WMO ATLAS OF MORTALITY AND ECONOMIC LOSSES FROM WEATHER, CLIMATE AND WATER EXTREMES (1970–2019)

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

14th meeting of the Executive Committee of the Warsaw International Mechanism for Loss and Damage (WIM)

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World Meteorological Organization

Date: 20 September 2021

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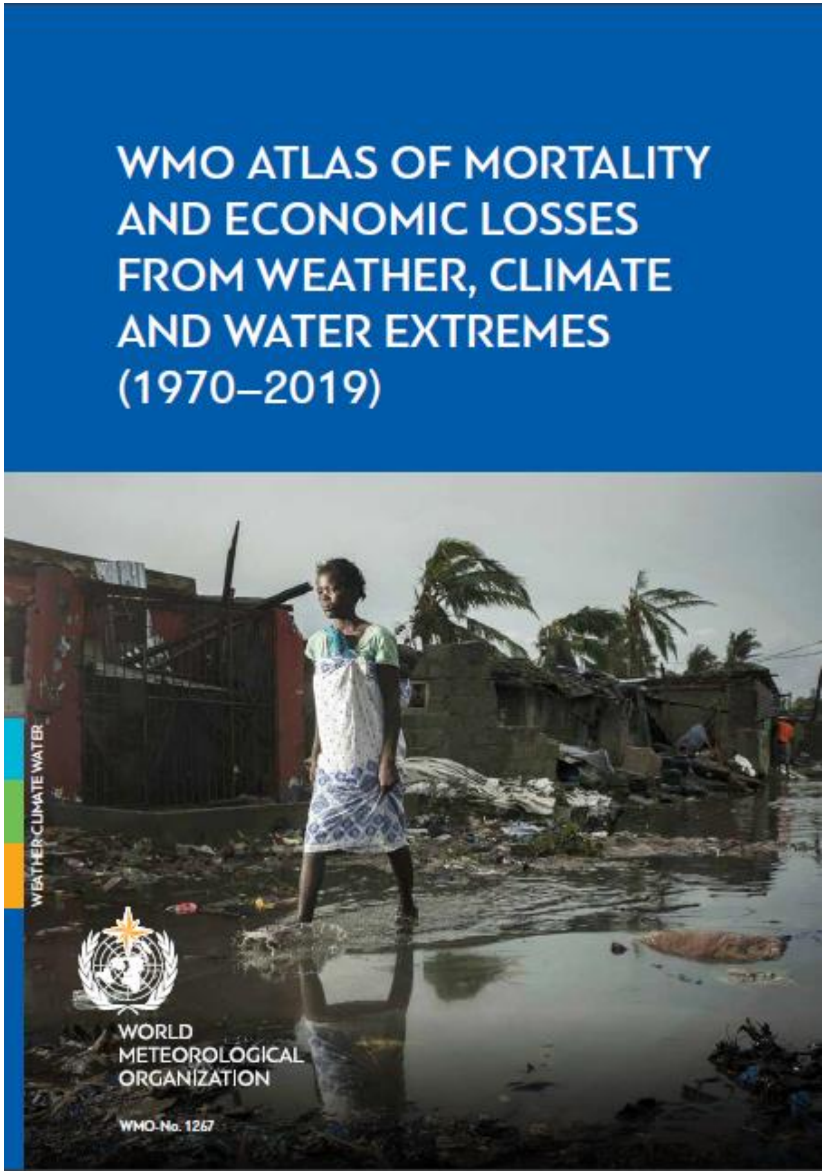
World Meteorological Organization
Organisation météorologique mondiale

What this presentation will cover

- Atlas structure
- Show selected WMO Atlas graphics globally, for Africa and for Tropical Cyclones.
- Provide some key points and takeaways



WMO Atlas structure

- Background and methodology for development of the Atlas
- How is loss & damage attributed to natural hazards and climate change
- Status of mortality and economic losses from 1970 – 2019.
  - Includes a special section "Focus on tropical cyclones which documents recorded impacts from tropical cyclones"
- Role and potential of disaster loss databases which includes contributions from UNDRR and WHO.

[Link: The Atlas of Mortality and Economic Losses from We... | E-Library (wmo.int)](https://library.wmo.int/index.php?lvl=notice_display&id=21930#.YUg7QSviuUk)

URL: https://library.wmo.int/index.php?lvl=notice_display&id=21930#.YUg7QSviuUk

Global

Table 1. Top 10 disasters ranked according to reported (a) deaths and (b) economic losses (1970–2019)[8]

(a)	Disaster type	Year	Country	Deaths
1	Drought	1983	Ethiopia	300 000
2	Storm (*Bhola*)	1970	Bangladesh	300 000
3	Drought	1983	Sudan	150 000
4	Storm (*Gorky*)	1991	Bangladesh	138 866
5	Storm (*Nargis*)	2008	Myanmar	138 366
6	Drought	1973	Ethiopia	100 000
7	Drought	1981	Mozambique	100 000
8	Extreme temperature	2010	Russian Federation	55 736
9	Flood	1999	Bolivarian Republic of Venezuela	30 000
10	Flood	1974	Bangladesh	28 700
(b)	**Disaster type**	**Year**	**Country**	**Economic losses (in US$ billion)**
1	Storm (*Katrina*)	2005	United States	163.61
2	Storm (*Harvey*)	2017	United States	96.94
3	Storm (*Maria*)	2017	United States	69.39
4	Storm (*Irma*)	2017	United States	58.16
5	Storm (*Sandy*)	2012	United States	54.47
6	Storm (*Andrew*)	1992	United States	48.27
7	Flood	1998	China	47.02
8	Flood	2011	Thailand	45.46
9	Storm (*Ike*)	2008	United States	35.63
10	Flood	1995	Democratic People's Republic of Korea	25.17

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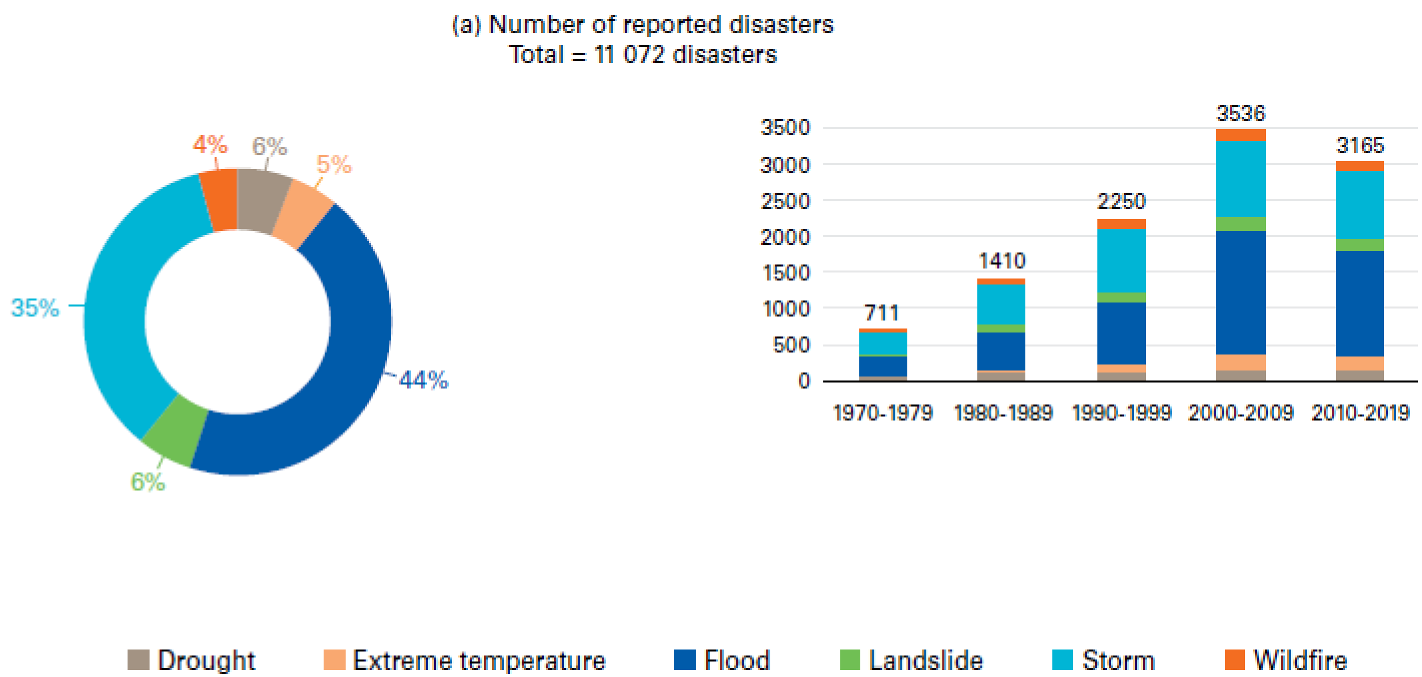
Global



