Food and Agriculture Organization of the United Nations

DIEM – Data in Emergencies

GFP annual conference

Monitoring flood impacts on agriculture in humanitarian contexts

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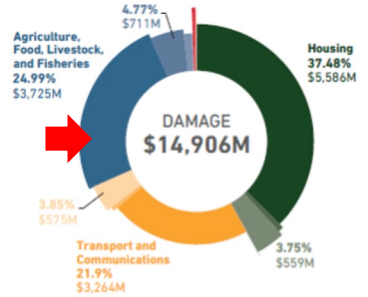
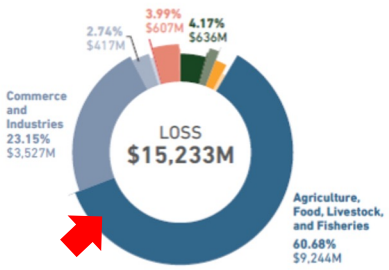
15 September 2025

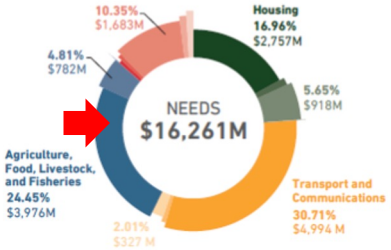
Why is it important

Pakistan 2022

- 4.4 million acres damaged
- 0.8 million animals perished
- US$ 12.9 billion damages & losses in agriculture sector
- Up to 10 million IDPs

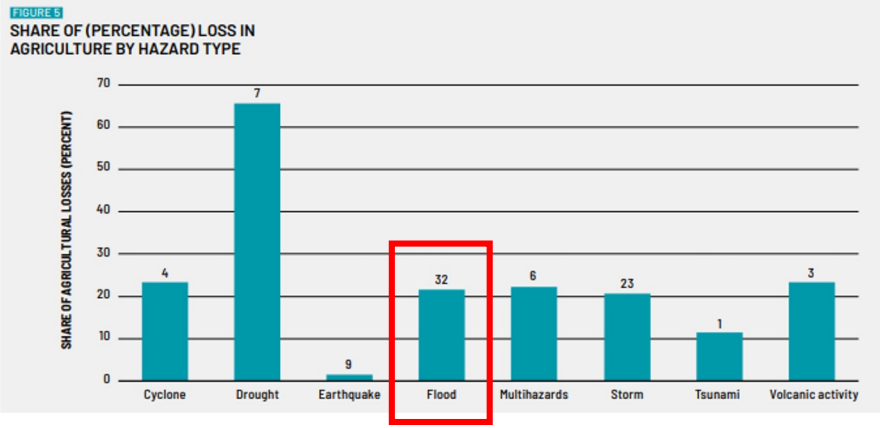






Sources: Post-Disaster Needs Assessment, IOM

Why is it important



FAO, DIFA 2023

- > 20% of flood-induced losses are in the agriculture sector (FAO, DIFA 2023)
- 16% of annual agricultural losses are due to floods (FAO, DIFA 2023)
- More and more extreme and frequent
- Widespread
- Food crisis countries, compound shocks

