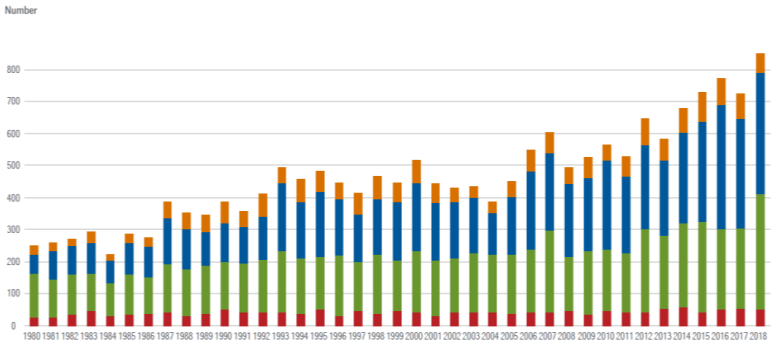


What Has to be Done to Manage Increasing Losses and Damages Caused by Climate Change?

Prof. Dr. Peter Hoeppe
Former Head Geo Risks Research/Corporate Climate Centre, Munich Re,
Adjunct Professor at ICRM (NTU, Singapore),
Chair of Munich Climate Insurance Initiative (MCII)

Herrenhausen Conference, October 9, 2019, Hannover, Germany

1

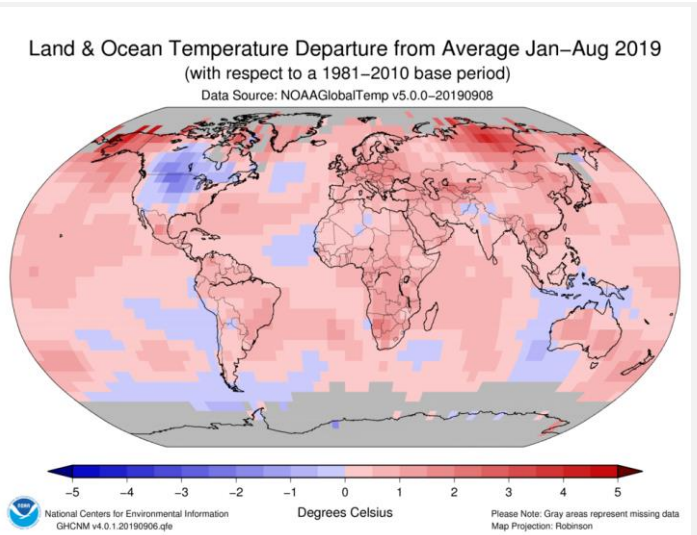
The Status of the Climate

Eighteen of the nineteen warmest years on record occurred in the period 2001-2018.

The last 5 years (2014, 2015, 2016, 2017, 2018) have been the warmest five years on record.

June and July 2019 have been the warmest on record.

The first eight months of 2019 have been the 3rd warmest.



2

Temperature Records 2019 in many European Countries

France: Gallargues-le-Monteux (F, South France), **45.9 °C** (28.6.)

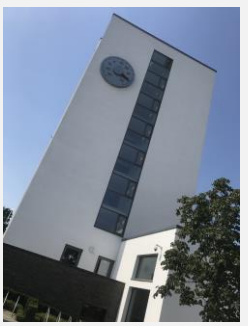
Germany: Lingen (D, Lower Saxony), **42.6°C** (25.7.)

Belgium: Begijnendijk (Flemish Brabant), **41.8 °C** (25.7.)

Luxemburg: Steinsel, **40.8°C** (25.7.)

Netherlands: Gilze-Rijen airbase, **40.4°C** (25.7.)

