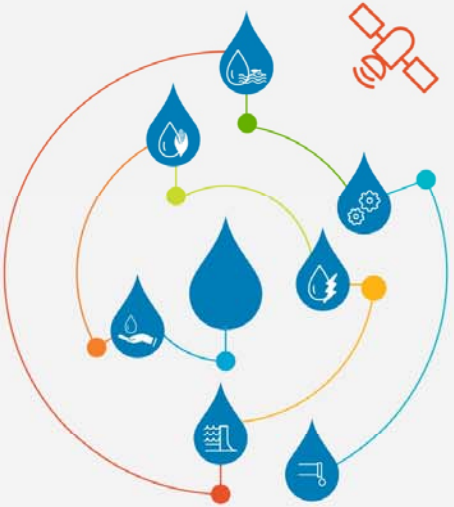
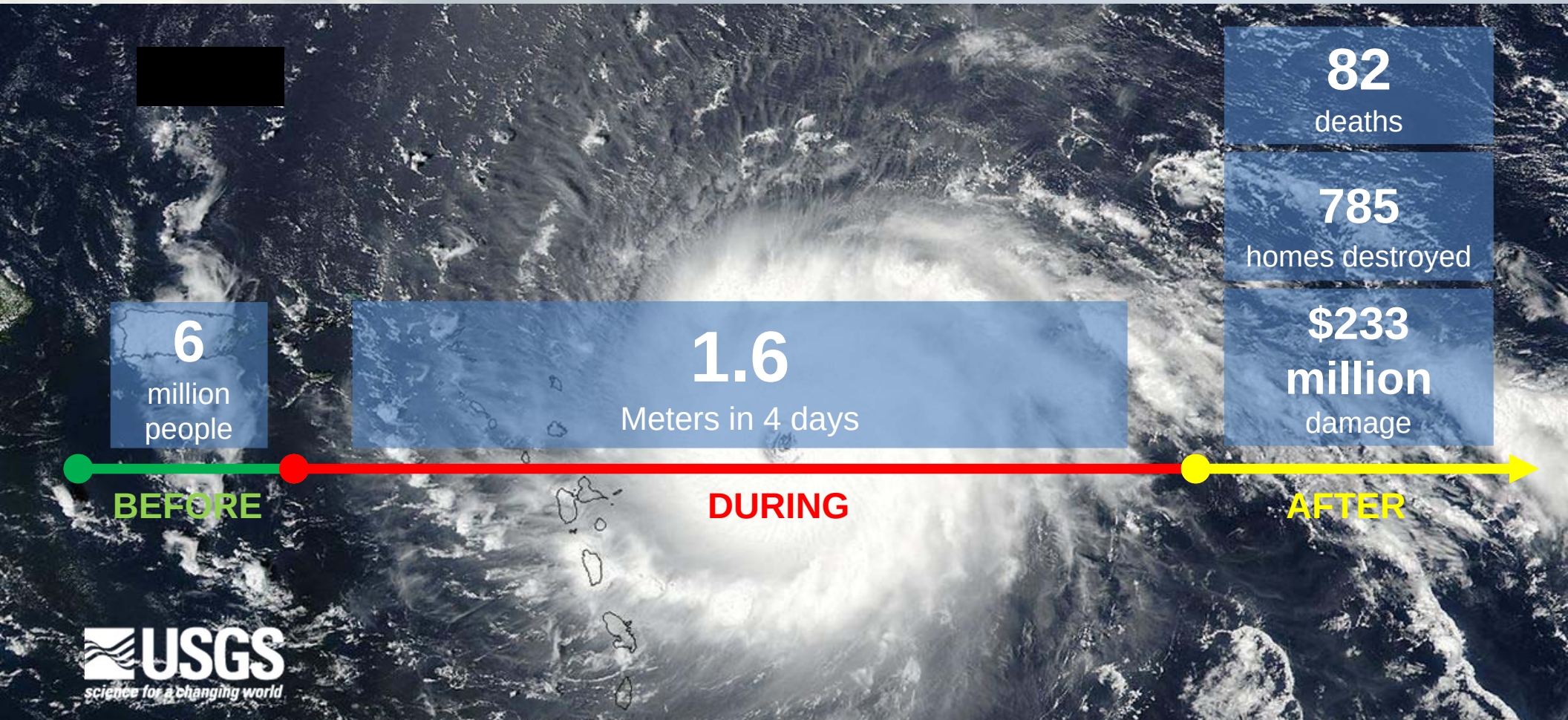
Real-time Water Dashboard: Intersecting Science and Digital Platforms to Deliver Big Data for Flood Management



