2020 - 54 Weeks	India (33007 ha) - 27 Apr 2021
Tonga (M 5.7) - 28 May 2021	JOBO-21 (111 km/h) - 24 Apr 2021	Colombia	Hyawak (Iceland) - 23 Apr 2021	Algeria-2021 - 24 Weeks	China (33112 ha) - 22 Apr 2021

European Commission

EFFECTS

Current System

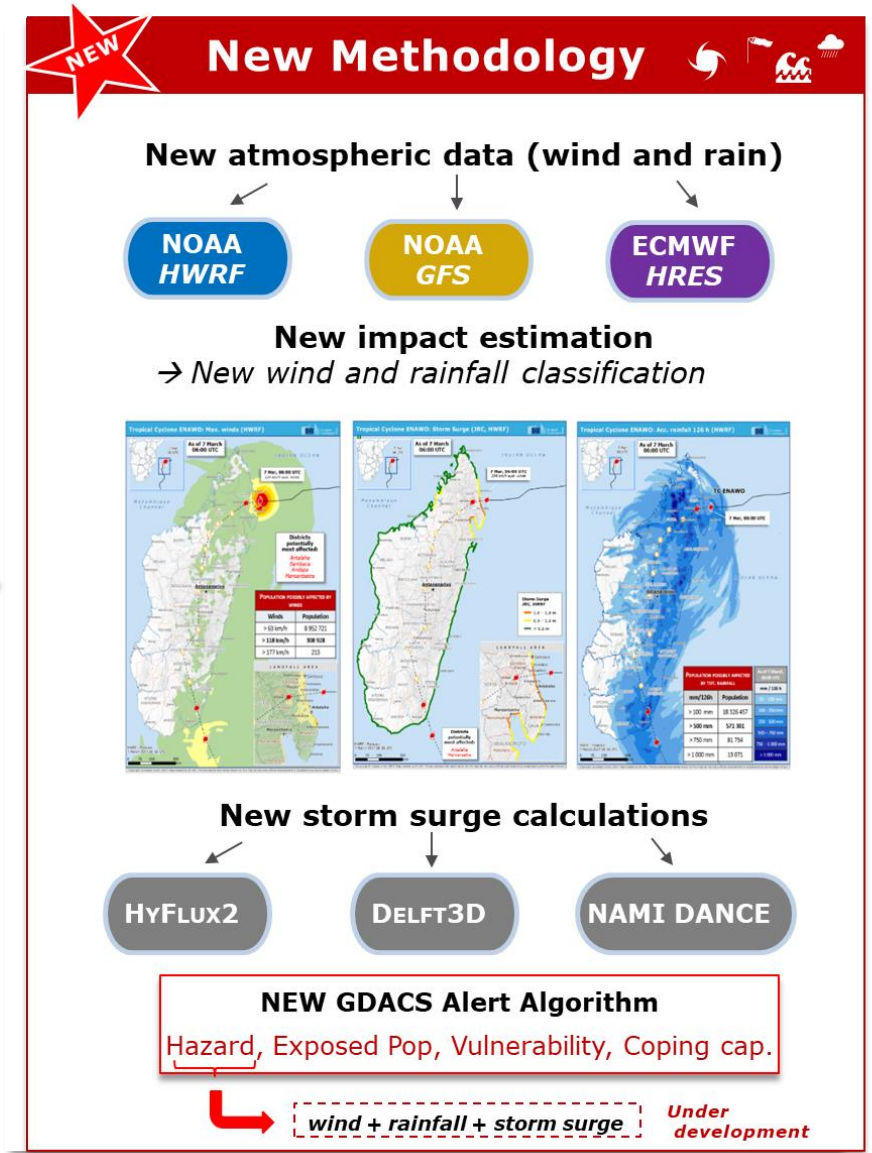
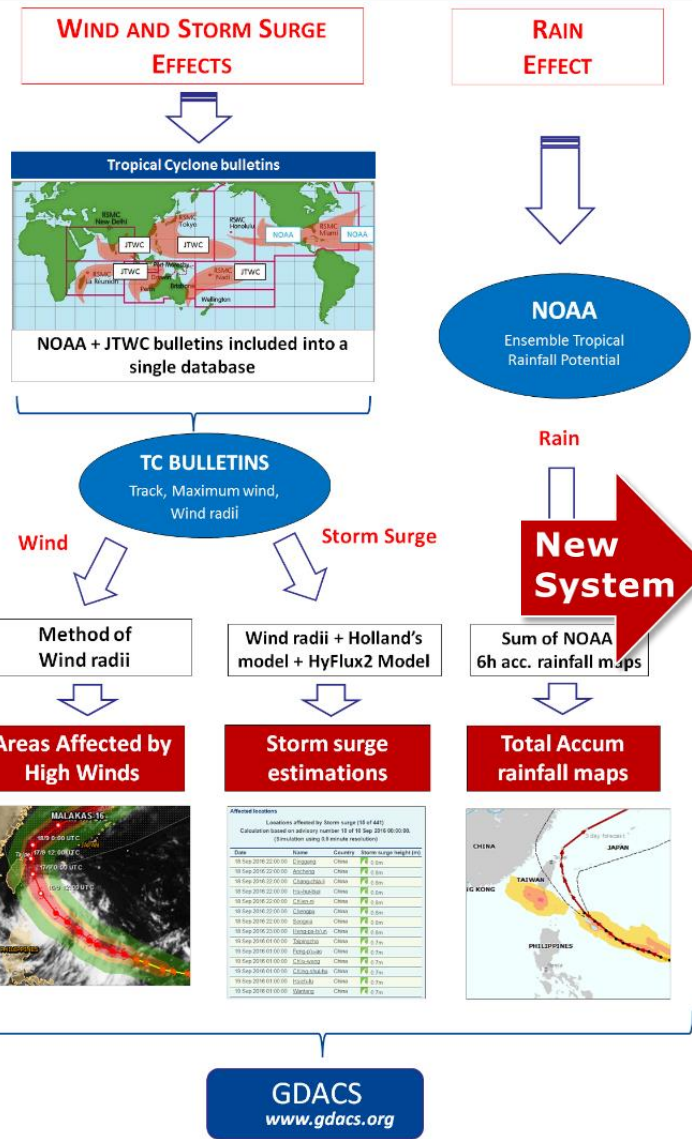