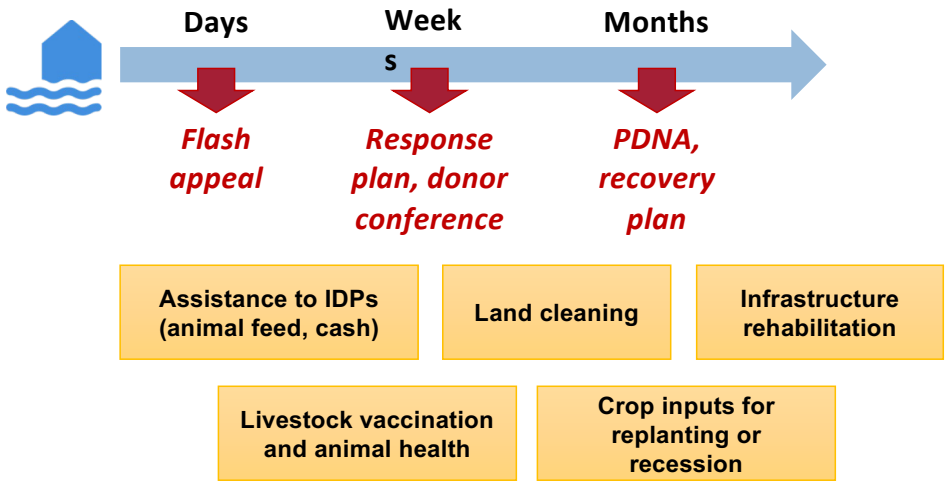
Damages, losses and human impact caused by floods in the agriculture sector are underreported and not measured optimally

(FAO, 2023)

How do humanitarians address floods

Pakistan 2025

Flood resilience, preparedness, disaster risk reduction, anticipatory action …
but there are massive **residual risks** calling for **emergency** response and **recovery** processes.



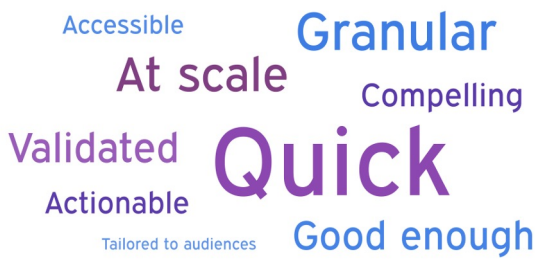
Photos: FAO

Implications for evidence needs

Who needs evidence?

- Different levels of decision: resource allocation, prioritization, programme design, advocacy
- FAO, UN agencies, government, donors, NGOs
- From a national technical officer to the UN resident coordinator / Minister of Agriculture

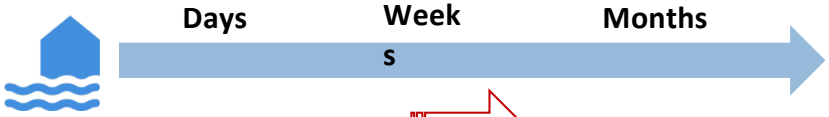
Data requirements



What is needed to inform decisions?

- Flood type, temporal dynamics / persistence, flood depth
- Agricultural population exposed & affected, location, profile
- Agricultural assets, crop types, seasonal calendar,, livestock numbers, animal health
- % of crop damaged, $ value of damages and losses, income loss
- Scales, flows (population, trade, aid), cascading effects
- Potential benefits (good rainfall in other areas, flood-recession crops)
- Scenarios and cost of agriculture sector recovery