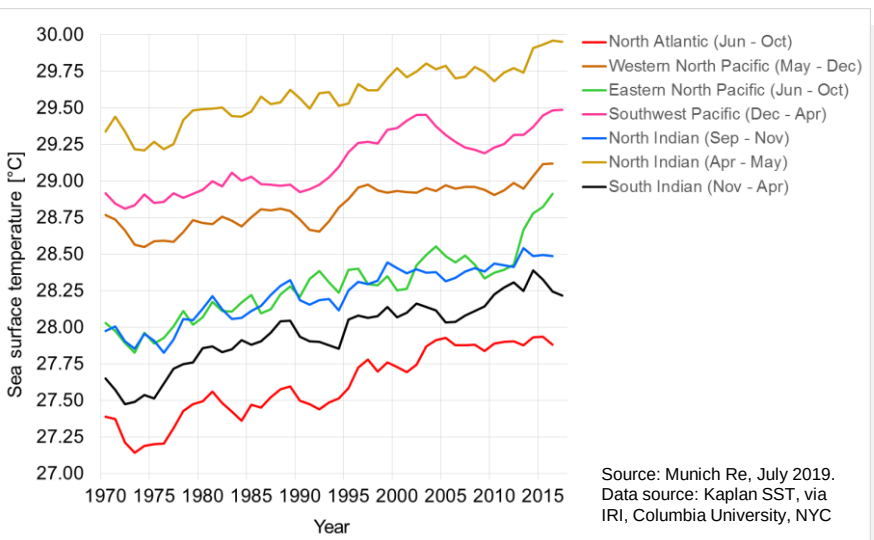
UK: Cambridge (Botanic Garden), **38.7°C** (26.7.)



Photos: UNU-EHS, Sönke Kreft

3

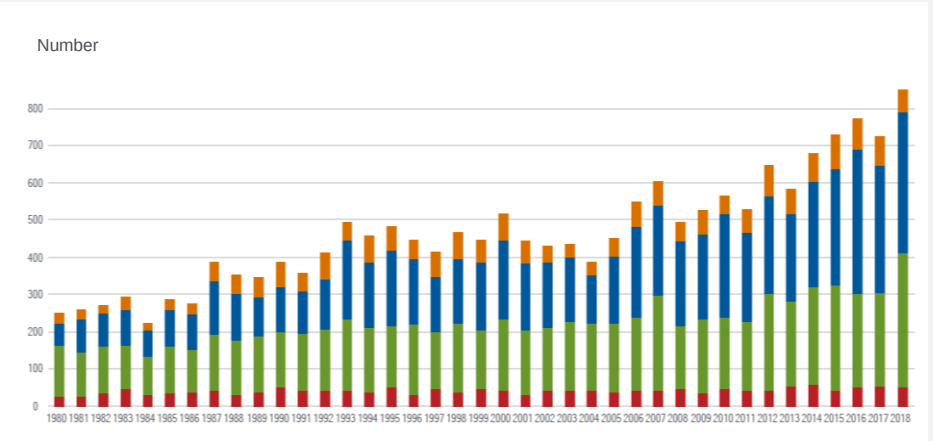
Sea-surface temperature in tropical ocean basins with TC activity over the period1968-2018/9 (five-year running means)



Source: Munich Re, July 2019.
Data source: Kaplan SST, via IRI, Columbia University, NYC

4

Loss events caused by natural perils worldwide 1980 - 2018
Number of relevant events by peril family