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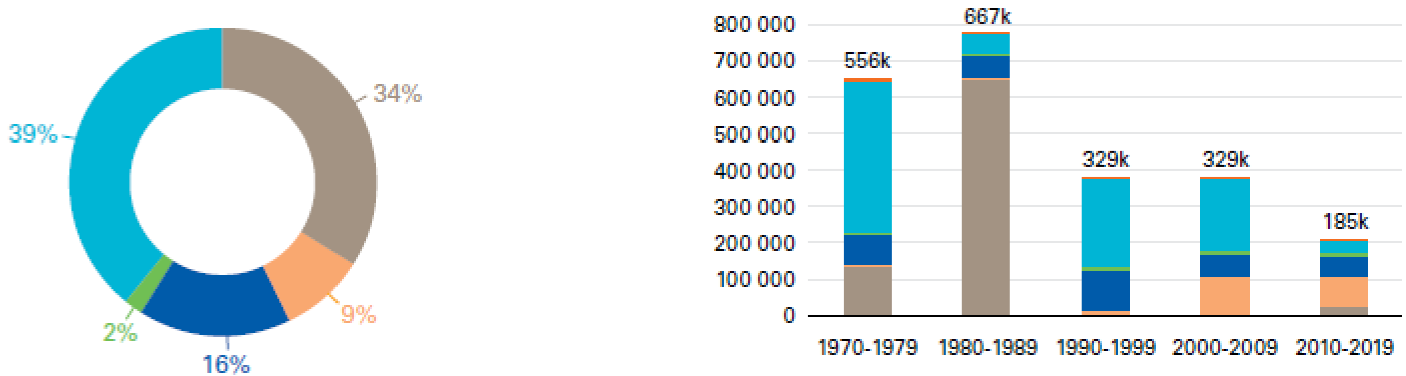
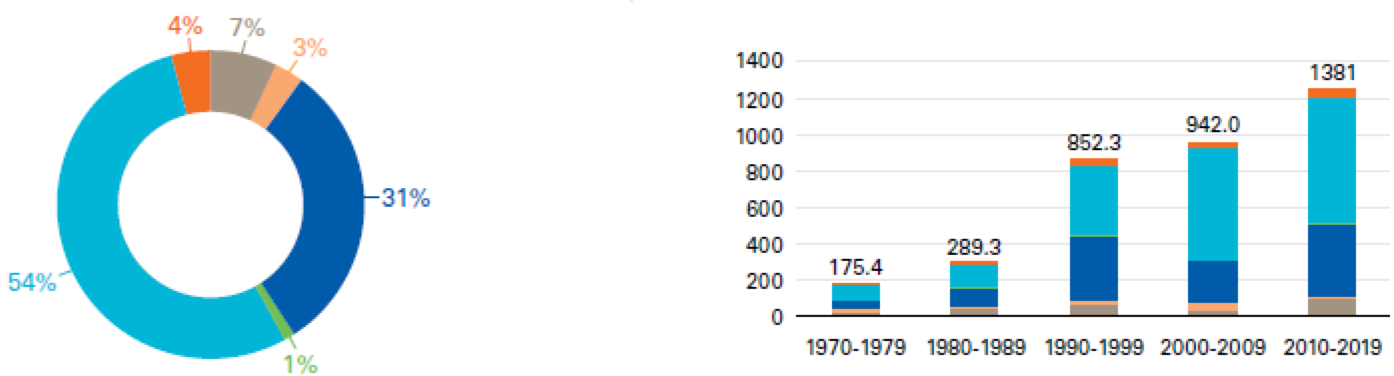
Global

(b) Number of reported deaths
Total = 2 064 929 deaths



(c) Reported economic losses in US$ billion
Total = US$ 3.6 trillion



Drought Extreme temperature Flood Landslide Storm Wildfire

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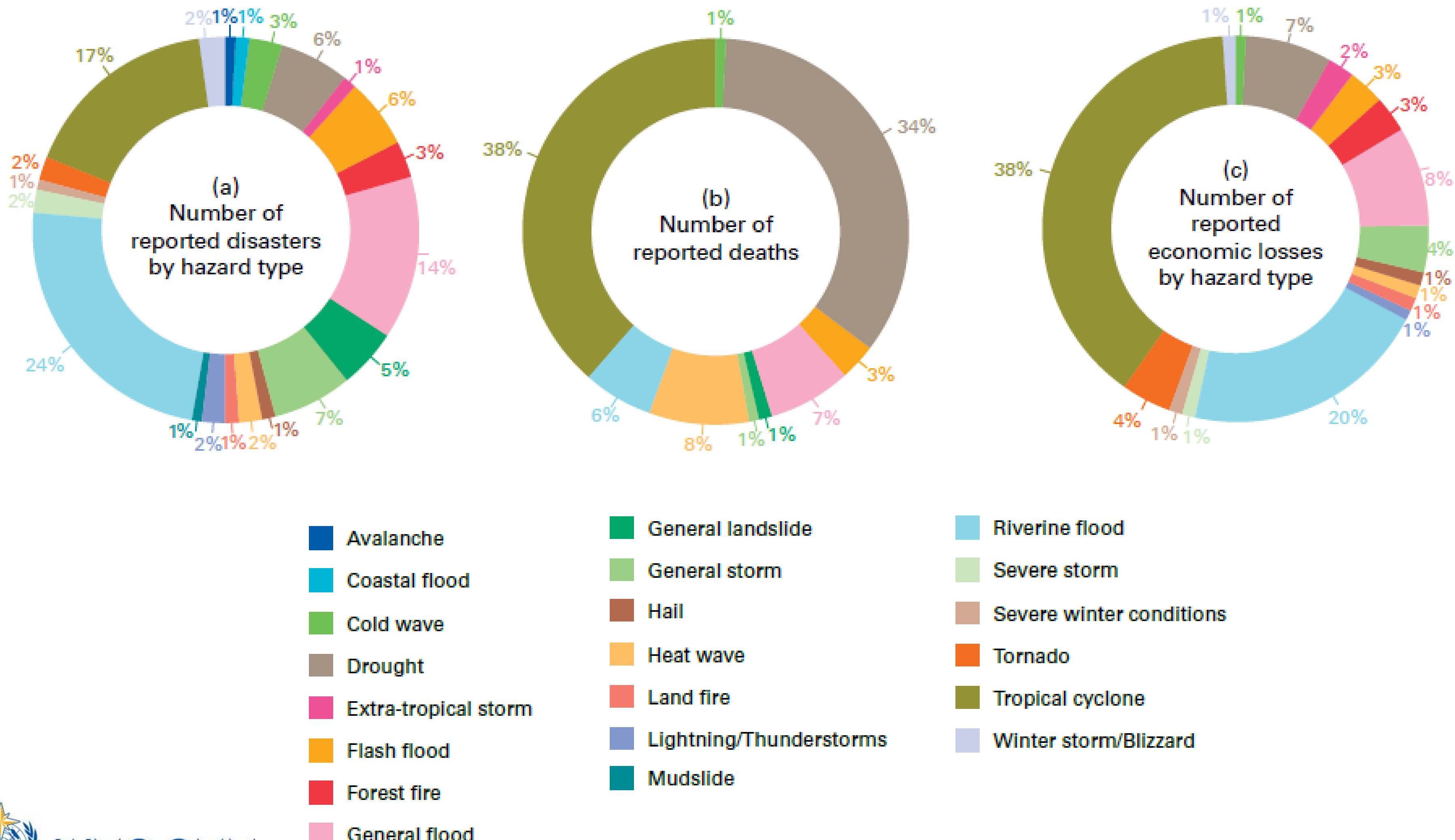
Global Distribution of disasters by hazard



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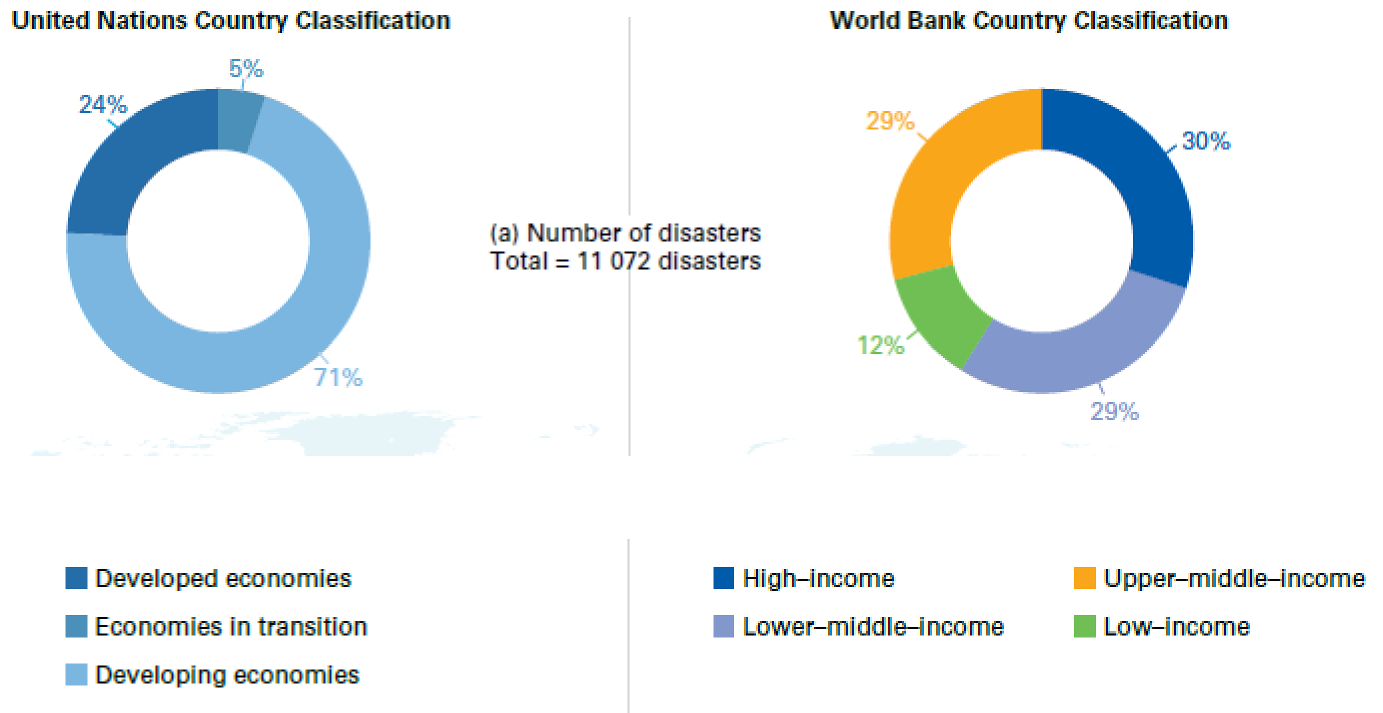
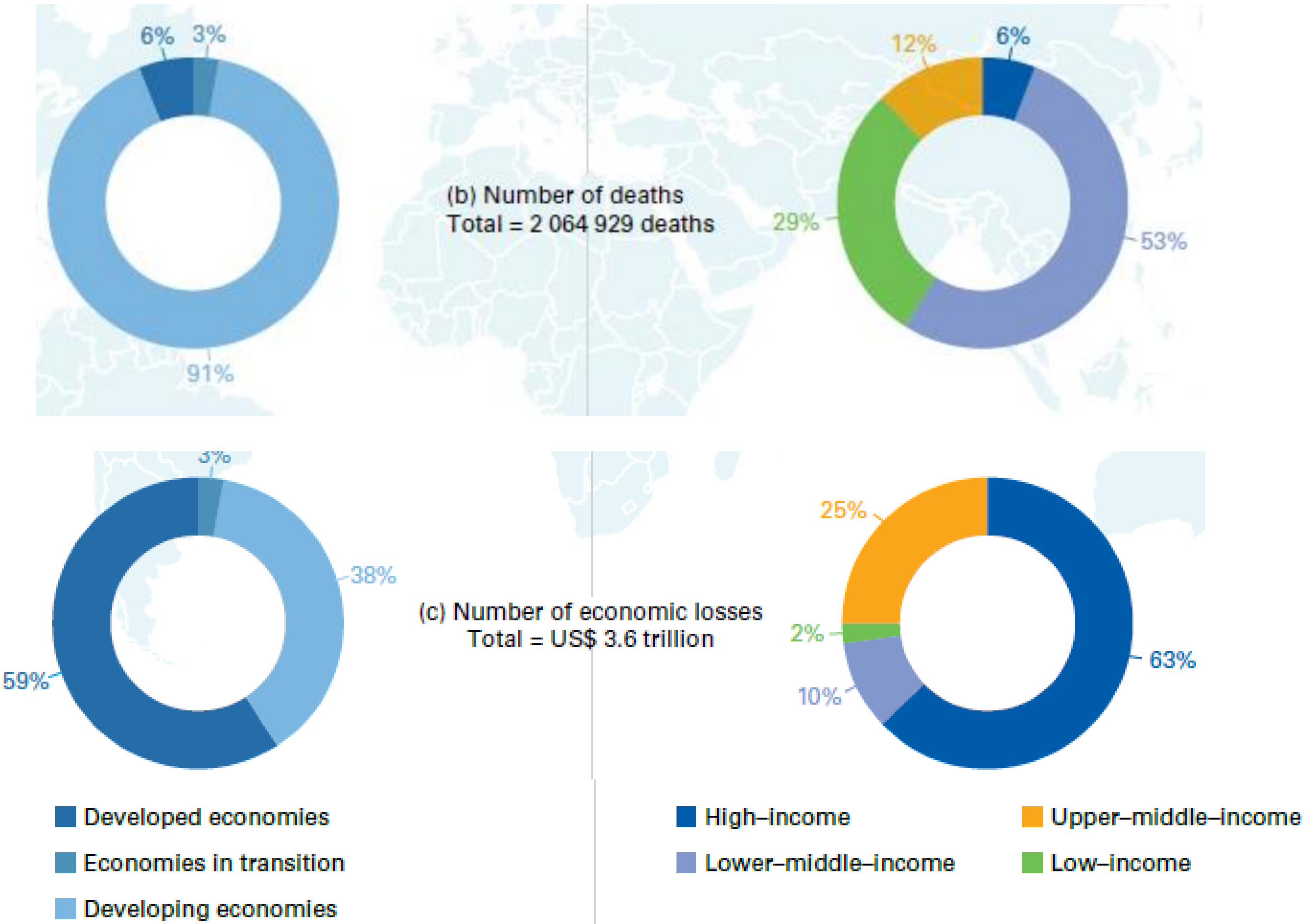
Global distribution of reported disasters by United Nations and World Bank country classifications