FAO DIEM approach



Exposure analysis ⇨ **Impact analysis**

Limited physical access

- Remote-sensing
- Baseline data
- Expert knowledge

Field access

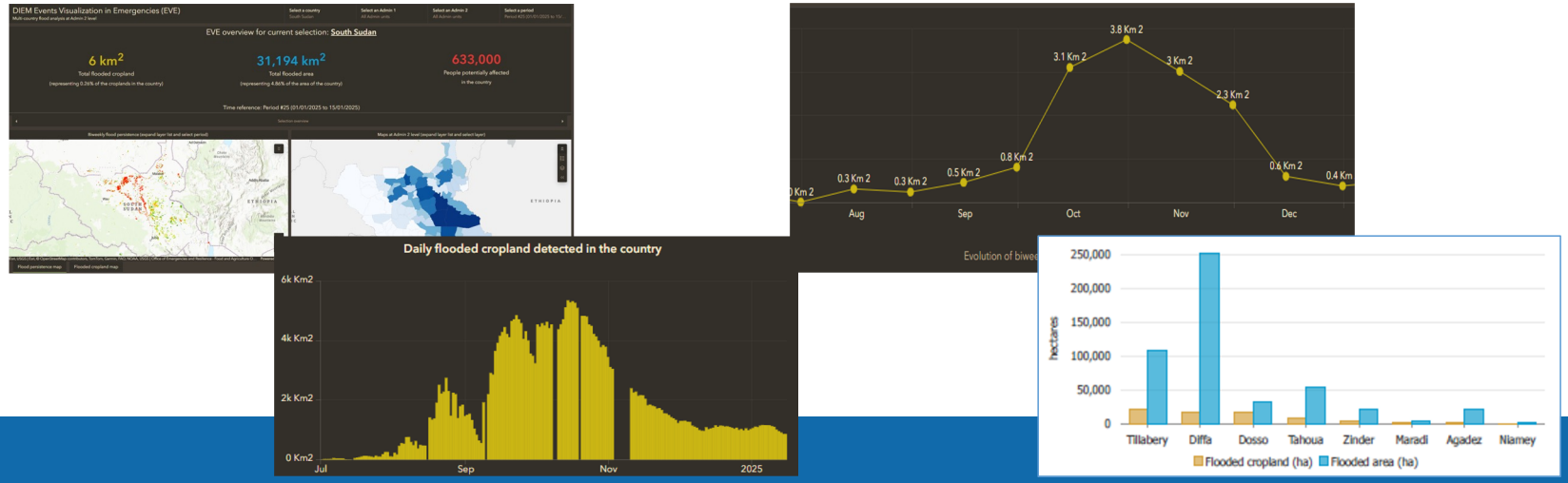
- Field observations
- Household survey
- Key Informant Interviews

Phased and integrated interpretation, analysis, and validation

Foundation: Events Visualization in Emergencies (EVE)

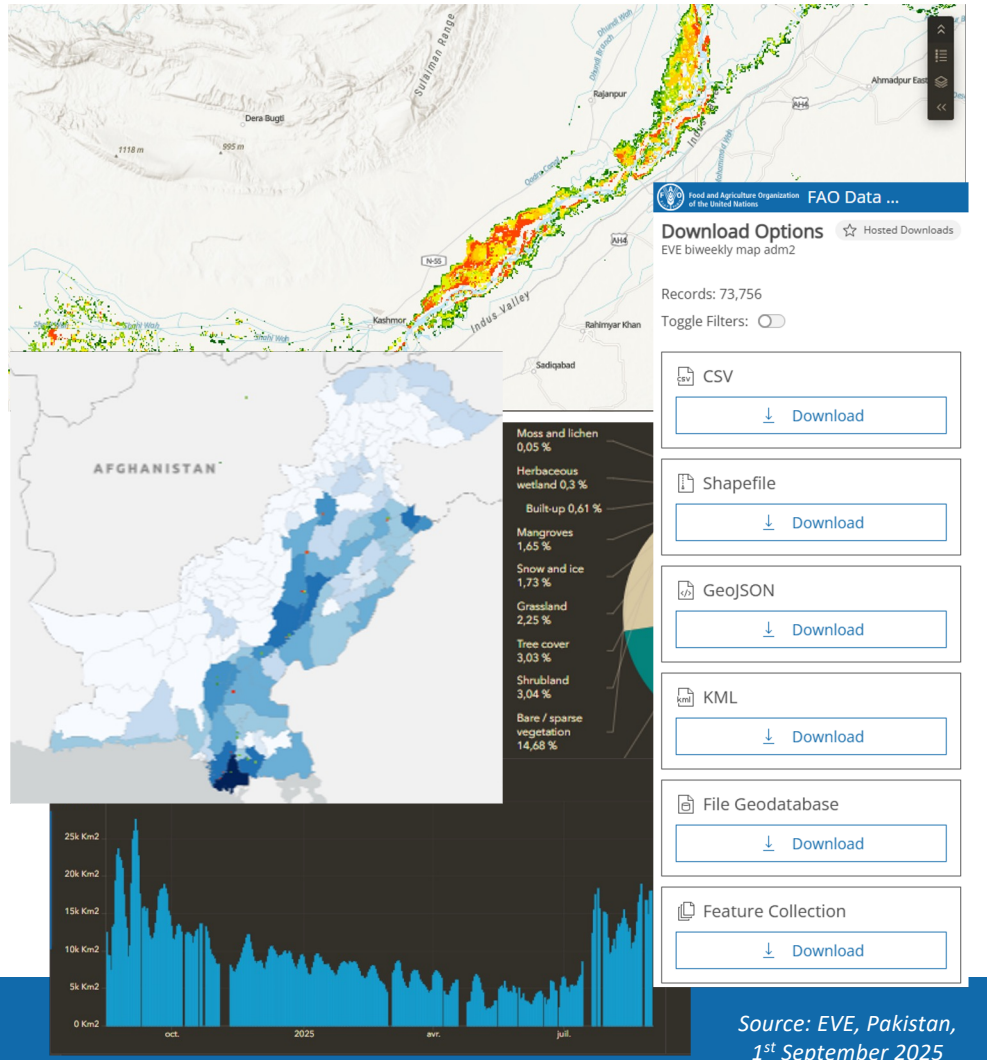
- Interactive, intuitive and open-access platform
- Powered by fully automated process
- Continuous analysis across 40+ countries
- Biweekly updates on flood dynamics at adm2 level