GLOBAL DISASTER ALERT AND COORDINATION SYSTEM

Current methodology and systems (since 2011)

- TC data:** TC bulletins of NOAA and JTWC included into a single database
- Wind** → TC bulletins
- Rain** → NOAA eTRaP/NASA GPM
- Storm Surge** → JRC storm surge system
 - Holland's model + JRC HyFlux2 code
 - + new storm surge systems (Delft3D, NOAA HWRf, GFS, ECMWF)

GDACS Alert Algorithm
Hazard (wind), Exposed Pop, Vulnerability



Early Warning Systems of the Copernicus Emergency Management Service

THE COPERNICUS EMERGENCY MANAGEMENT SERVICE

On-demand
mapping



Rapid
Mapping



Risk & Recovery
Mapping



Early warning
and monitoring



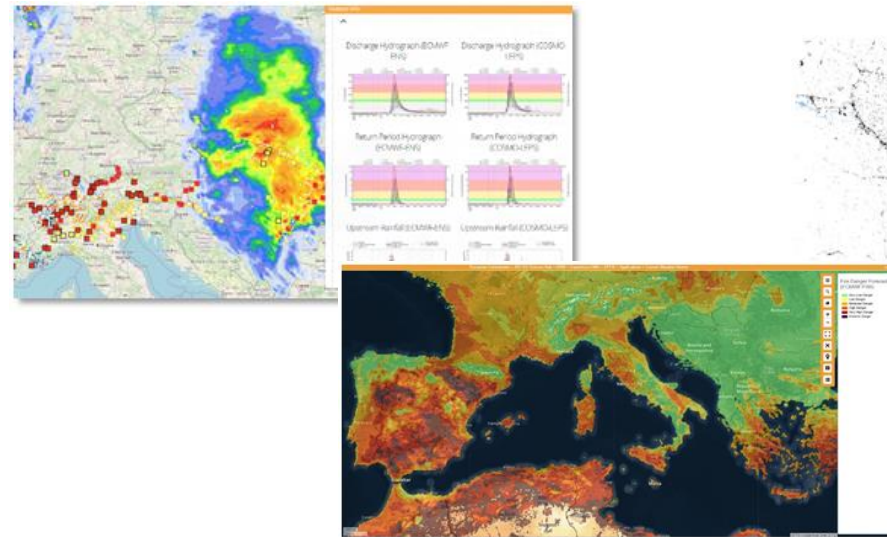
Floods



Fires



Droughts



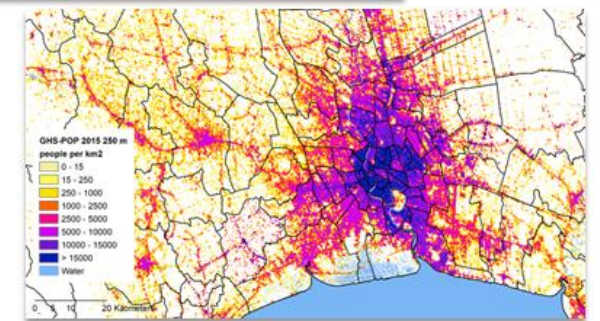
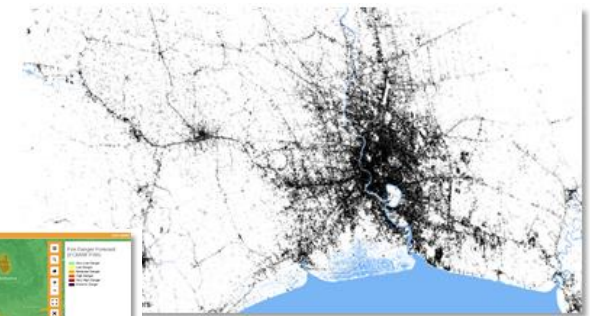
Exposure
Mapping



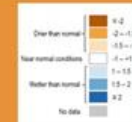
Population



Built-up
areas



Soil moisture anomaly



February 2021

March 2021

May 2021



Early Warning & Monitoring – Floods

What is GloFAS?

- GloFAS couples NWP and Hydrological modelling to produce **global flood forecasts**
- **Complementary** information to National Hydrological and Meteorological Services (NHMS) and CP
- **Freely available**, across the world
- **Riverine** flood forecasting only, for **large catchments** (>2000km²).
- **Newly released: Sentinel-1 flood monitoring** of all flood types

What does GloFAS provide?:

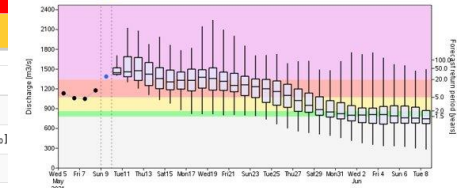
- Global **hydrological ensemble forecasts** updated daily
- Global, **SAR-based, flood monitoring** with timeliness of >8hours and revisit frequency of 3-12 days at 20m resolution