Global disaster impacts by United Nations and World Bank country classifications



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Africa Top 10 disasters ranked according to reported (a) deaths and (b) Economic losses

(a)	Disaster type	Year	Country	Deaths
1	Drought	1983	Ethiopia	300 000
2	Drought	1983	Sudan	150 000
3	Drought	1973	Ethiopia	100 000
4	Drought	1981	Mozambique	100 000
5	Drought	2010	Somalia	20 000
6	Drought	1973	Somalia	19 000
7	Drought	1980	Chad	3 000
8	Flood	1997	Somalia	2 311
9	Landslide	2017	Sierra Leone	1 102
10	Flood	2001	Algeria	921
(b)	**Disaster type**	**Year**	**Country**	**Economic losses (in US$ billion)**
1*	Drought	1990	South Africa	1.96
1*	Storm (*Idai*)	2019	Mozambique	1.96
3	Flood	1987	South Africa	1.72
4*	Storm (*Emilie*)	1977	Madagascar	1.48
4*	Drought	2015	Ethiopia	1.48
6	Drought	1999	Morocco	1.38
7	Drought	1976	Senegal	1.35
8	Drought	2017	South Africa	1.22
9	Storm (*Gervaise*)	1975	Mauritius	0.95
10	Flood	2011	Algeria	0.89

* Countries that have identical figures for deaths or economic losses are ranked jointly.

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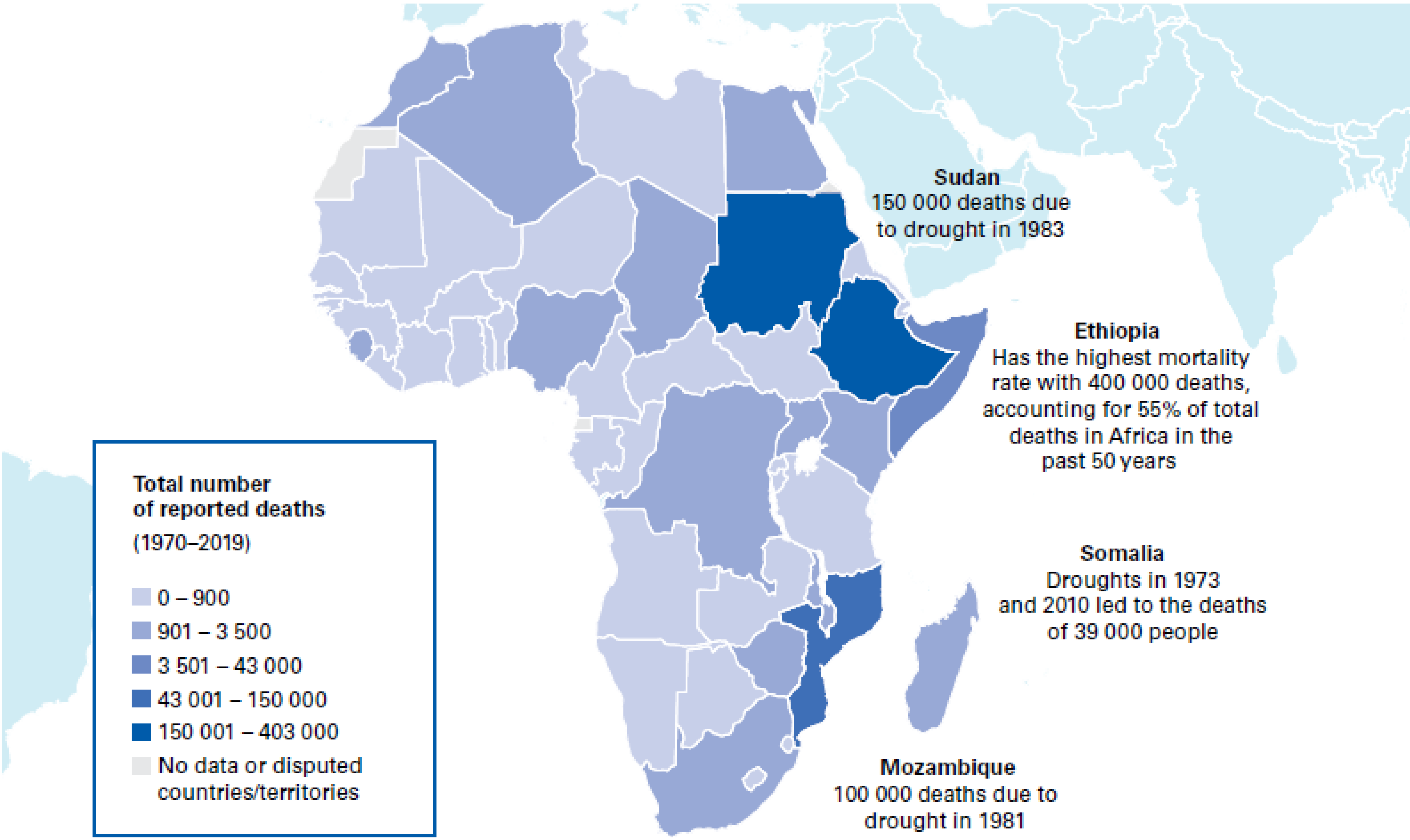
Africa - reported deaths related to disasters