https://data-in-emergencies.fao.org/pages/diem_eve



EVE's key capabilities

- Flood persistence analysis
- Land cover types analysis
- Cropland and population exposure to flood
- Time analysis
- National Adm2 maps
- Output data available for manual download or via API



Source: EVE, Pakistan, 1st September 2025

Data sources and technology stack

In close collaboration with

WFP World Food Programme ADAM

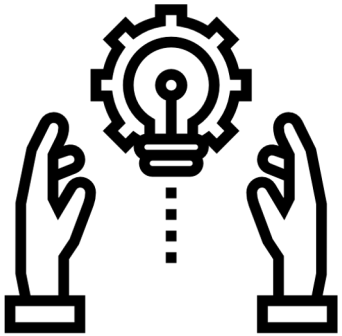
- **Data:**
  - NOAA VIIRS: Provides daily surface water at 375m resolution, at global scale
  - ESA WorldCover: High-resolution (10m) land cover data
  - WorldPop: Population density data at 100m resolution

- **Technology:**
  - Google Earth Engine python API: Powers large-scale geospatial analysis and efficient data processing
  - Python: used for post-processing, data engineering and statistical analyses.
  - ArcGIS Online: facilitates interactive visualization and user-friendly dashboards.

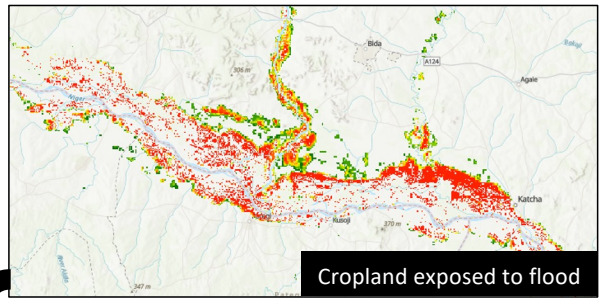
NOAA WorldCover esa WorldPop Google Earth Engine ESRI ArcGIS Online Mapping and analysis: location intelligence for everyone

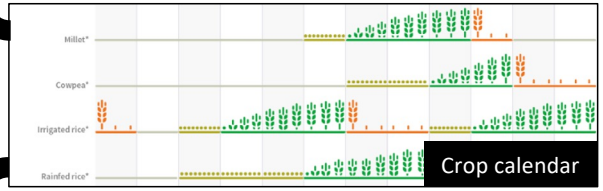
EVE limitations and future developments

- Mismatch with field observations in some situations due to
  - False negatives (flash floods, cloud cover)
  - False positives (surface water VS flood)
  - Inaccuracy of global land cover map in some contexts
- Inclusion of local datasets (crop types, irrigated areas) for refined impact assessments
- Integration of agricultural calendars to improve the relevance of analyses
- Integration of other baseline datasets (agricultural infrastructure, livestock, fisheries & aquaculture)