Sachin D. Shah
U.S. Geological Survey
Geospatial Science + Cyber Innovation Branch
3 October 2018

ADB

The Push for Digital Platforms: Texas Water Dashboard

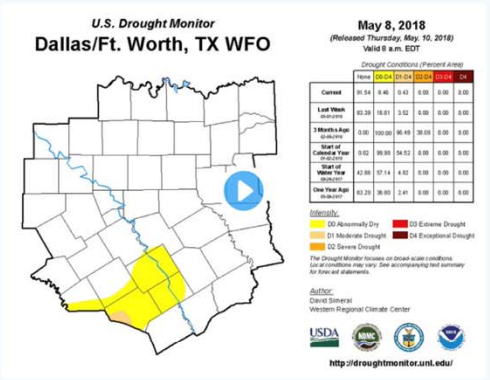


USGS science for a changing world

Twitter

Real-time communication from partners and stakeholders

NWS Fort Worth
@NWSFortWorth
Watch the severity of drought expand across North & Central Texas since May! #dfwwx #ctxwx #txwx #texomawx



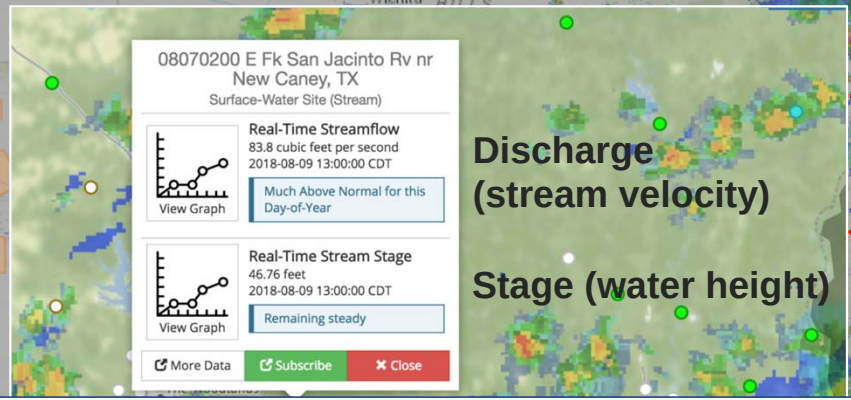
45m

FEMA Region 6
@FEMARegion6
Building a culture of preparedness one student at a time. #R6prepares 👏

48m

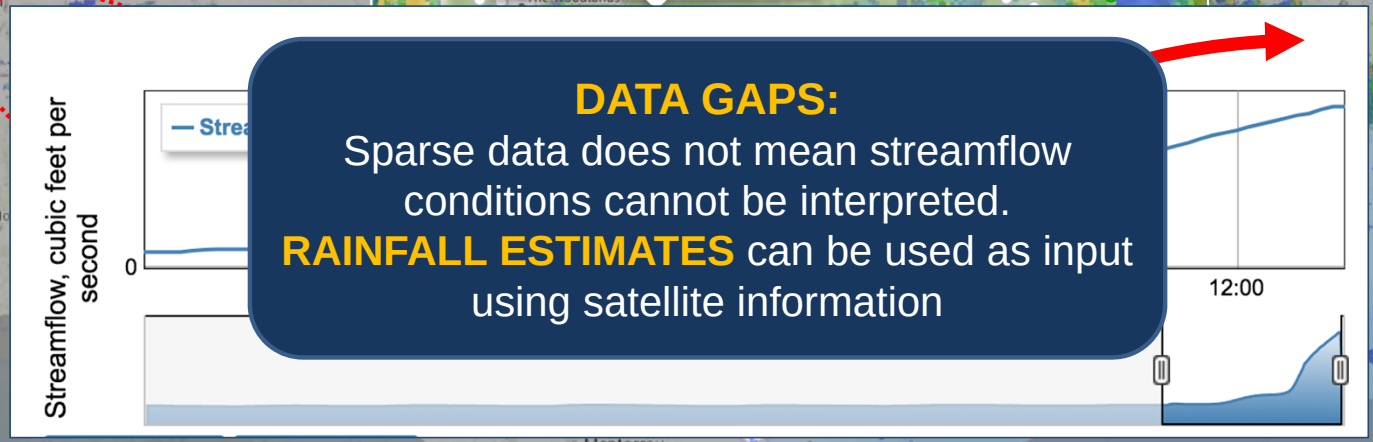
Clear Map | River Report | About

Base Map



Discharge (stream velocity)

Stage (water height)



DATA GAPS:
Sparse data does not mean streamflow conditions cannot be interpreted.
RAINFALL ESTIMATES can be used as input using satellite information