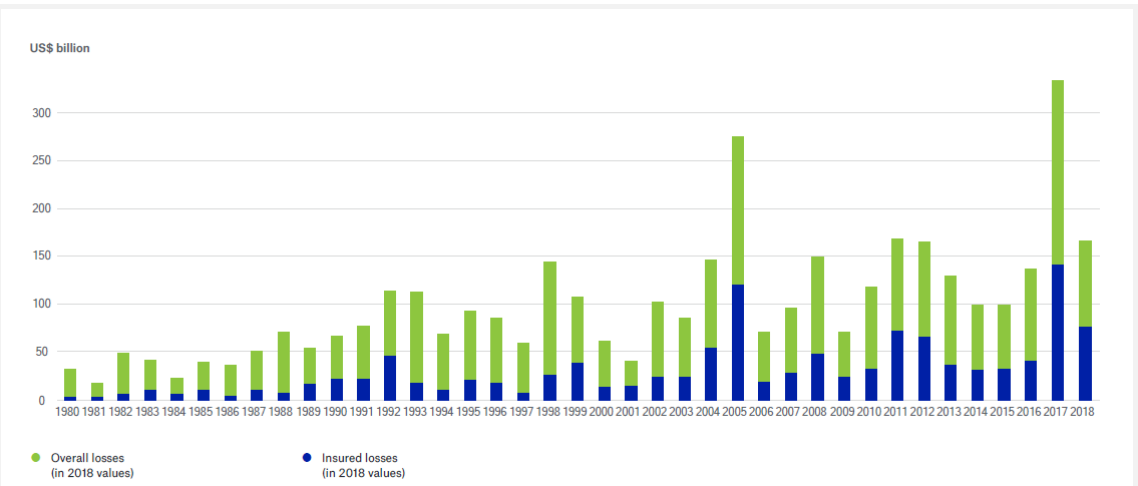


Accounted events have caused at least one fatality and/or produced normalized losses ≥ US$ 100k, 300k, 1m, or 3m (depending on the assigned World Bank income group of the affected country).

Source: Munich Re NatCatSERVICE, 2019

5

Weather-related loss events worldwide 1980 - 2018
Inflation adjusted overall and insured losses

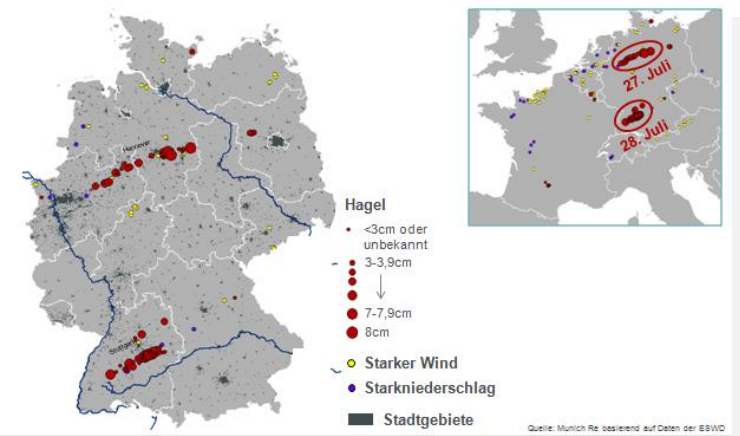


Inflation adjusted via country-specific consumer price index and consideration of exchange rate fluctuations between local currency and US$.
Source: Munich Re NatCatSERVICE, 2019

6

Hail Event on July 27/28, 2013 in Germany
Most expensive hail event in history!

Hail stones with diameters up to 8 cm (tennis ball ≈ 7 cm)



Region	Overall losses	Insured losses	Fatalities
Baden-Wuerttemberg, NRW, Lower Saxony	€ 3.6 bn	€ 2.8 bn	1

7

7

Thunderstorms on June 23, 2016, in The Netherlands

(20 mm precipitation within 10 minutes in De Bilt, **humidity record for NL T_D=25°C**)

Hail stone in Luyksgestel (Nord-Brabant).
Source: KNMI

Region	Total losses	Insured losses	Fatalities
Netherlands: Zeeland, South-Holland, Utrecht, North-Brabant	€ 1.3 bn	€ 650 mn	0