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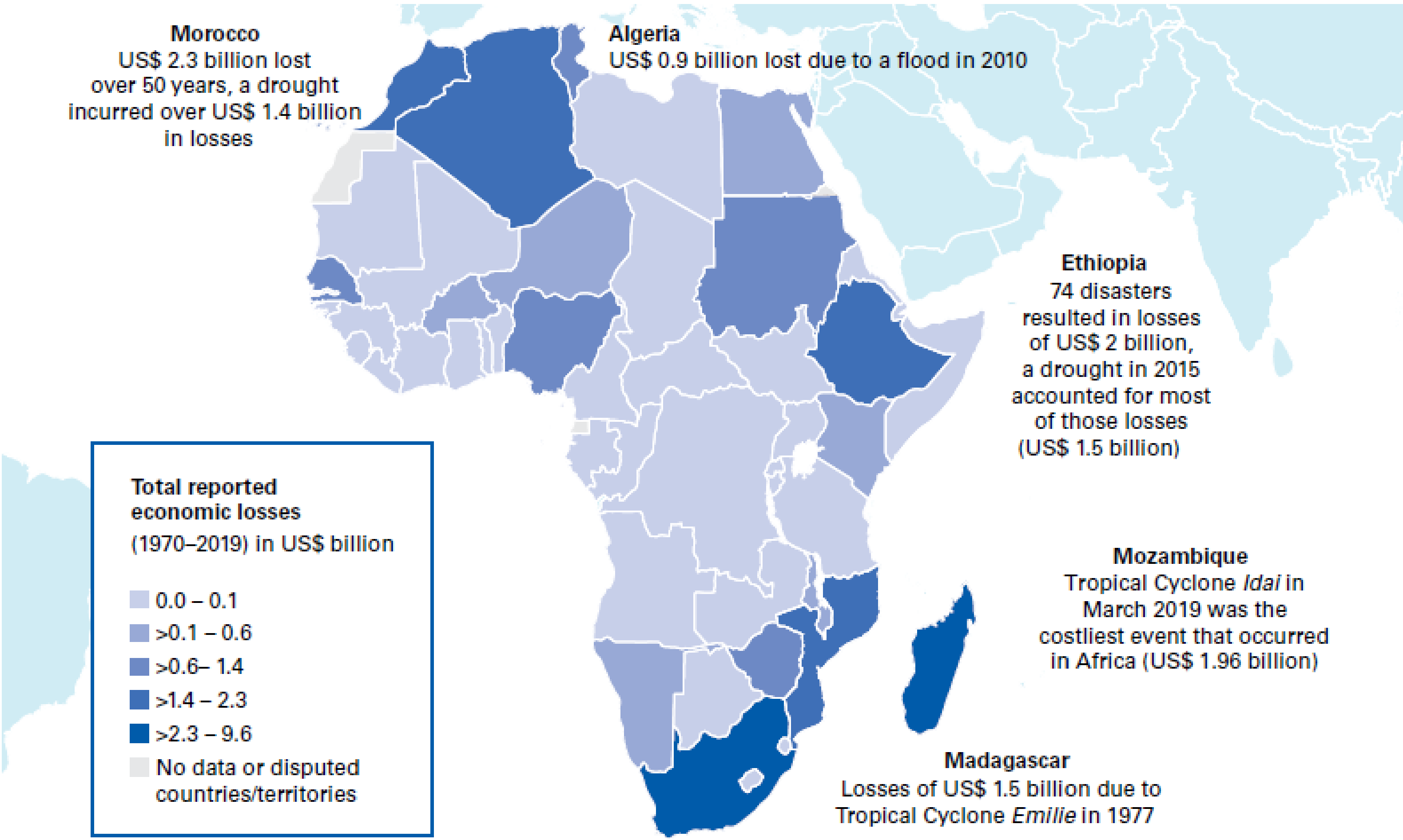
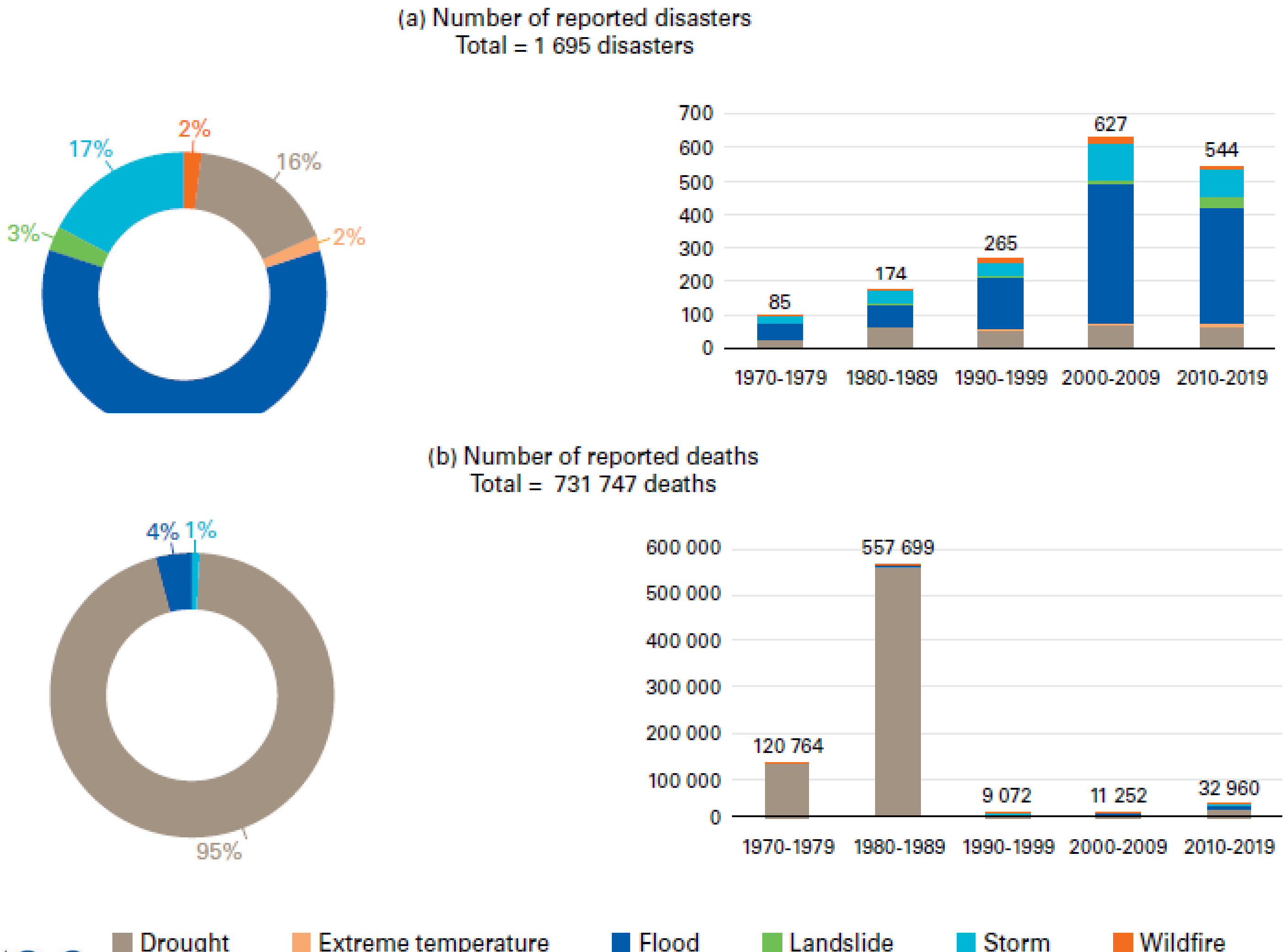
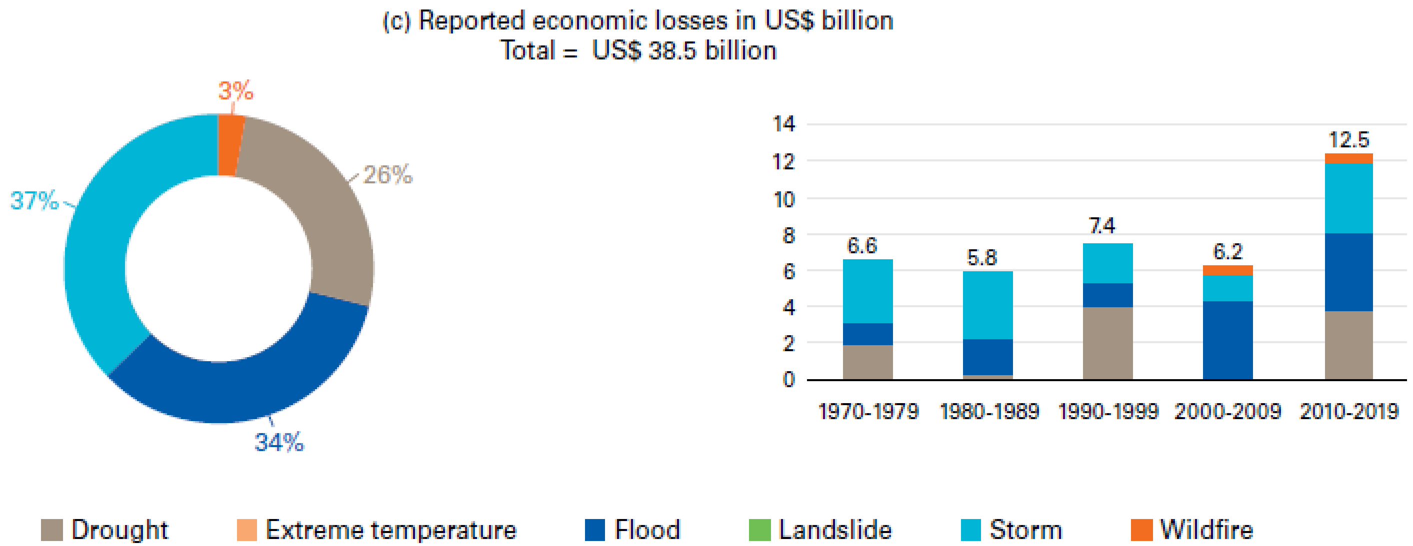
Africa - Reported Economic losses related to disasters