Building on EVE





ANNUAL CROPS CULTIVATED (list all crops cultivated during agricultural season when disaster hit)	2021 Average yield (ton / ha)	2021 Total Production (mt)	2021 Price / ton (natl currency)	2022 Total area cultivated - ha	2022 Average yield (ton / ha)	2022 Total Production (mt)	2022 Price / ton (natl currency)
Maize	1,700.0	116,467.0	165,630	154,694	1,676.5	259,346.0	167,366
Millet	703.1	49,188.0	174,920	78,618	848.7	66,723.0	177,913
Rice	2,043.5	42,426.0	281,586	20,149	2,613.6	52,661.0	280,634
Sorghum	759.9	258,061.0	155,608	372,736	939.7	350,268.0	158,158
Wheat	-	-		-	-	-	
Fonio	692.5	18,183.0		17,578	900.0	15,820.0	
Sunflower							
Cassava							
Sweet potato							
Yams							

Production, yield and prices baselines

+ Secondary data

+ Expert knowledge

Potential crop loss estimation

$ value

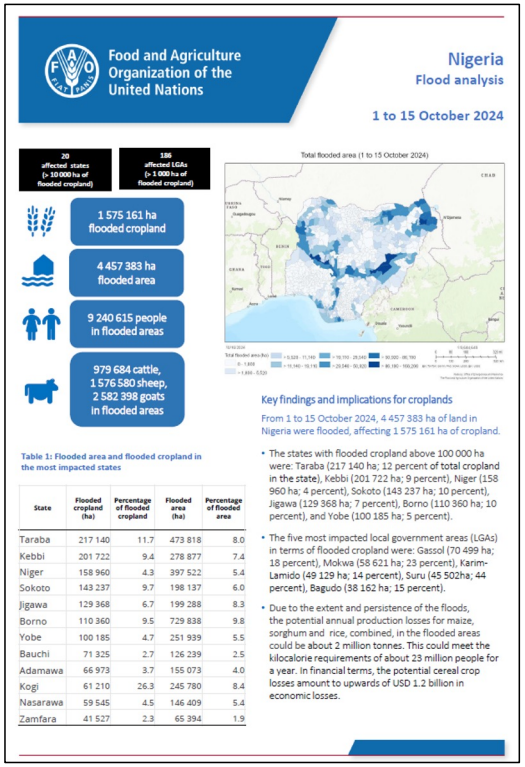
Kcal equivalent

Number of people who could have been fed

Potential implications on livelihoods and food availability

Within a week

Executive brief



Food and Agriculture Organization of the United Nations

Nigeria
Flood analysis
1 to 15 October 2024

20 affected states (> 10 000 ha of flooded cropland)

186 affected LGAs (> 1 000 ha of flooded cropland)

1 575 161 ha flooded cropland

4 457 383 ha flooded area

9 240 615 people in flooded areas

979 684 cattle, 1 576 580 sheep, 2 582 398 goats in flooded areas

Total flooded area (1 to 15 October 2024)