- **Map products and datasets** through dedicated web and data services
- **Highlights** of expected flooding and associated flood risk level over next 30 days
- **Seasonal hydrological outlook** showing wet/dry anomalies over next 16 weeks
- **Additional information** as hydrographs, initial condition maps and forecast table to help interpret results

Forecast Day	21	22	23	24	25	26	27	28	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
21/02/2017																								
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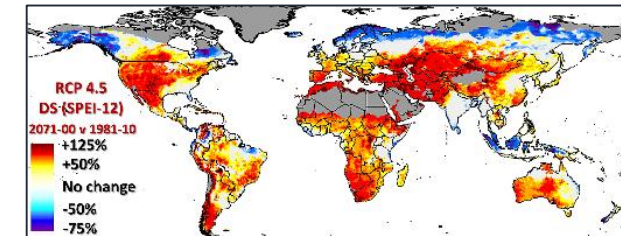
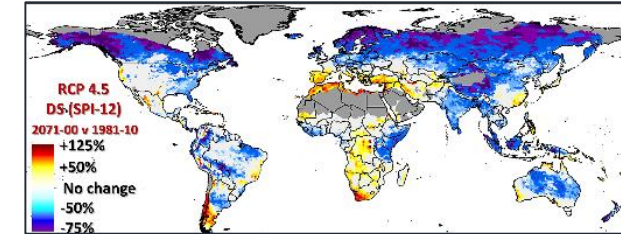


	Low Impact <10k (people)	Medium Impact 10k-100k (people)
Short Lead time (1-3 days)		
Medium Lead time (4-10 days)		
Long Lead time (>10 days)		

Exposure Information
Population affected [No. of people]
Population within floodplain affected [%]
Cities affected [% area affected]



- Why? *Droughts are ...*
 - Increasing in frequency and severity in many parts of the world, likely to aggravate in the future.
 - A global hazard with significant economic, societal and environmental impacts (e.g. 9 billion Euros/year in EU+UK).
- What?
 - **Early warning, monitoring and forecasting of droughts** and their likely **impacts**, based on satellite data, hydro-meteorological modelling and in-situ observations.
 - Based on a conceptual model of **drought risk**
- For Whom?
 - European **Emergency Response Coordination Centre (ERCC)**
 - Global Disaster Alert and Coordination System (**GDACS**)
 - International aid organizations, EEAS, UNCCD