Africa – No. of disasters and reported deaths



Africa – Economic Losses



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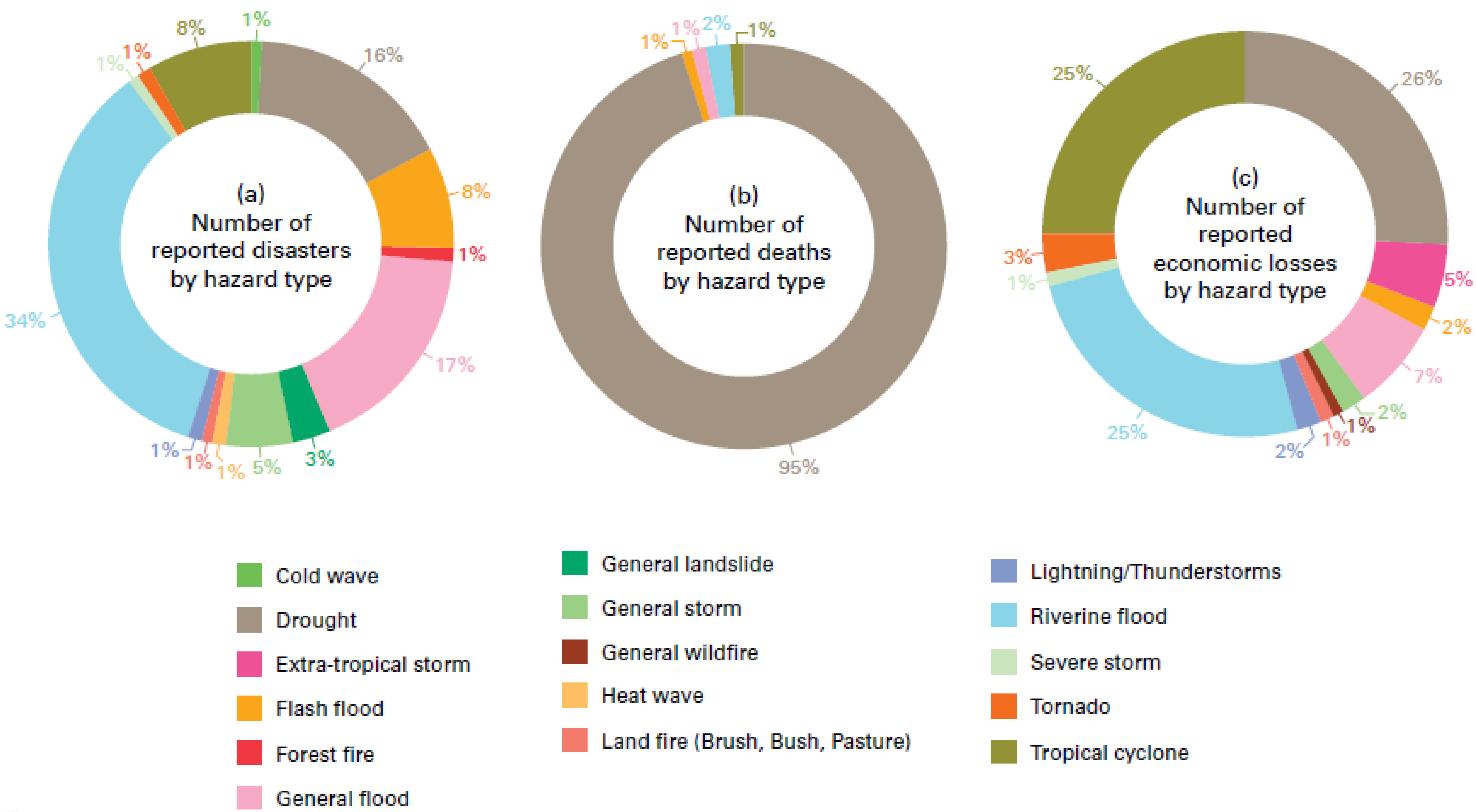
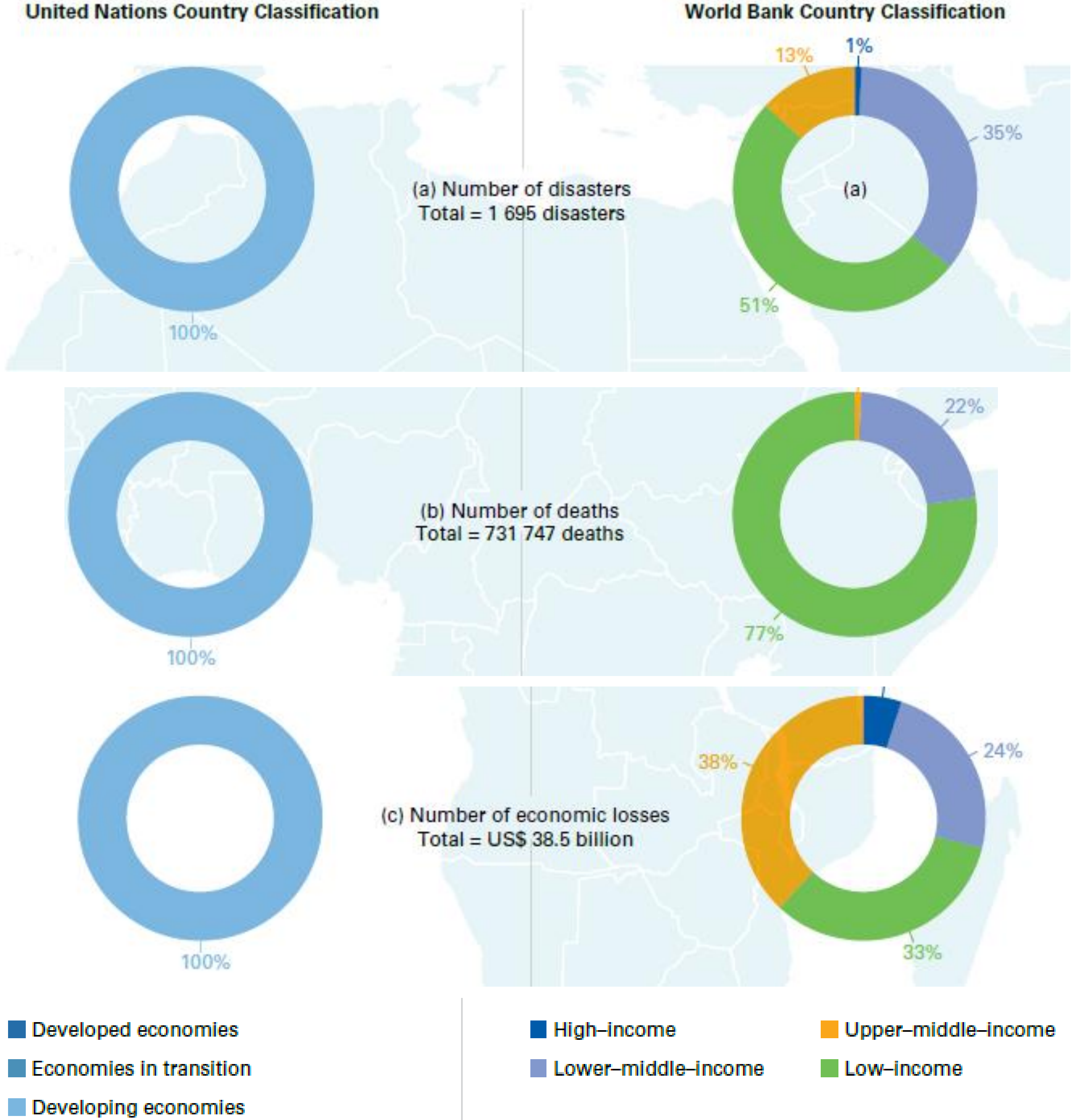
Africa – by Hazard




United Nations Country Classification
World Bank Country Classification
100%
(a) Number of disasters
Total = 1 695 disasters
(a)
1%
13%
35%
51%
100%
(b) Number of deaths
Total = 731 747 deaths
22%
77%
100%
(c) Number of economic losses
Total = US$ 38.5 billion
38%
24%
33%
Developed economies
Economies in transition
Developing economies
High–income
Upper–middle–income
Lower–middle–income
Low–income

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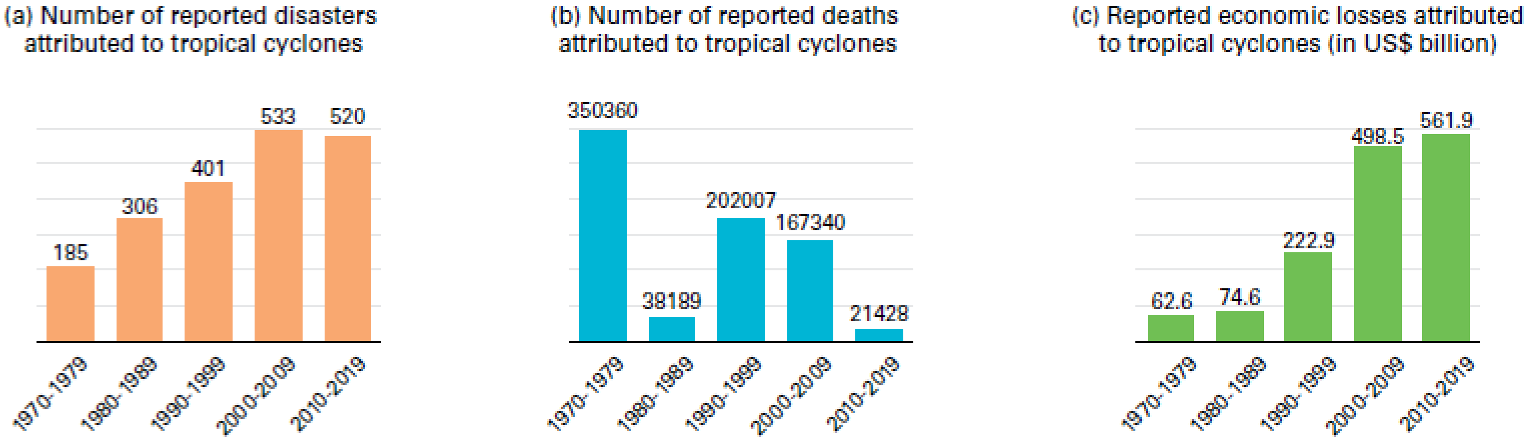
FOCUS ON TROPICAL CYCLONES

Table 8. Top 10 tropical cyclones by (a) number of deaths and (b) economic losses globally (1970–2019)

(a)	Disaster type	Year	Country	Deaths
1	Storm	1970	Bangladesh	300 000
2	Storm (*Gorky*)	1991	Bangladesh	138 866
3	Storm (*Nargis*)	2008	Myanmar	138 366
4	Storm	1985	Bangladesh	15 000
5	Storm (*Mitch*)	1998	Honduras	14 600
6	Storm	1977	India	14 204
7	Storm (05B)	1999	India	9 843
8	Storm	1971	India	9 658
9	Storm (*Fifi*)	1974	Honduras	8 000
10	Storm (*Haiyan*)	2013	Philippines	7 354
(b)	**Disaster type**	**Year**	**Country/territory**	**Losses in US$ billion**
1	Storm (*Katrina*)	2005	United States	163.61
2	Storm (*Harvey*)	2017	United States	96.94
3	Storm (*Maria*)	2017	Puerto Rico	69.39
4	Storm (*Irma*)	2017	United States	58.16
5	Storm (*Sandy*)	2012	United States	54.47
6	Storm (*Andrew*)	1992	United States	48.27
7	Storm (*Ike*)	2008	United States	35.63
8	Storm (*Ivan*)	2004	United States	24.36
9	Storm (*Charley*)	2004	United States	21.65
10	Storm (*Rita*)	2005	United States	20.94