8

8

Convective loss event in October 2018 in Italy

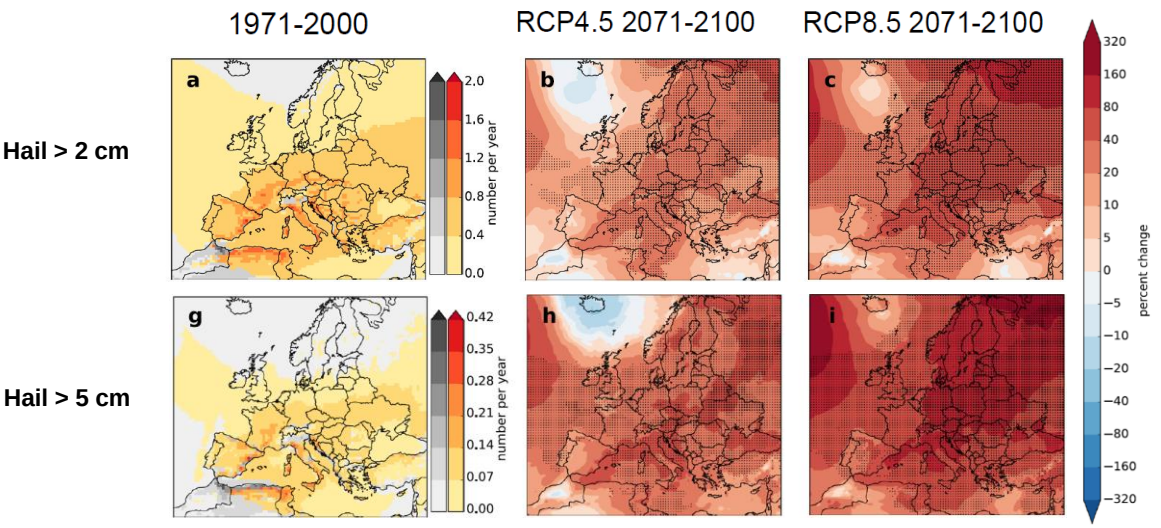
Region	Total Losses	Insured Losses	Fatalites
Italy: Alto Adige, Trentino, Venetia, Liguria, Sardinia, Sicily	€ 3 bn	€ 450 mio	30

Extreme weather event on June 6, 2019 in Germany with intense precipitation, wind storm and extreme hail

Region	Total Losses	Insured Losses	Fatalities
Germany, especially Bavaria	€ 860 mio	€ 650 mio	-