Forest Fire Information System

- Joint initiative between GEO, NASA and JRC
- Not yet fully operational in CEMS (integration ongoing)
- provide a comprehensive view and evaluation of fire regimes and fire effects at global level
- provide tools to support operational wildfire management from national to global scales.
- Complements national fire information systems through the provision of **harmonised data, methods and standards**
- **Users:** EC DGs and Services, EP, national/regional forest fire and civil protection services, FAO, UNECE, UNISDR

Main outputs

➤ Fire danger forecast

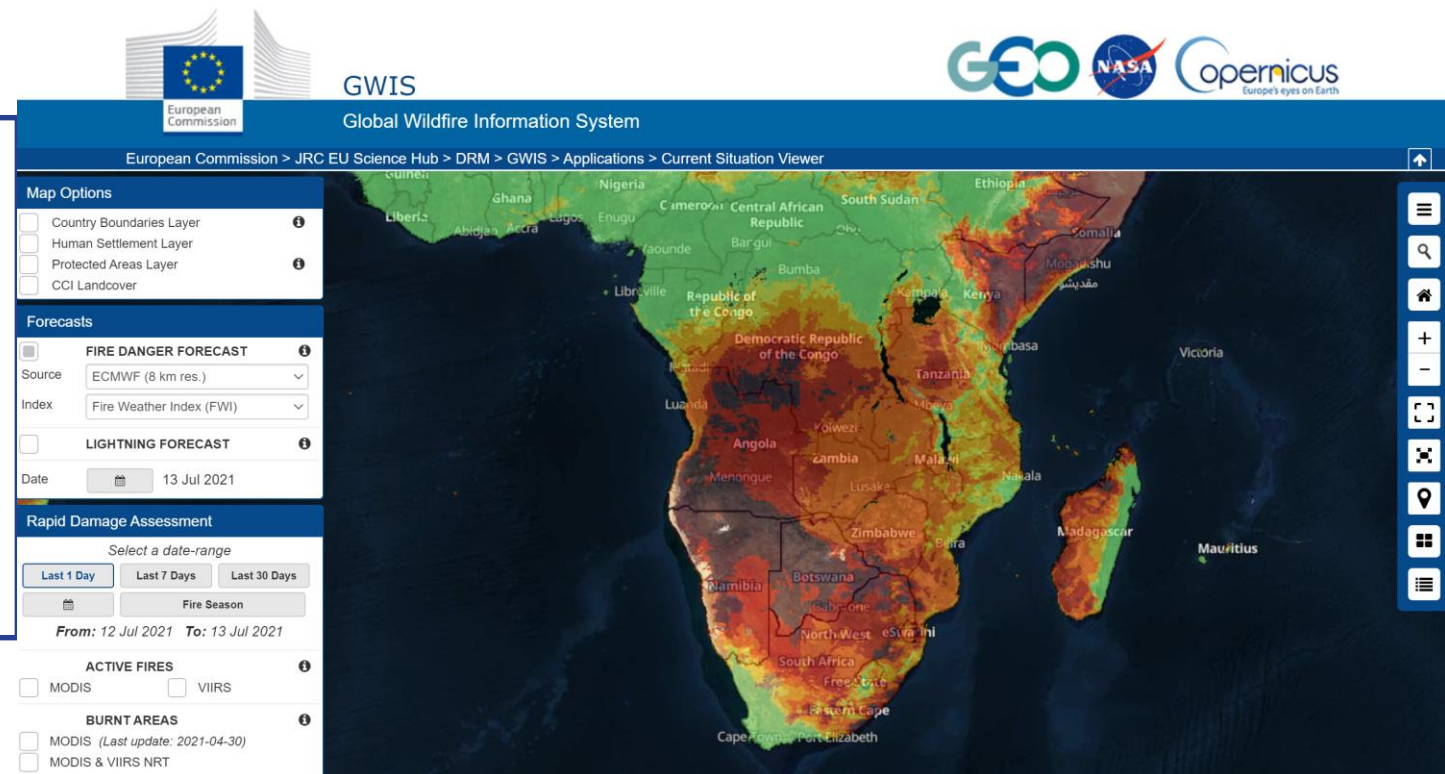
- Fire danger forecast up to 10 days in advance on the bases of the Canadian Fire Weather Index (FWI)