300 km
200 mi
Scale: 1 : 9,244,649

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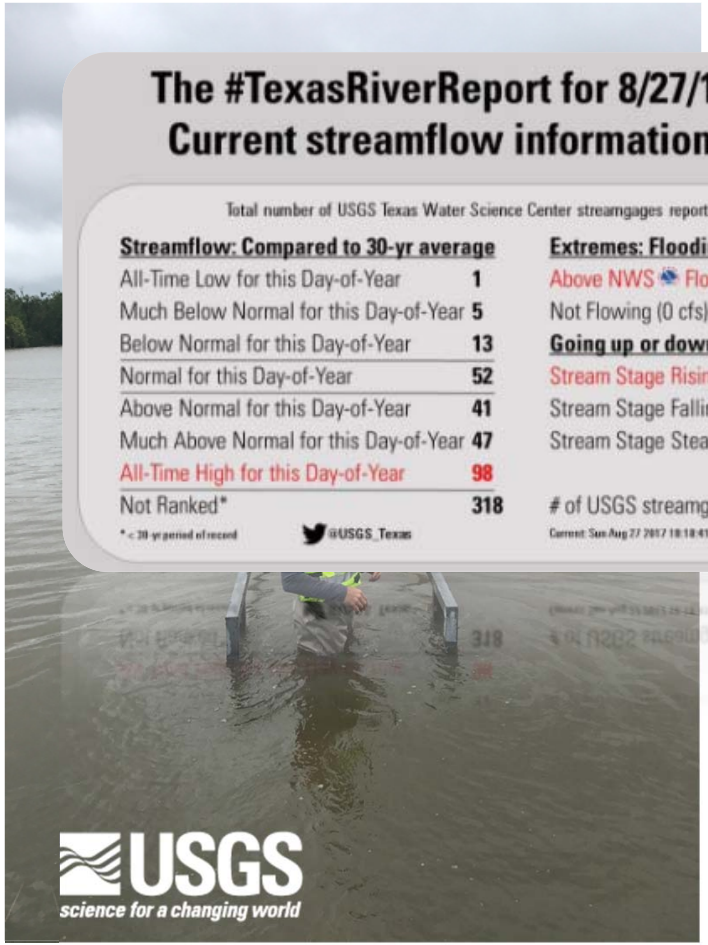
Data Network: Point of Collection and Delivery

Applying the Innovation: Extreme Storm Events



The #TexasRiverReport for 8/27/17 USGS science for a changing world

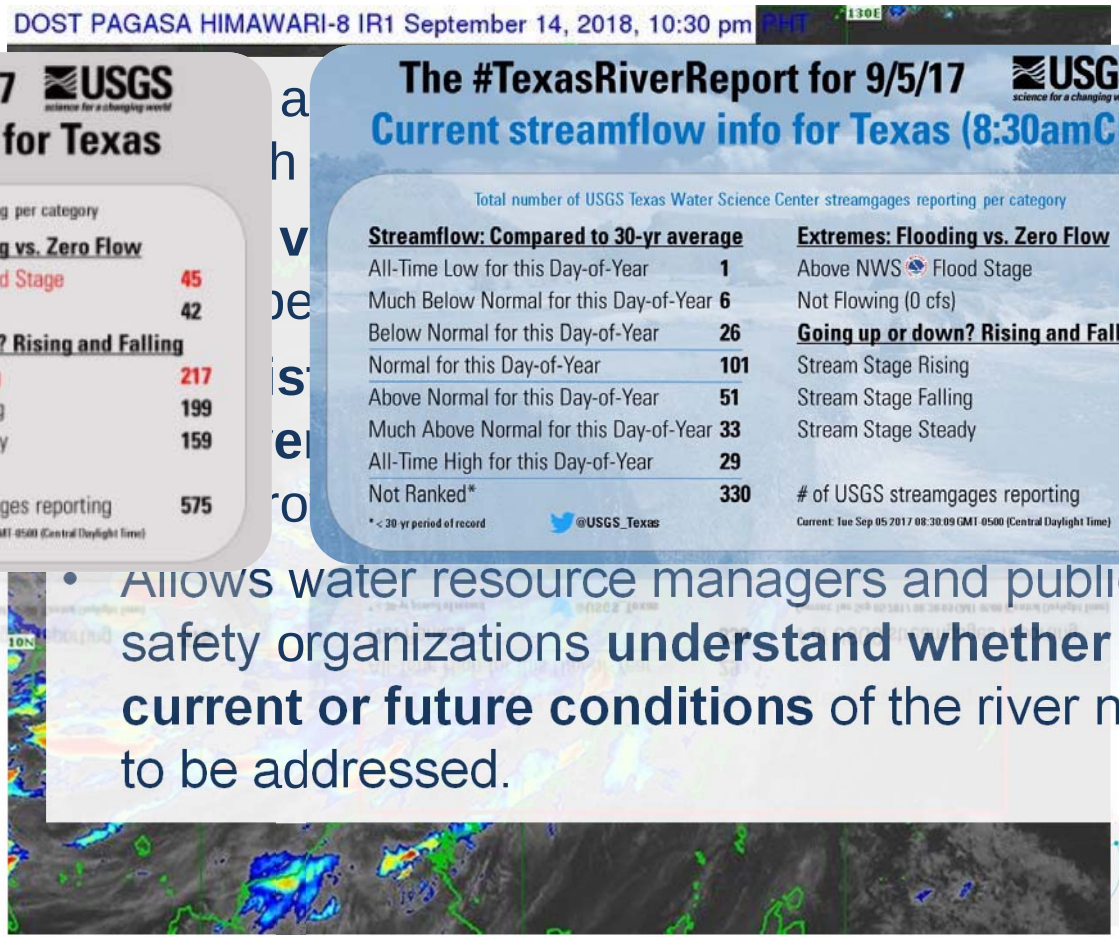
Current streamflow information for Texas