Tropical Cyclone by Decade



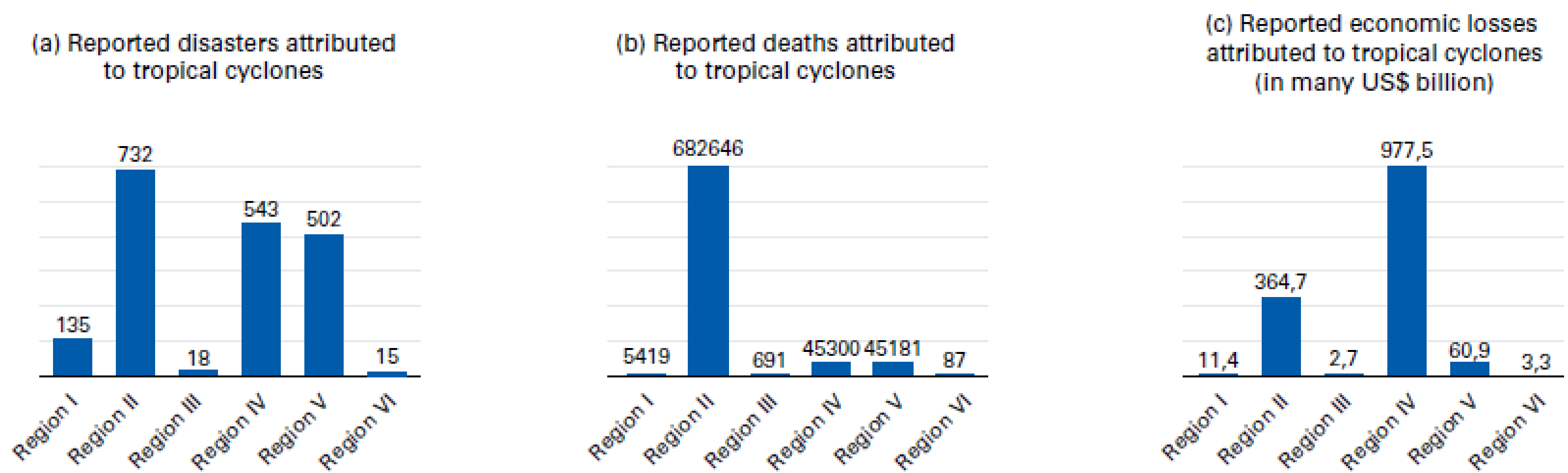


Figure 34. Distribution of (a)number of disasters, (b) number of deaths and (c) economic losses attributed to tropical cyclones by WMO region

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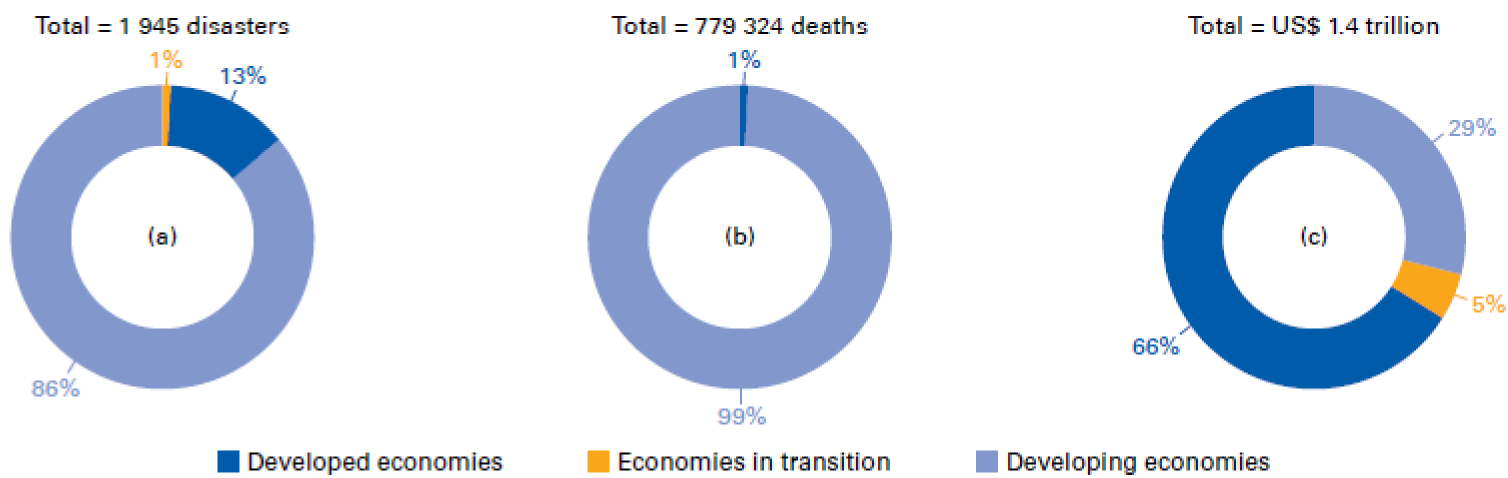
Tropical Cyclones – Economic Distributions



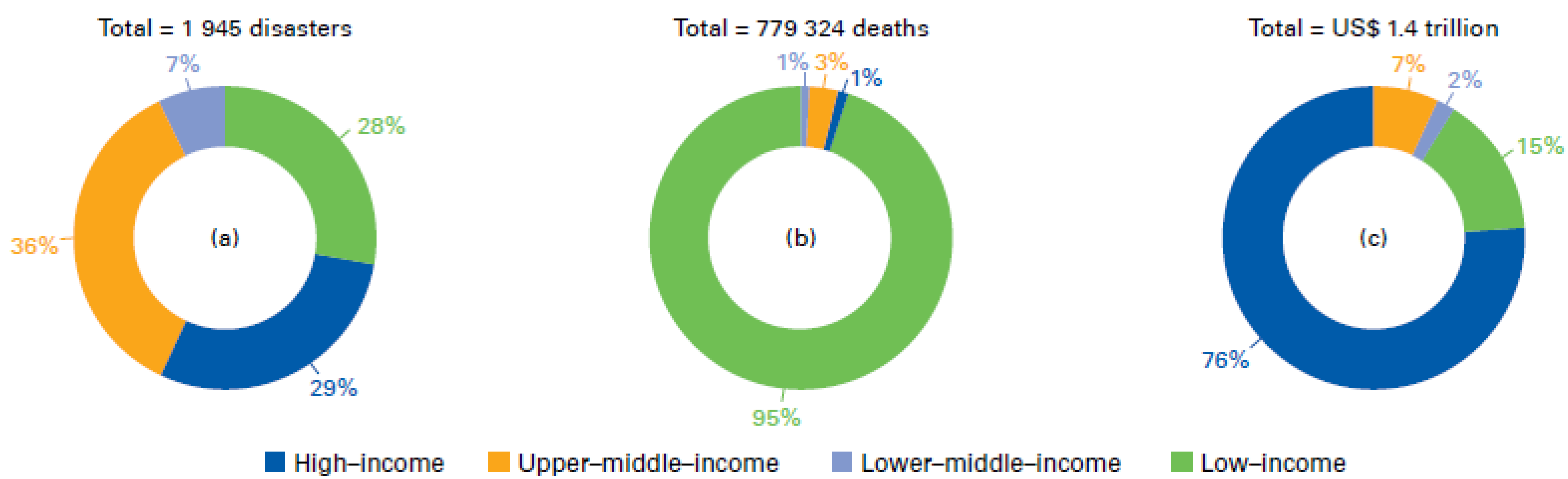


Figure 36. Distribution of (a) number of disasters, (b) number of deaths and (c) economic losses attributed to tropical cyclones by World Bank country classification

Some Key Points

- Loss of life due to weather, climate, and water-related hazards has decreased over time. This has been widely attributed to the implementation of and strengthening of early warning systems
  - Bangladesh – Cyclone preparedness programme
  - Louisiana – Hurricane Ida
  - Work still needs to be done: Still, 91 percent of deaths due to weather, climate, and water-related disasters have been recorded in developing countries (UN classification).
- Economic losses have increased. this has been widely attributed to increased building in vulnerable areas as well as along exposed coast lines susceptible to tropical cyclones.

Key messages

- Review hazard exposure and vulnerability considering a changing climate to reflect that tropical cyclones may have different tracks, intensity, and speed than in the past.
  - Typhoon Haiyan in the Philippines – Hit a southern area of the Philippines that had never been hit before by a tropical cyclone.
  - Hurricane Harvey in southeast Texas – slow moving – significant flooding.
  - Need for strengthening disaster/ hazard databases for improved understanding of risk to society
- Strengthen national disaster loss and damage recording processes, including identifying losses, attribution to weather, water, and climate-related hazards, exposure and vulnerability data collection, storage, and analysis methodologies.
- Strengthen disaster risk financing mechanisms at national to international levels, especially for Least Developed Countries and Small Island Developing States and Territories to facilitate build back better and preventative measures.
- Develop national integrated and proactive policies/plans on slow-onset disasters such as drought.

Thank you

WMO Cataloguing of Hazardous Events

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Organisation météorologique mondiale

The WMO Cataloguing of Hazardous Events (WMO-CHE)

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Why the WMO Cataloging of Hazardous Events Initiative

Issue:

In many cases the attribution and context of a recorded loss is not accurately associated to the causal hazard.

Vision: To provide loss and damage stakeholders with a **c**ataloging of weather, climate, water and space weather events as a standardized national operational process.

Example:

- Typhoon Haiyan, November 2013, Philippines and Vietnam
- El Nino 2015

Typhoon Haiyan / Yolanda 2013

Characteristics

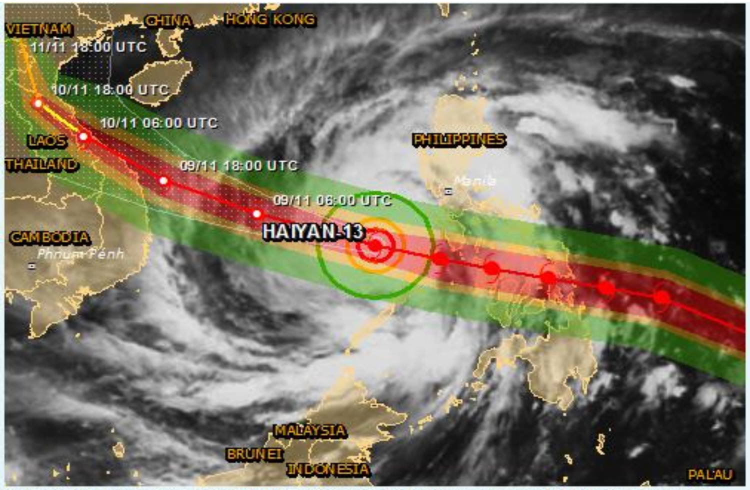
- Max wind: 230 km/h
- Costal surges: up to 5 meters

Reported loss and damage

- More than 6352 deaths with 1071 missing
- 14 millions people affected
- 850 million USD damage

How are loss and damages attributed to each causal hazard in a systematic and authoritative way? (Wind, storm surge, rain, flooding, disease outbreak, loss of power… etc)?