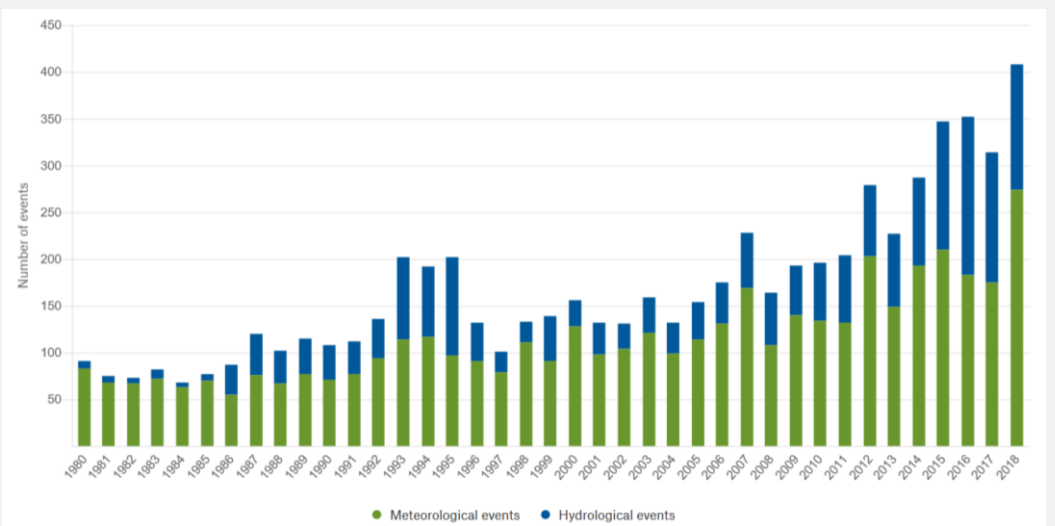
*Source: GDV 2019

New study on future convective events
Projected changes of hail



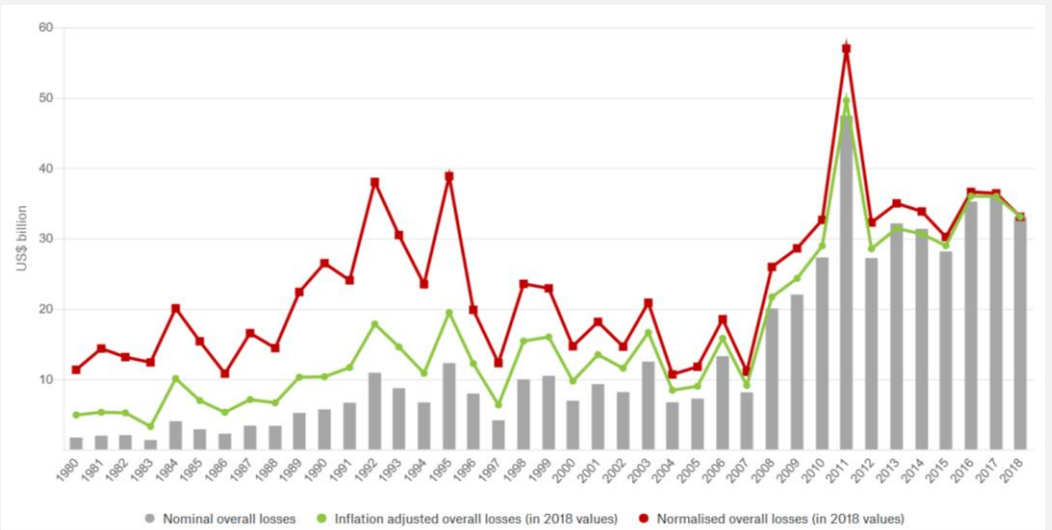
Source: A.T. Rädler, P.H. Groenemeijer, E. Faust, R. Sausen and T. Púčik, 2019: Frequency of severe thunderstorms across Europe expected to increase in the 21st century due to rising instability, npj Climate and Atmospheric Science, DOI:10.1038/s41612-019-0083-7

Number of loss relevant convective storm events worldwide 1980-2018
Source: Munich Re NatCatSERVICE



Losses (nominal, inflation adjusted, normalised) caused by convective storm events worldwide 1980-2018

