

**CENTRE FOR SCIENCE AND ENVIRONMENT**



**ANIL AGARWAL DIALOGUE 2020**

# **ANNUAL MEDIA CONCLAVE ON THE STATE OF INDIA'S ENVIRONMENT**

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# Extreme Weather and What it Means for India's Poor

**Akshit Sangomla**

# Earth is heating up

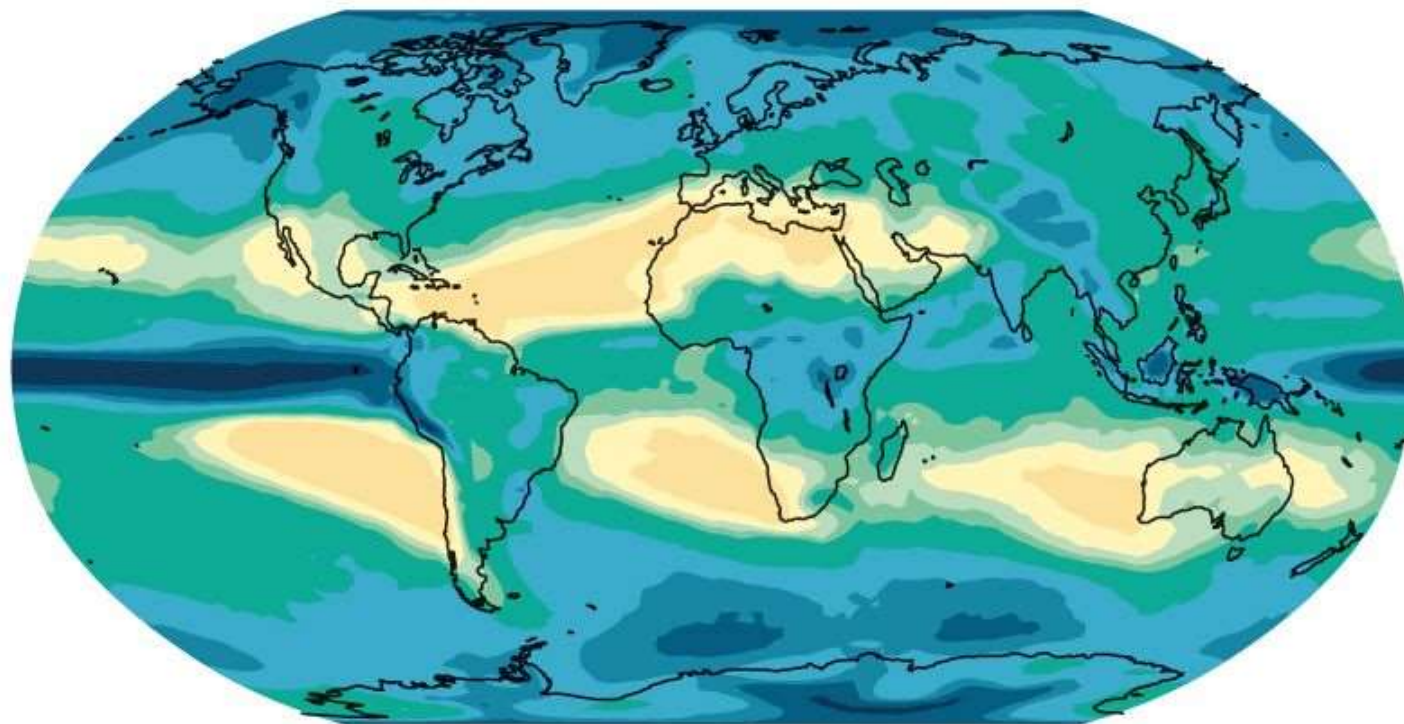
- In 2018 the concentration of green house gases was the highest in 3 million years at **407.8 parts per million**.
- 80 percent of this is carbon dioxide which is a long life gas.
- This has caused the Earth to heat up by **1.1 degree Celsius** since pre industrial times.
- 2019 was the second warmest year ever recorded
- 2009-2019 was the warmest decade