How do we ensure loss and damage is recorded for the lifespan of the hazard (e.g., impacts from all countries Philippines, Vietnam, SIDS) .



Cloud map. The map shows the areas affected by tropical storm strength winds (green), 58mph winds (orange) and cyclone wind strengths (red). (*Source: JRC*)

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El Nino 2015

Characteristics

- Prolonged drought in vast area, Asia, etc.
- Heavy rain in South America.

Example of reported loss and damage

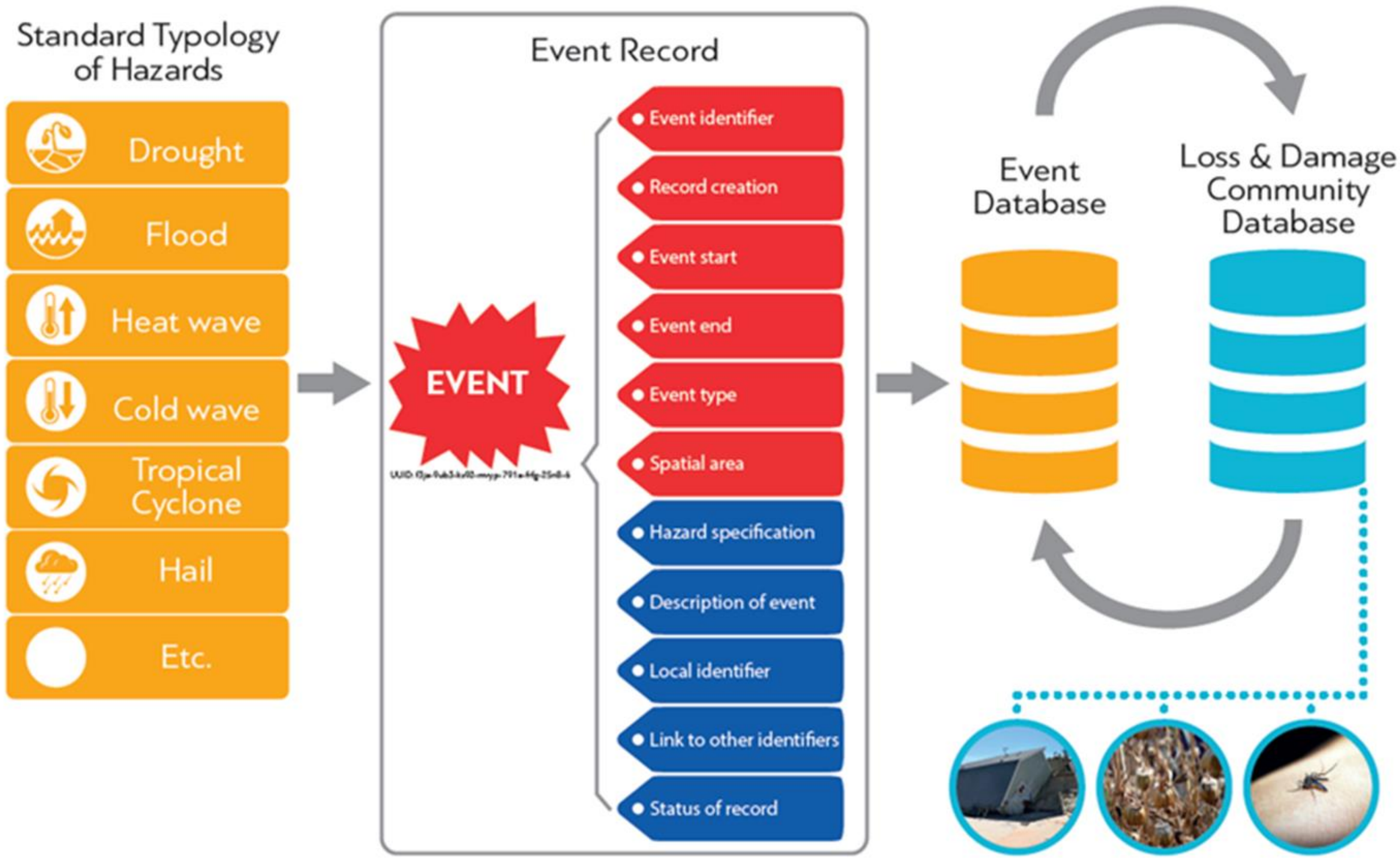
- Severe impacts on sectors: agriculture, forestry, transport, trade, industry, tourism, …
- Estimated economic impact 25Bn US$ for Indonesia (2% of GDP).

How are losses and damages (national to global) attributed to El Nino in a systematic and authoritative way?

WMO CHE Goals

- Strengthening Members capabilities to record weather, climate, water and space weather events in a systematic way (for forensic meteorology, liability claims, research, and many other disciplines)
- WMO’s contribution to the monitoring of the global agenda through an empirical science-based approach
- Strengthening of Member disaster management capacities and MHEWS through improved risk-based information
- Strengthening of WMO leadership related to hydrometeorological and climate related hazards through provision of an agreed upon list of types of events associated with impacts

The Cataloguing Methodology



WMO Events List

- Initial list of event types with which losses and damage are potentially associated
- Authoritative list of event types that is non-technical and practical which will facilitate standardization of event terminology that is under the mandate of the WMO.
- Not intended to be a hierarchical list based on causalities but to be a flat list to facilitate observation and recording
- Can be amended by countries and regions through the appropriate WMO governance mechanism
- Synergizes with the **UNDRR / ISC Hazard Definition & Classification Review: Technical Review https://council.science/events/hazards-report/**

Events list (Initial global common list)

1. Avalanche
2. Cold wave
3. Drought
4. Dry spell
5. Dust storm
6. Sandstorm
7. Extra-tropical cyclone
8. Flood
9. Fog
10. Freezing rain
11. Frost
12. Hail
13. Haze/Smoke
14. Heat wave
15. High Seas
16. Rogue waves
17. High UV radiation
18. Icing
19. Landslide
20. Mudslide
21. Debris flow
22. Lightning
23. Pollen pollution/Polluted air
24. Rain
25. Wet Spell
26. Snow
27. Snowstorm
28. Space weather event
29. Storm surge/Coastal flood
30. Thunderstorms
31. Squall lines
32. Tornado
33. Tropical cyclone
34. Tsunami
35. Volcanic ash
36. Wild land fire/Forest fire
37. Wind

Cascading Event Records

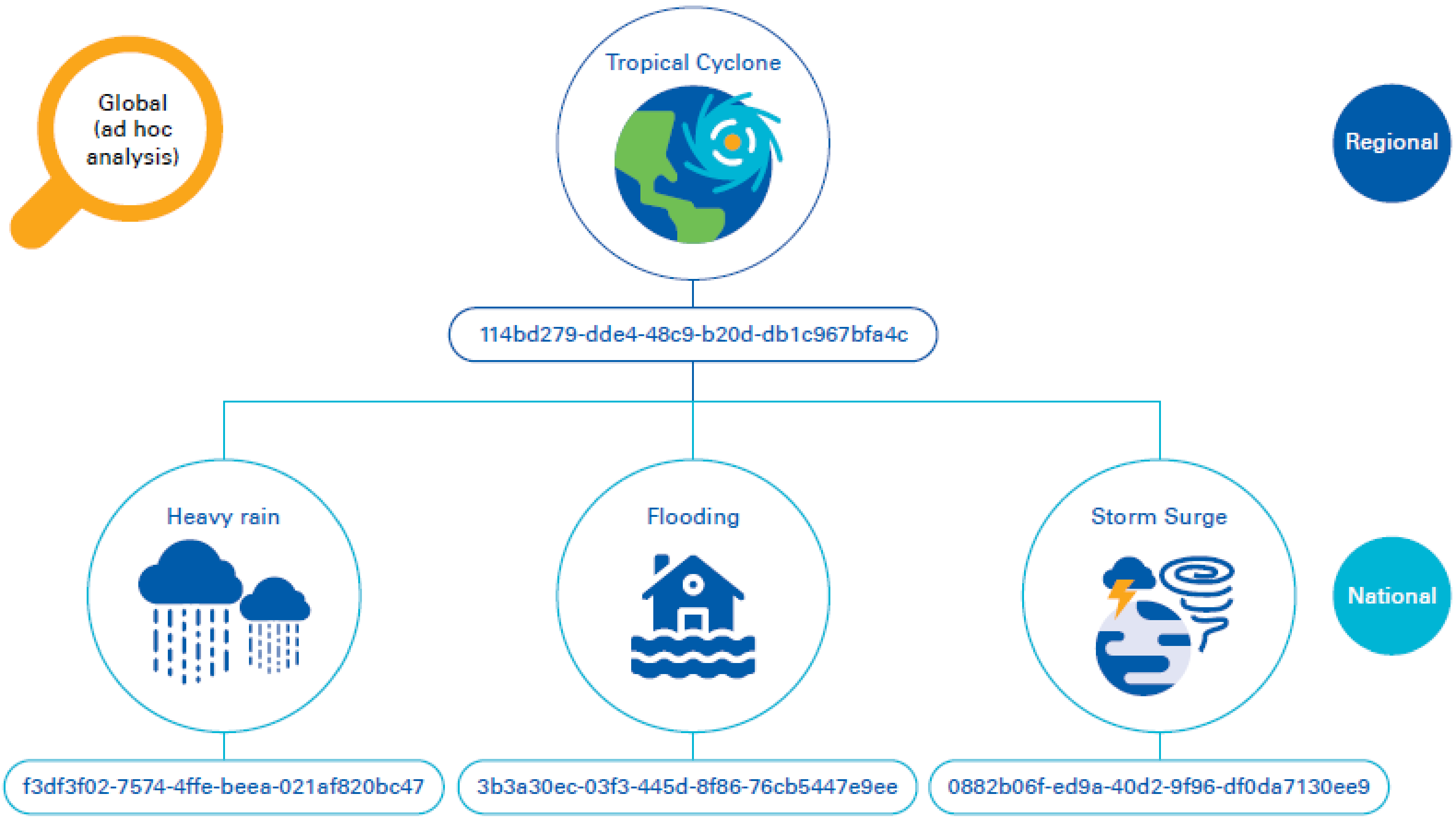


Figure 3. Example of cross-linkage of events through unique identifiers (blue lines indicate links)