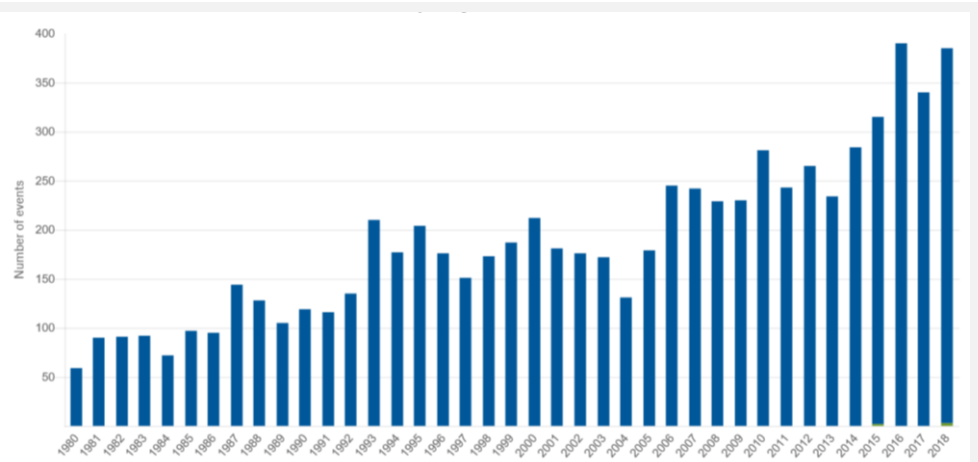
Source: Munich Re NatCatSERVICE



13

Number of loss relevant flood events worldwide 1980 - 2018

Source: Munich Re NatCatSERVICE

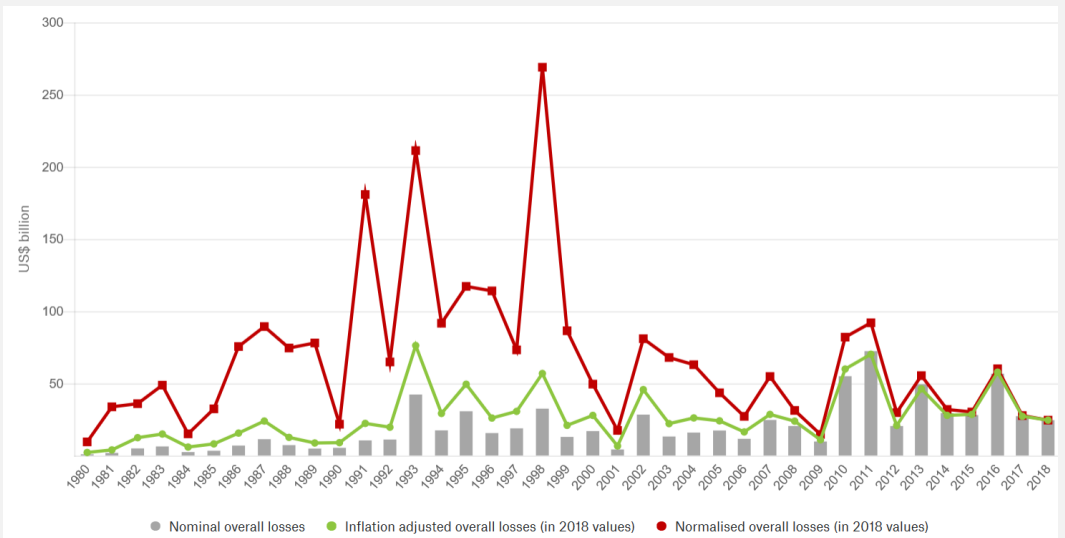


Accounted events have caused at least one fatality and/or produced normalized losses ≥ US$ 100k, 300k, 1m, or 3m (depending on the assigned World Bank income group of the affected country).

14

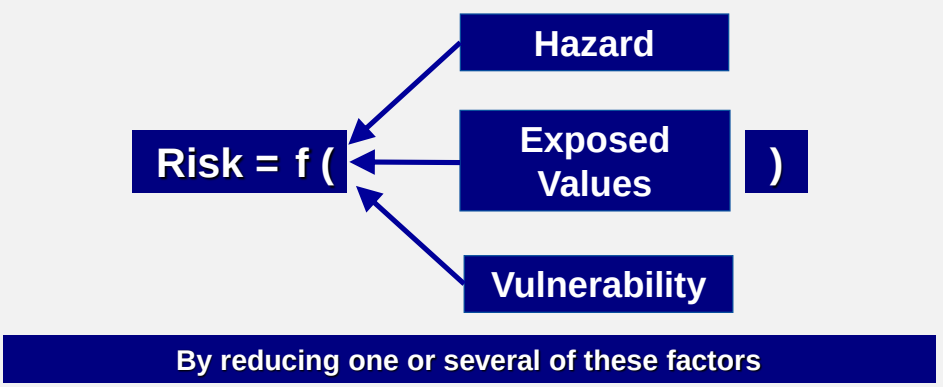
Losses (nominal, inflation adjusted, normalized) caused by flood events worldwide 1980 – 2018

https://natcatservice.munichre.com



15

How can risks caused by climate change be reduced and managed?



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Prevention Measures can reduce the risks caused by climate change driven natural perils

17

Example of successful flood protection - storm surges in Hamburg

Storm surge (max. water level) and loss

- Feb. 1962 (5.70 m) €1,563m
- Jan. 1976 (6.45 m)
- Nov. 1981 (5.81 m)
- Feb. 1990 (5.75 m)
- Jan. 1993 (5.76 m)
- Jan. 1994 (6.03 m)
- Jan. 1995 (6.03 m)
- Feb. 1999 (5.74 m)
- Dec. 1999 (5.95 m)
- **Dec 2013 (6.09 m)**

Source: Bundesamt für Seeschifffahrt und Hydrographie

Flood protection in Hamburg

Although the 1962 water level was significantly exceeded nine times, the city has not suffered any major loss since 1962.
Investment of € 2.2 bn into flood protection has avoided losses of more than € 20 bn