Table 1: Flooded area and flooded cropland in the most impacted states

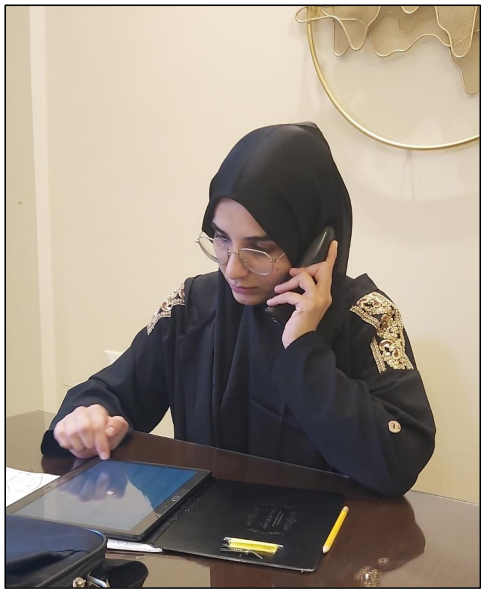
State	Flooded cropland (ha)	Percentage of flooded cropland	Flooded area (ha)	Percentage of flooded area
Taraba	217 140	11.7	473 818	8.0
Kebbi	201 722	9.4	278 877	7.4
Niger	158 960	4.3	397 522	5.4
Sokoto	143 237	9.7	198 137	6.0
Jigawa	129 368	6.7	199 288	8.3
Borno	110 360	9.5	729 838	9.8
Yobe	100 185	4.7	251 939	5.5
Bauchi	71 325	2.7	126 239	2.5
Adamawa	66 973	3.7	155 073	4.0
Kogi	61 210	26.3	245 780	8.4
Nasarawa	59 545	4.5	146 409	5.4
Zamfara	41 527	2.3	65 394	1.9

Key findings and implications for croplands

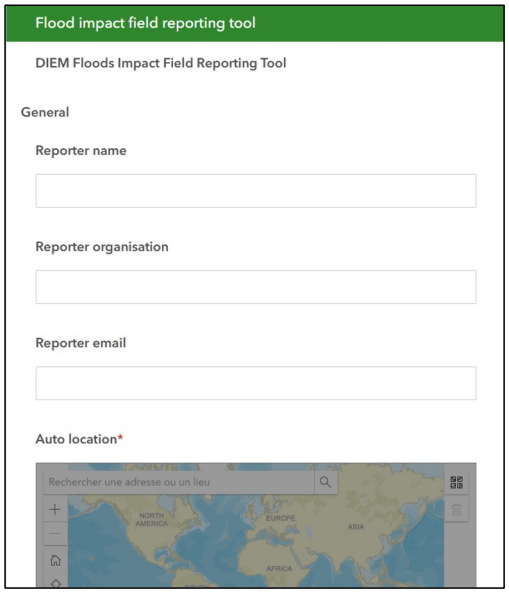
From 1 to 15 October 2024, 4 457 383 ha of land in Nigeria were flooded, affecting 1 575 161 ha of cropland.

- The states with flooded cropland above 100 000 ha were: Taraba (217 140 ha; 12 percent of total cropland in the state), Kebbi (201 722 ha; 9 percent), Niger (158 960 ha; 4 percent), Sokoto (143 237 ha; 10 percent), Jigawa (129 368 ha; 7 percent), Borno (110 360 ha; 10 percent), and Yobe (100 185 ha; 5 percent).
- The five most impacted local government areas (LGAs) in terms of flooded cropland were: Gassol (70 499 ha; 18 percent), Mokwa (58 621 ha; 23 percent), Karim-Lamido (49 129 ha; 14 percent), Suru (45 502ha; 44 percent), Bagudo (38 162 ha; 15 percent).
- Due to the extent and persistence of the floods, the potential annual production losses for maize, sorghum and rice, combined, in the flooded areas could be about 2 million tonnes. This could meet the kilocalorie requirements of about 23 million people for a year. In financial terms, the potential cereal crop losses amount to upwards of USD 1.2 billion in economic losses.

Augmenting the analysis



Key-informant interviews with local government agents



Field verification using crowdsourcing
Pilot: Sahel floods 2025

Conclusions

- Funding cuts, humanitarian data ecosystem at risk
- Diversifying and augmenting data sources
- Data sharing, systems interoperability
- Importance of data preparedness
- More dialog between evidence providers and users
- Data are ingredients of a story which remains to be told

Thank you !