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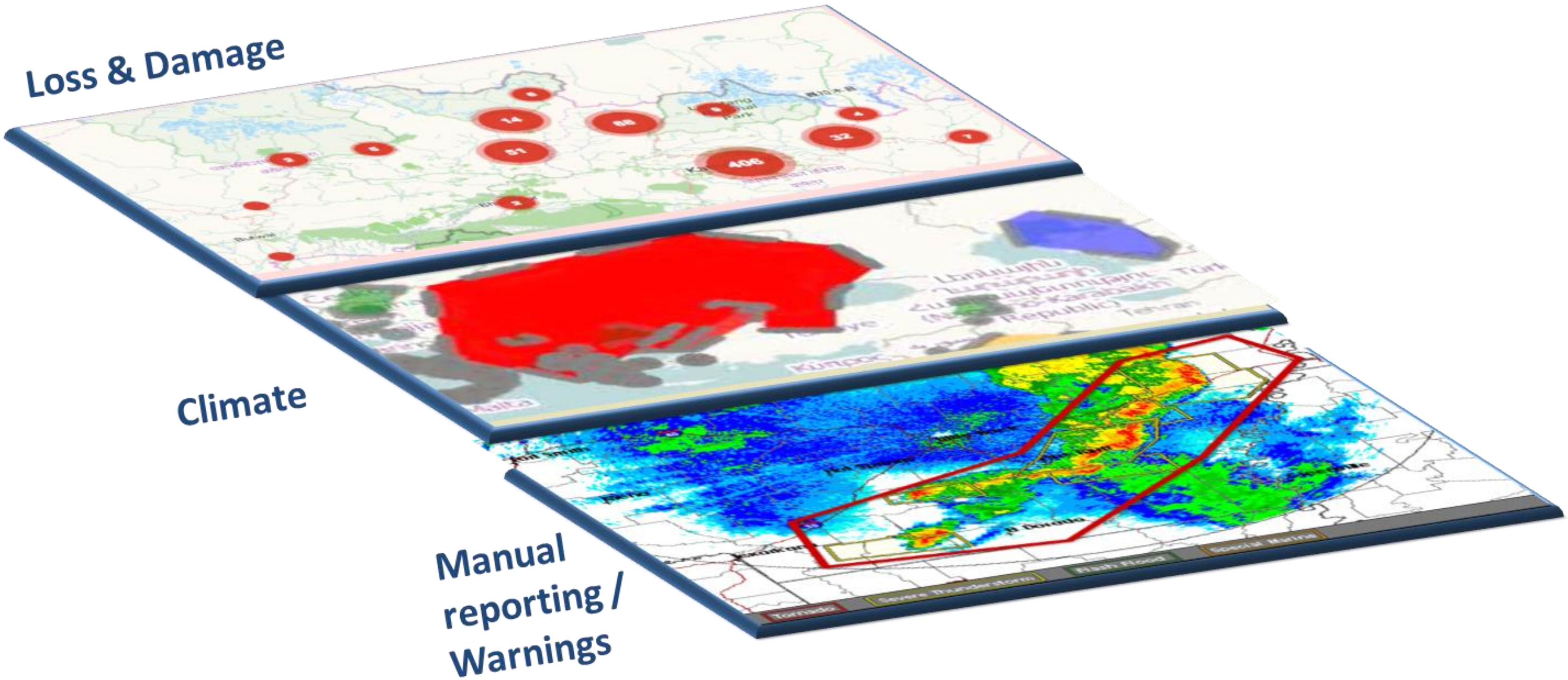
Applications: Layering of Information



- Layering of event information enables new possibilities for analysis and application.
- Provides a platform for:
  - Higher quality impact-based forecasts
  - Enhanced research into the historical relation between/among hazards
  - Detailed hazard and impact information for risk analysis (higher granularity of data)
  - Many other applications….

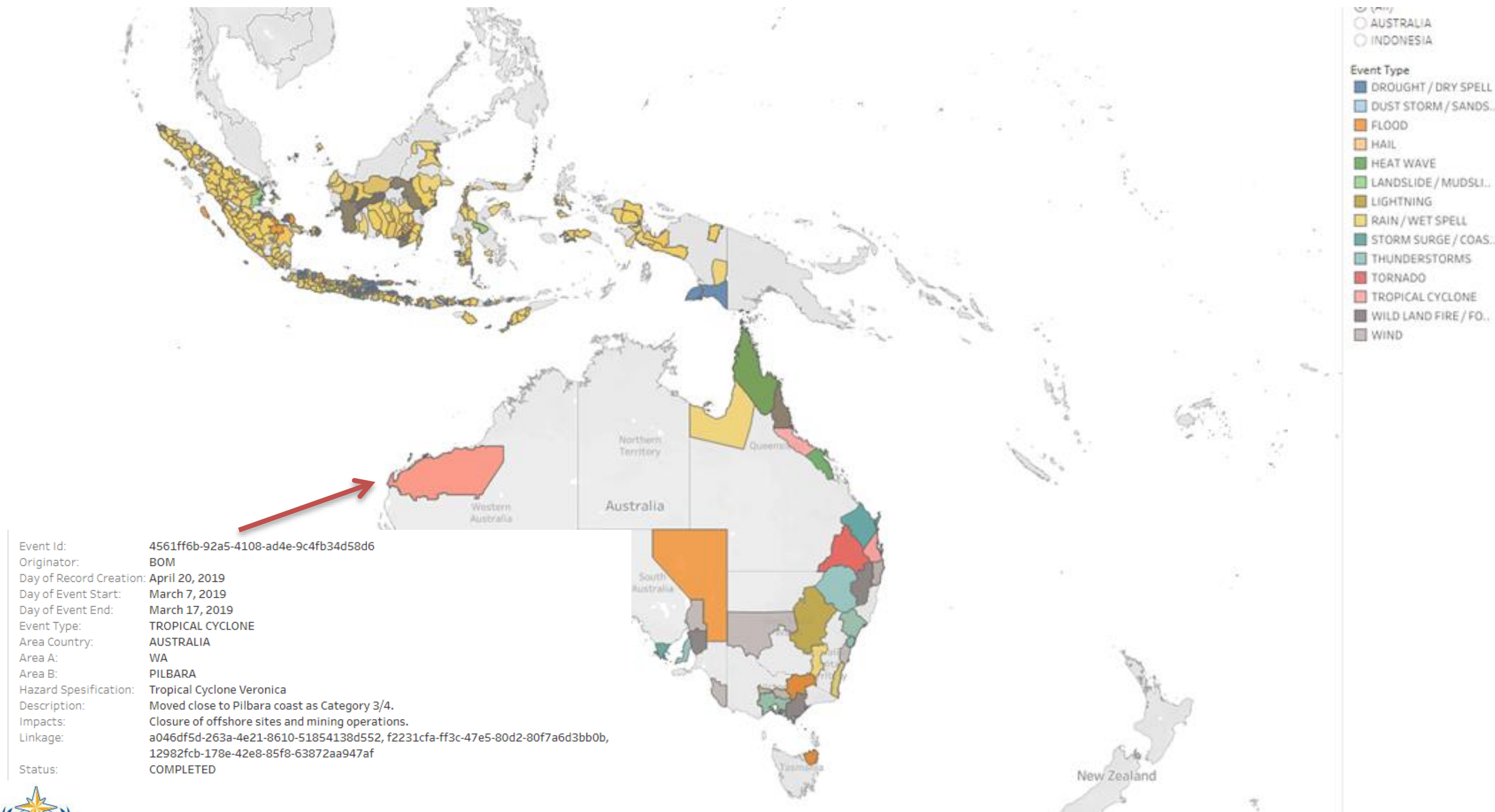
Example of applications

- Tracking global policy indicators
- Risk management (public and private sector)
  - Risk identification (hazard component, empirical methodology of understanding hazards, how hazards interact with other hazards and their combined impacts)
  - Risk reduction (e.g. empirical methodology to quantify past events as input to developing building standards, land use planning, strengthening MHEWS and disaster planning)
  - Risk transfer (insurance, risk facilities, cat bonds)
- Research
  - Tracking event trends in event frequency, severity and distribution
  - On causal contributions of hazards, exposure and vulnerability to losses

Two pilots of the WMO-CHE

Testing the new Standard
Asia and South Pacific

1,300 records of hazardous events from August 2018 to today.



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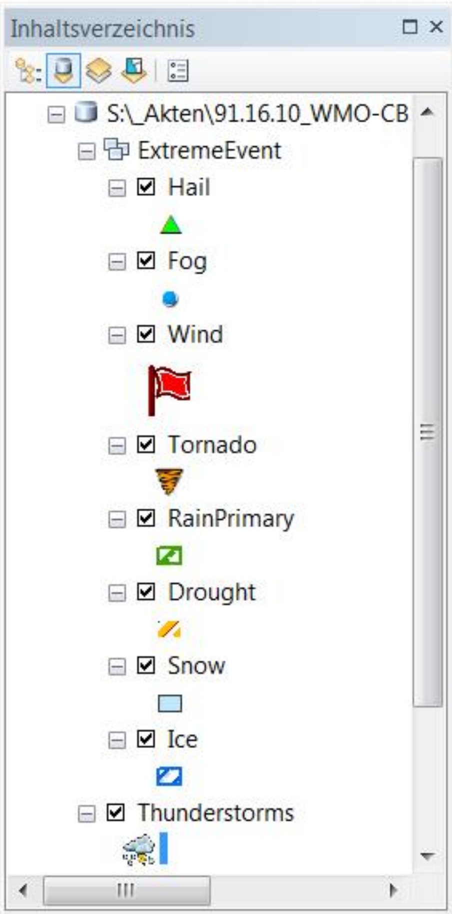
Link: http://puslitbang.bmkg.go.id/extreme-catalogue.html

in Europe


Inhaltsverzeichnis
S:_Akten\91.16.10_WMO-CB
ExtremeEvent
Hail
Fog
Wind
Tornado
RainPrimary
Drought
Snow
Ice
Thunderstorms