18

18

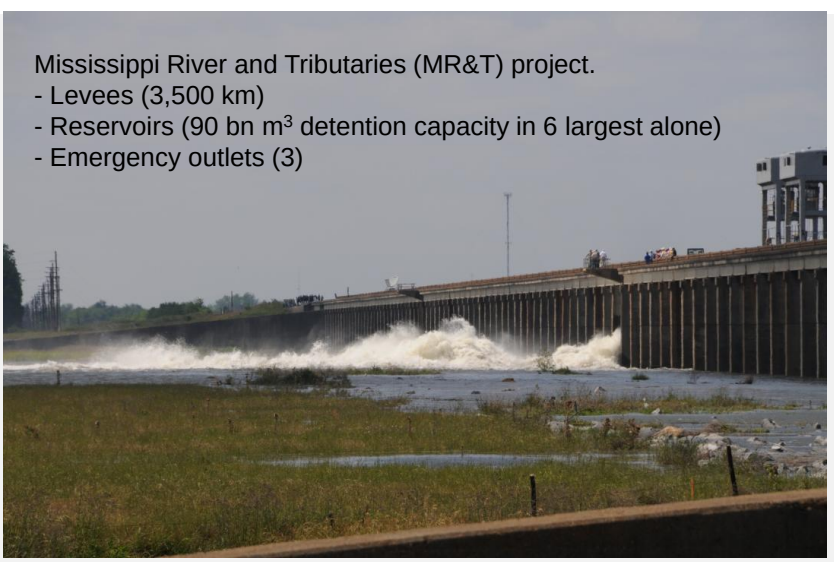
Example of successful flood protection - Haihe River basin (China)

Tianjin

- Devastating flood in 1963:
  - 5000 fatalities
  - Losses in 1996 values: RMB 13bn
    (= 2.68 % of GDP China)
- Following enormous investments into flood control
- Flood 1996 (similar hydrologic conditions as in 1963):
  Loss: RMB 6bn (= 0.08 % of GDP)
- Since completion, the flood risk in the Haihe basin and in Tianjin is significantly reduced.

19

Example of successful flood protection - Mississippi



Morganza Spillway

20

Mississippi flood 2011: Damage, losses and prevented losses

	Property Damage (US$ m)	Agriculture Damage (US$ m)	Repair of dykes, etc. (US$ m)
Actual damage	1,700	900	2,000
Potential damage without the MR&T project	102,400	8,200	-
Prevented by the MR&T project	100,700	7,300	-

Source: Mississippi Valley Division, U.S. Army Corps of Engineers

21

Buildings can be built in a less vulnerable way in respect to extreme weather, better building standards reduce damages

Insurance industry is the main sponsor of IBHS research institute

Insurance Institute for Business & Home Safety®

22

Better Building Standards Reduce Damages

Tests to compare high-wind (160 km/h) performance of structures using common construction practices with using stronger, safer wind-resistant elements.

The components used to make the resilient building stronger and safer cost less than 5% of the total cost of the entire structure.

Wind tunnel simulation: https://vimeo.com/17764719

Why is there no comparable Research Institute in Europe?

Insurance can increase the resilience of economies and societies

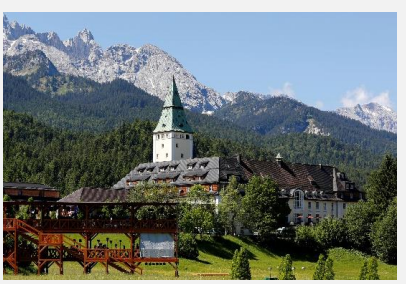
Insurance provides recovery financing and thus increases resilience

Insurance cover significantly helps economic recovery following a natural catastrophe:

- Academic studies show that a higher level of insurance cover is accompanied by significantly better economic performance following a catastrophe.
- Depending on the type of catastrophe and the level of economic development, insurance cover can even offset the negative indirect effects of natural catastrophes on national economies

- **Martin Melecky and Claudio Raddatz, World Bank (2011):** Higher insurance penetration at an equivalent level of prosperity leads to lower GDP losses and less government debt after natural catastrophes
- **Goetz von Peter, Sebastian von Dahlen and Sweta Saxena (2012):** The higher the share of insured losses to total losses, the more positive GDP performance is following a catastrophe
- **Florian Englmaier, Till Stowasser (2013):** The effect of insurance markets on countries' resilience: particularly in emerging economies, more insurance cover (i.e. increasing the insurance penetration rate) can mitigate the negative economic effects of natural catastrophes