Total number of USGS Texas Water Science Center streamgages reporting per category

Streamflow: Compared to 30-yr average		Extremes: Flooding vs. Zero Flow	
All-Time Low for this Day-of-Year	1	Above NWS Flood Stage	45
Much Below Normal for this Day-of-Year	5	Not Flowing (0 cfs)	42
Below Normal for this Day-of-Year	13	**Going up or down? Rising and Falling**	
Normal for this Day-of-Year	52	Stream Stage Rising	217
Above Normal for this Day-of-Year	41	Stream Stage Falling	199
Much Above Normal for this Day-of-Year	47	Stream Stage Steady	159
All-Time High for this Day-of-Year	98		
Not Ranked*	318	# of USGS streamgages reporting	575

* < 30 yr period of record @USGS_Texas

Current: Sun Aug 27 2017 18:18:41 GMT-0500 (Central Daylight Time)



The #TexasRiverReport for 9/5/17 USGS science for a changing world

Current streamflow info for Texas (8:30amCDT)

Total number of USGS Texas Water Science Center streamgages reporting per category

Streamflow: Compared to 30-yr average		Extremes: Flooding vs. Zero Flow	
All-Time Low for this Day-of-Year	1	Above NWS Flood Stage	15
Much Below Normal for this Day-of-Year	6	Not Flowing (0 cfs)	61
Below Normal for this Day-of-Year	26	**Going up or down? Rising and Falling**	
Normal for this Day-of-Year	101	Stream Stage Rising	105
Above Normal for this Day-of-Year	51	Stream Stage Falling	200
Much Above Normal for this Day-of-Year	33	Stream Stage Steady	272
All-Time High for this Day-of-Year	29		
Not Ranked*	330	# of USGS streamgages reporting	577

* < 30 yr period of record @USGS_Texas

Current: Tue Sep 05 2017 08:30:09 GMT-0500 (Central Daylight Time)

- Allows water resource managers and public safety organizations **understand whether current or future conditions** of the river need to be addressed.

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Modernization:
Science, Technology, Response

DATA COMMUNICATION

SCIENCE

E

Making the Connections

- Provide improved *near-real time* stream gauge data sets
- Can be used for hydrological, hydrodynamic *modeling* and flood *forecasting*
- *Early warning* against floods
- *River basin management* on different scales
- Data for calibrating *satellite rainfall estimates*.

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Hurricane Florence

Layers | Legend 6

Hurricane Florence Forecast

Comments: Forecast points start with the current position of the storm and continue with forecasted positions out to 120 hours. The dashed forecast track connects these points. The shaded region indicates the cone of uncertainty.

Data Source: National Oceanic and Atmospheric Administration (NOAA) – National Hurricane Center

USGS Streams: Status

Remove

All-Time Low for this Day	0th percentile (minimum)
Much Below Normal	<10th percentile
Below Normal	10th – 24th percentile
Normal	25th – 75th percentile
Above Normal	76th – 90th percentile
Much Above Normal	>90th percentile
All-Time High for this Day	100th percentile (maximum)
Not Flowing	0 cubic feet per second
Above NWS Flood Stage	See Comments
Not Ranked	See Comments

Comments: Marker color indicates the current streamflow condition. Categories are based on the percentile of existing