# Climate emergency

- The **9 climate tipping points** could be crossed faster than before and at lower levels of warming (1.5-2°C)
- Losses of Amazon rain forests, boreal forests, permafrost, Arctic sea ice, coral reefs, Atlantic circulations, Greenland ice sheet, East Antarctic and **West Antarctic** ice sheets
- Current trend puts us at a warming of between **3-5°C** which will be far beyond the point of no return
- US\$ 232 billion losses caused by natural disasters in 2019. **US\$ 229 billion** by weather related disasters
- 2009-2019 was the costliest decade in terms of climate disasters at **US\$ 2.98 trillion** as compared to 1.88 trillion from 2000-2009

# HEAVY RAIN

A climate model simulating daily precipitation changes suggests that if the planet warms by 3 °C, most land areas would see substantially more heavy rains.



◀ LESS LIKELY | MORE LIKELY ▶

-10

0

10

20

50

80

100

150

Change in probability of the most heavy rains (%)

# Flood-drought cycle becomes deadly

- Extreme rainfall means floods
- But worse, it means that water flows away; is not captured or harvested
- Leads to droughts
- Impacts on farmers – struggling for subsistence
- Impacts on water supply in cities
- Adds to conflict between cities and farmers on use of water

# Extreme weather in India

- Every month in the last two years has had at least one extreme weather event
- Extreme events have always occurred. Their character is changing
- Some of their characteristics can be explained by natural climate cycles of the Earth's atmosphere and oceans like El Nino Southern Oscillation, Indian Ocean Dipole and North Atlantic Oscillation.
- Other characteristics have a clear imprint of global warming

# Unusual weather events

- Delayed and uneven monsoon of 2019 that caused floods and landslides
- Extreme rainfall events in the past two years
- Cyclone Fani in May 2019
- Heat waves in 2019
- Kerala floods in 2018
- Dust storms of 2018



# Erratic 2019 Monsoon

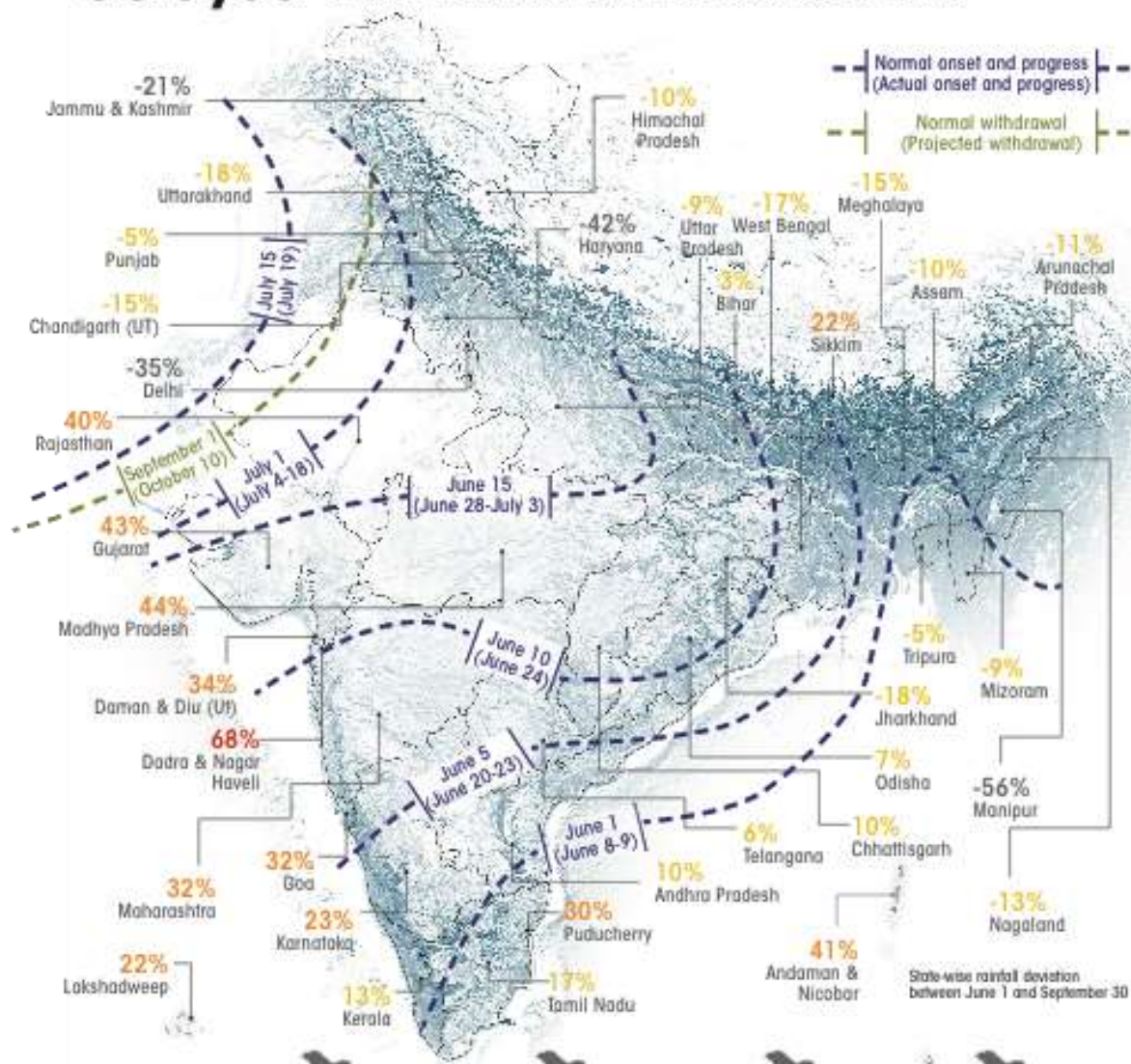
- Delayed by a week
- Was sluggish in the first month due to cyclone Vayu
- 31 states and union territories faced rainfall deficit of more than 25 percent. 16 had deficit of more than 40
- Changed character in mid July. 12 states received 60 percent surplus rains in that week
- In next three months caused floods in 22 states killing 2,100 people. Most intense in 25 years
- Extended into mid October
- Monsoon character is changing