➤ Active fire detection (MODIS, VIIRS)

➤ Near real time burnt areas (MODIS, VIIRS)

➤ Country profiles (fire regimes)

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



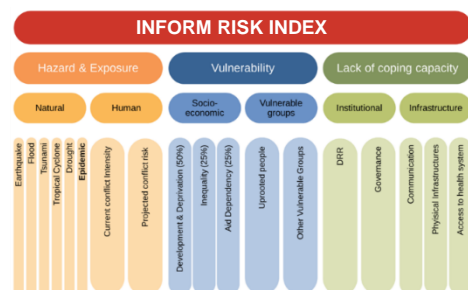
INFORM Warning

- supporting decisions around preparedness, early warning and early action

INFORM REPORT 2022

Shared evidence for managing
crises and disasters

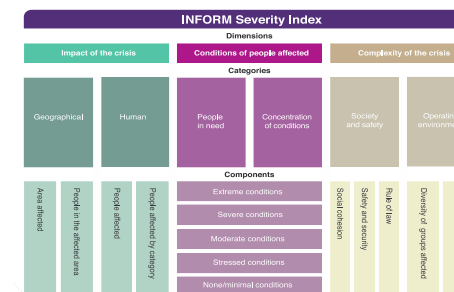
INFORM RISK



INFORM WARNING

To be developed...

INFORM SEVERITY



Prevention

Preparedness

Response

RISK DRIVERS and RISK
Structural RISK drivers
Yearly releases

Link RISK INFORMATION and
EARLY ACTION for automatic
WARNINGS

IMPACT and SEVERITY
Measuring impacts and needs
Monthly releases

RISK assessment
for risk management

12 months
ANTICIPATORY action

IMPACT assessment
for crisis management

It will complement other EW systems
which act when the event happens
(e.g., GDACS)

INFORMWARNING CONCEPT

will warn about risk trends, forecasts, scenarios and events that could lead to crisis impacts in the next 12 months



1. Risk monitor

Dynamic risk indicators

		→ Complexity	Increasing crisis severity
		→ Conditions	
		→ Impact	
		→ Infrastructure	Decreasing capacity
		→ Institutional	
		→ Vulnerable groups	Increasing vulnerability
		→ Socio economic	
		→ Natural	Increasing hazard and exposure
		→ Human	
		→ Food security	
		→ Conflict	Existing early warning model integration
		→ Storm	
		→ Drought	

2. Analysis

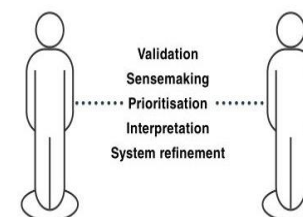
WARNING LEVEL

Country A	Low
Country B	Medium
Country C	Very High
Country D	High
Country E	Low

ALERT

Location	Country C, Provinces A, B
Timing	3-6 months
Impact level	Very High
Drivers	Drought season, conflict
Impact type	Food security, displacement

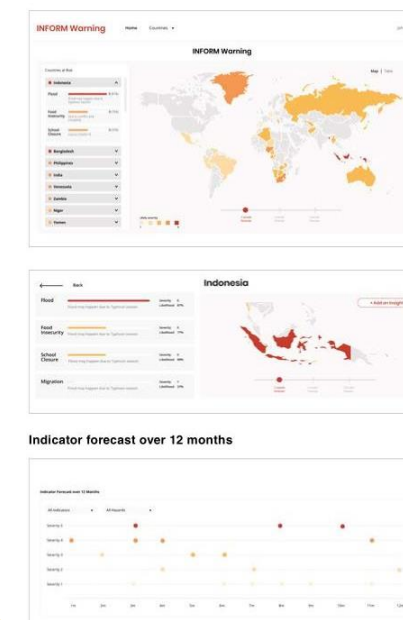
3. Human Curation



PRIORITY ALERTS

Alert 1	Country C	3-6 mths	Very High
Alert 2	Country F	9-12 mths	Very High
Alert 3	Country K	1-3 mths	Very High
Alert 4	Country R	3-6 mths	High
Alert 5	Country Z	6-9 mths	High

4. Web platform



Additional, external analysis

More info:

GDACS: <https://www.gdacs.org/>

CEMS: <https://emergency.copernicus.eu/>

INFORM: <https://drmkc.jrc.ec.europa.eu/inform-index>



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