Clear Map | About

Search for a place

Danville

USGS Gulf of Mexico Dashboard

2:00 PM Sat

100 km
50 mi
Scale: 1 : 2,311,162

Typhoon Mangkhut

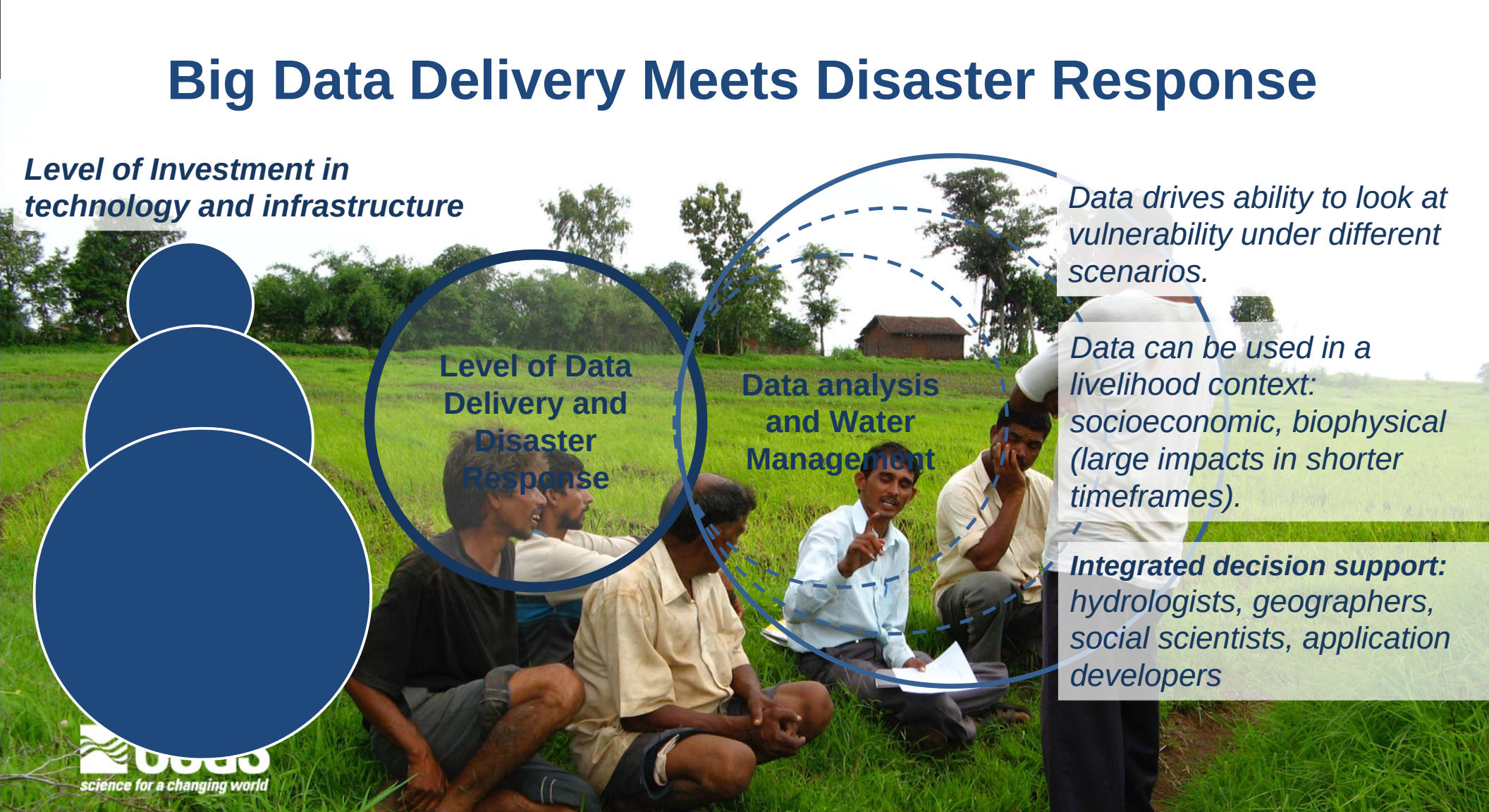
- 88 deaths in agricultural region
- Philippines 20 storms/yr
- City of Baguio: 31” rain

Once the data model is built with the pertinent information, scaling is simple & replicable:

1. Specific events
2. Geographies
3. Decision objectives (emergency response, pollution control)

Big Data Delivery Meets Disaster Response

Level of Investment in technology and infrastructure



Data drives ability to look at vulnerability under different scenarios.

Data can be used in a livelihood context: socioeconomic, biophysical (large impacts in shorter timeframes).

Integrated decision support: *hydrologists, geographers, social scientists, application developers*

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