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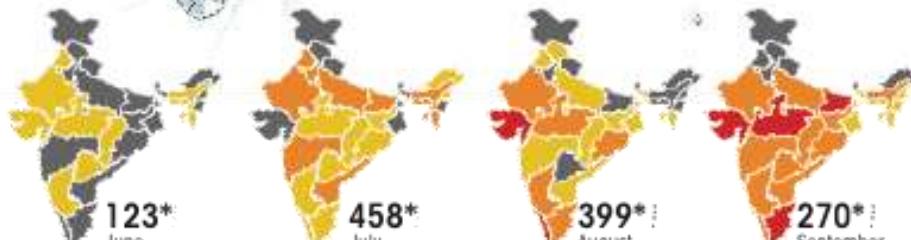
# Heavily delayed

Weather forecasters initially predicted a deficit monsoon this year on the back of a delayed start and slow progress. But heavy rains later have made this monsoon the wettest in 25 years. Even its withdrawal, which should have started on September 1, is delayed by 40 days



## DOWNPOUR

This monsoon saw 1,250\* very high rain days



1000 extreme rain events in first 12 days of August

It does not rain  
It pours

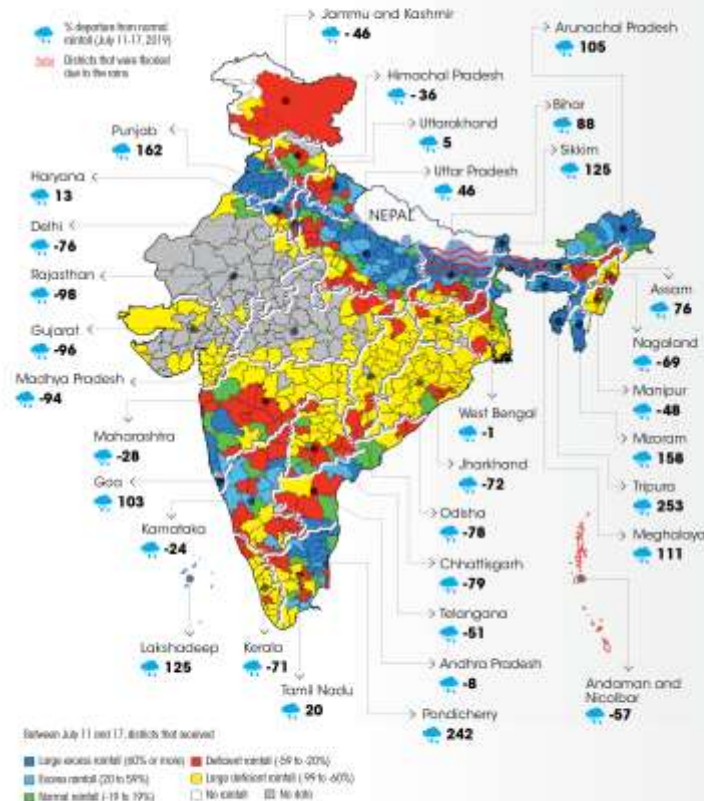
More rain  
Fewer rainy days

[https://www.downtoearth.org.in/dte-infographics/extreme\\_rainfall/index.html](https://www.downtoearth.org.in/dte-infographics/extreme_rainfall/index.html)

## COVER STORY / TRANSBOUNDARY BASIN

### A week of rains wreaks havoc

Twelve states in India received over 60 per cent surplus rains in the second week of July this year. The resultant floods in Bihar and Assam affected over 10 million and claimed 168 lives.



### KNOCKOUT SPELL

Within a span of 11 days, seasonal rainfall in Bihar went from deficit to surplus.

July 7

171.5 mm

rainfall recorded in Bihar till then. 27 of its 38 districts had more than 40 per cent deficient rains.

July 13

6 districts

in Bihar—East Champaran, Sitamarhi, Madhubani, Kishanganj, Araria and Sheohar—flooded due to incessant rainfall.

July 14

0.3 million

cows released from the Koshi Storage in Nepal that gushes to downstream Bihar.

July 16

10 districts

in Bihar reel under floods. The four additional districts are Purnia, Khatwa, Saharsa, Darbhanga.