G7 Climate Risk Insurance Initiative “InsuResilience”

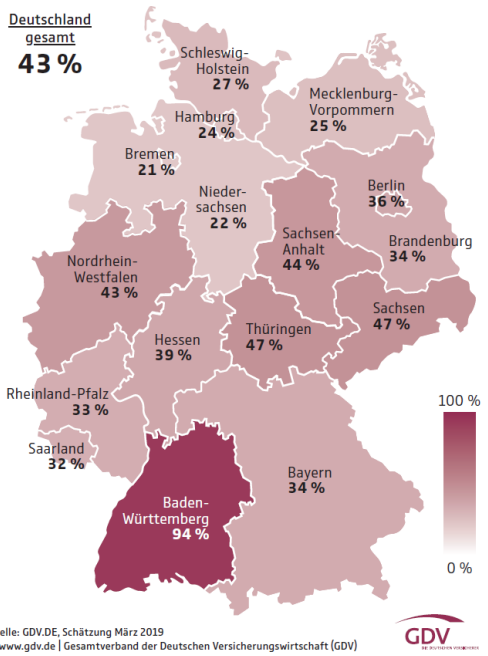


- G7 decided in 2015 on a five year project to support people in developing countries to protect themselves against economic consequences of more intense and frequent extreme weather events
- Target: extra 400 million people earning less than US$ 2 per day get access to direct (100 m) or indirect (300 m) insurance of losses caused by weather extremes
- G7 Governments already pledged US$ 680 million with option of more to follow later
- At COP23 in Bonn in November 2017 “InsuResilience Global Partnership” has been launched. Currently 11 countries + EU, 11 Multilateral Institutions (ADB, World Bank…), 9 Civil Society Organisations, 15 companies, and 5 Academia/Think Tanks

Insurance density for covers of flood risks in Germany in 2019

On average only 43% of residential buildings in Germany have flood insurance

Lowest insurance density in Bremen and Lower Saxony 21%, 22%), highest in Baden-Württemberg (94%)



Plans for Drought Insurance for Farmers in Germany

- Bavaria demands insrance for farmers against losses caused by droughts supported by the state and has started a corresponsing initiative in the Federal Council.
- State Secretary for Agriculture Kaniber suggest a so called multi peril insurance (hail, floodm frost, drought) similar to the already existing system in Austria.
- Premiums shall be subsided with 25% by the Federal Government and by 25% by the States.
- Insurance of drought is more problematic for insurers compared to hail as there is a high accumulation risk.

Source: SZ 8.4.2019, B5 28.04.2019

Photo: Verena N. / pixelio.de

UN Climate Change Conference COP21 Paris (2015)
Most relevant decisions

- **Emission Reduction – limiting climate change**

  Goal of holding global warming well below 2°C, aiming for 1.5°C
- **Climate Finance**

  Mobilizing $100bn p.a. by 2020, considerable debate over what counts as (additional) climate finance
- **Climate Insurance**
  - The Warsaw International Mechanism for Loss and Damage (WIM) introduced at COP19 to further investigate and organize the topic
  - Climate-related losses and damages are acknowledged as a third climate strategy pillar next to adaptation and mitigation. A clearinghouse for risk transfer will be established serving as a repository
  - Insurance is considered as an essential tool to address loss and damage, referenced directly under §49 of the Decisions as well as Article 8 of the Agreement

Conclusions

- Weather related natural disasters are increasing in number and magnitude
- There is more and more scientific evidence for causal links between global warming and increasing frequencies and intensities of natural catastrophes
- To keep losses and damages manageable, ambitious reductions of green house gas emissions are indispensable
- While hazards have increased already and will even more in the future, prevention measures can avoid similar increases in losses, even may decrease losses
- Especially flood loss prevention measures are economically highly efficient
- For non preventable damages and where prevention is economically not efficient insurance solutions can help to increase the resilience after weather shocks.