July 17

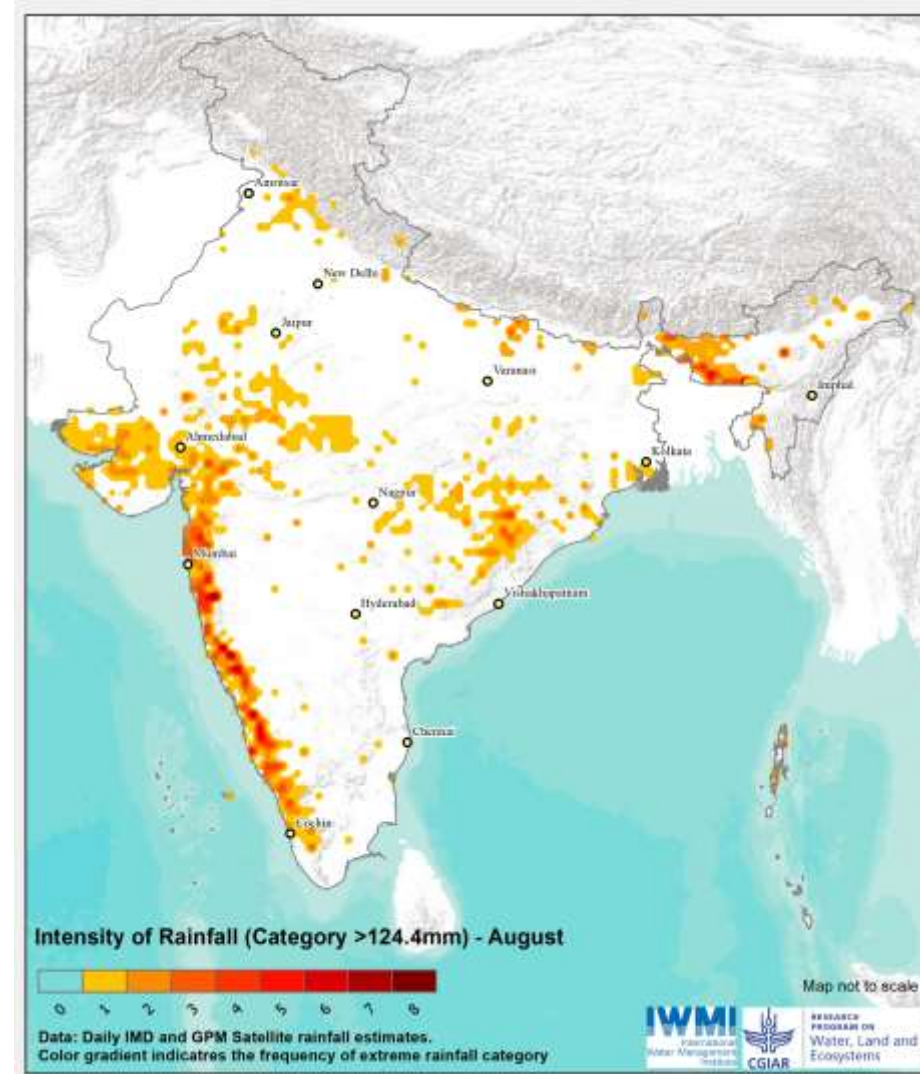
12 districts

in the state report floods. Bihar becomes a monsoon-surplus state. The two additional districts are Supaul, Muzaffarpur.

May not be scale  
Source: India Meteorological Department, International Water Management Institute, and media reports.

# India's true finance minister turns extreme

- Extreme and heavy rain events in August 2019
- IMD has to rework definitions of 'heavy' rain





# Drought-flood not single day events

- Cripple people
- Destroy livelihoods
- Take away development dividend
- As events become more frequent, survival becomes more difficult
- No option but to move – migrate – **to cities to new countries**
- Add to growing insecurity in world

Not climate change alone. **Our mismanagement.**  
Climate change is exacerbating impacts. Let's not let leaders blame change on the inevitable

## Rare dust storms of 2018

- In 100 days beginning February there were 44 storms across 16 states
- 423 people were killed and 785 people were injured
- Wind speeds exceeded 130 km/hr. Maximum known speeds are between 90 and 100 km/hr
- Main cause was the interaction of western disturbances with low pressure areas over Indo Gangetic Plains



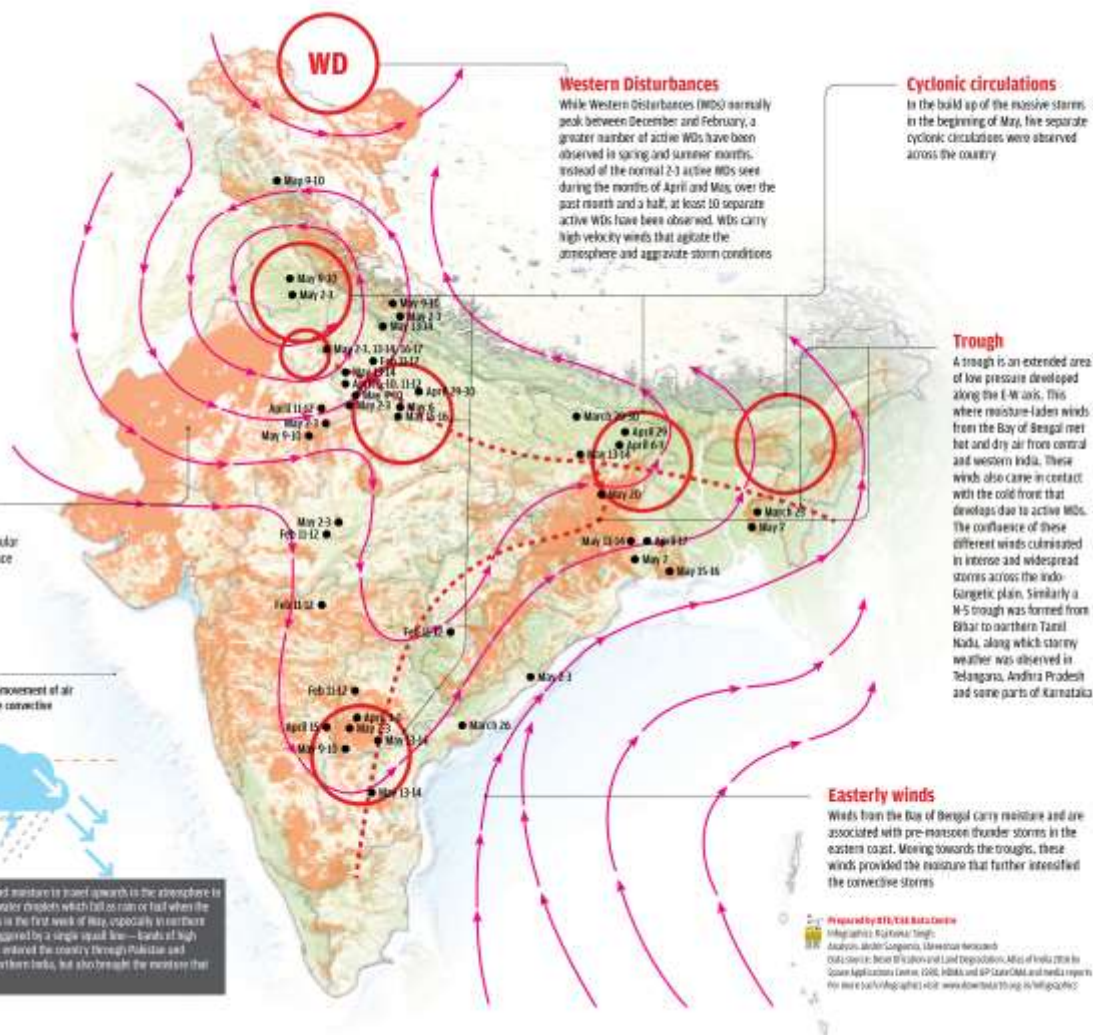
Rapid desertification, unprecedented heat wave conditions, greater number of Western Disturbances, increasing cyclonic circulations and two lines of low pressure winds combined to trigger the massive storms across India

**Legenda**

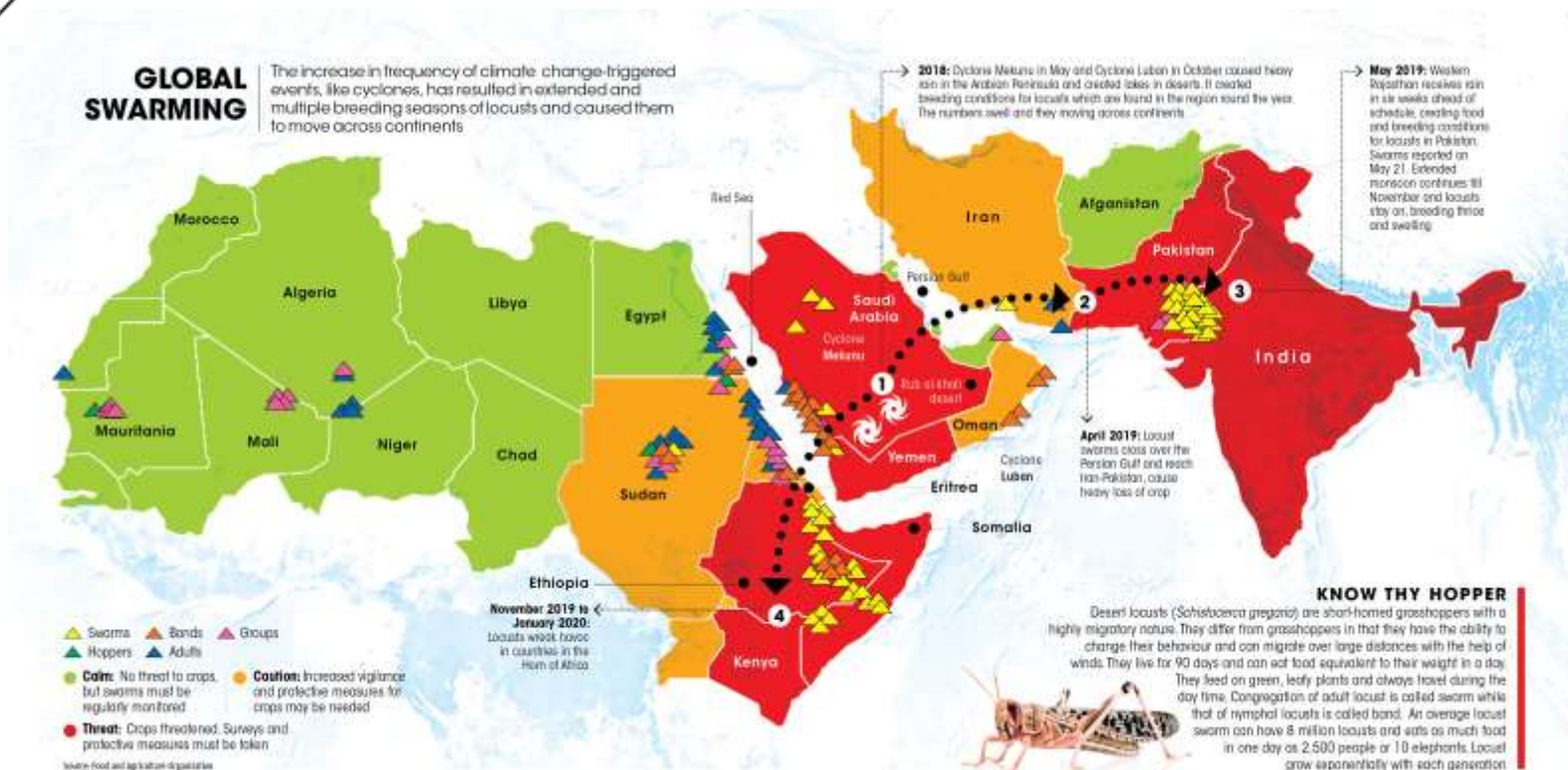
- Arrester desilvestificazione
- Storni (Rial), thunder, dust
- Wind direction

Temperatures over 40°C observed in northwest, central, east and north peninsular India. Interaction of hot air near the surface with colder winds from the Western Disturbances gives rise to intense and widespread storms.

Convective storm systems develop when intense heat at or near the surface causes air and moisture to travel upward to the atmosphere to form rising bearing clouds. As a cloud gains height, water vapour condenses and forms water droplets which fall as rain or fall when the clouds are strong, able to hold the water. The greater characteristic about the storm is the first week of May, especially in southern and northwestern India, was a kind of time domain of storms, which was apparently triggered by a single rapid low – South of high speed winds high up at the atmosphere that typically bring storms and rain. These winds entered the country's through Pakistan and Afghanistan. The rapid low level wind impinged the system of cyclonic circulations in northern India, but also brought the moisture that penetrated successive convective storms.



# Locust Attacks of 2019-20





## Tanumali

A rice farmer from Thengipada village of Odisha. Lost his house to extreme weather events thrice in the last 20 years. 1999 Super Cyclone, 2018 Floods, Cyclone Fani in 2019.

**“My family of 8 is  
in complete distress  
after this cyclone.”**



# Few links to important stories

<https://www.downtoearth.org.in/coverage/climate-change/run-for-cover-100-days-44-storms-16-states-423-deaths-60743>

<https://www.downtoearth.org.in/coverage/natural-disasters/cyclone-fani-the-tale-of-a-weird-storm-64521>

<https://www.downtoearth.org.in/news/natural-disasters/cyclone-fani-opens-four-new-mouths-in-chilika-lake-increases-salinity-wipes-out-fish-65071>

<https://www.downtoearth.org.in/news/climate-change/communication-gap-bihar-floods-show-why-india-nepal-need-to-get-their-act-together-65961>

<https://www.downtoearth.org.in/coverage/climate-change/this-is-why-kerala-floods-were-the-worst-in-a-century-61491>



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*Thank you*

