Increasing flood losses indicate increasing flood risk

What are the responsible parameters?

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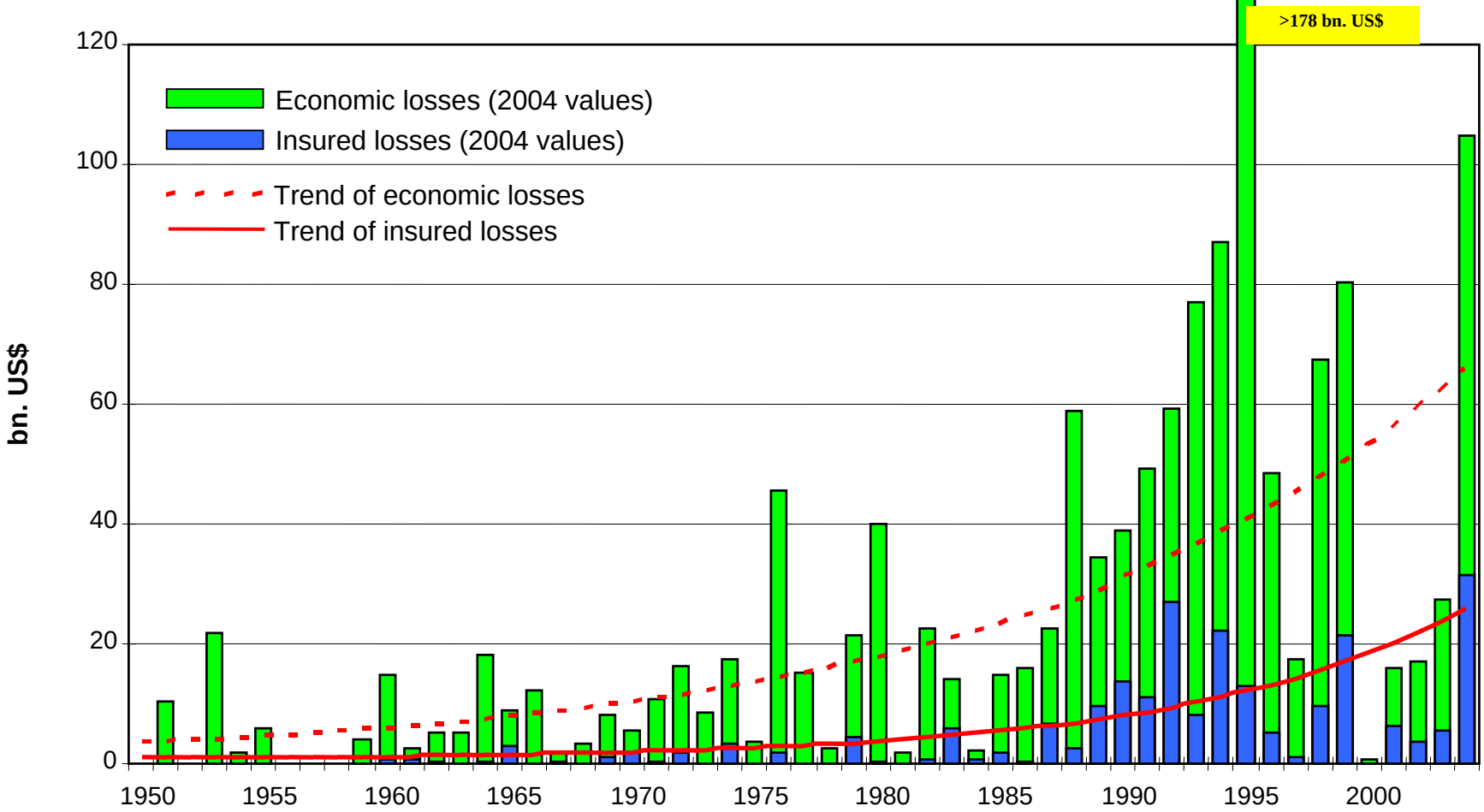
Contents

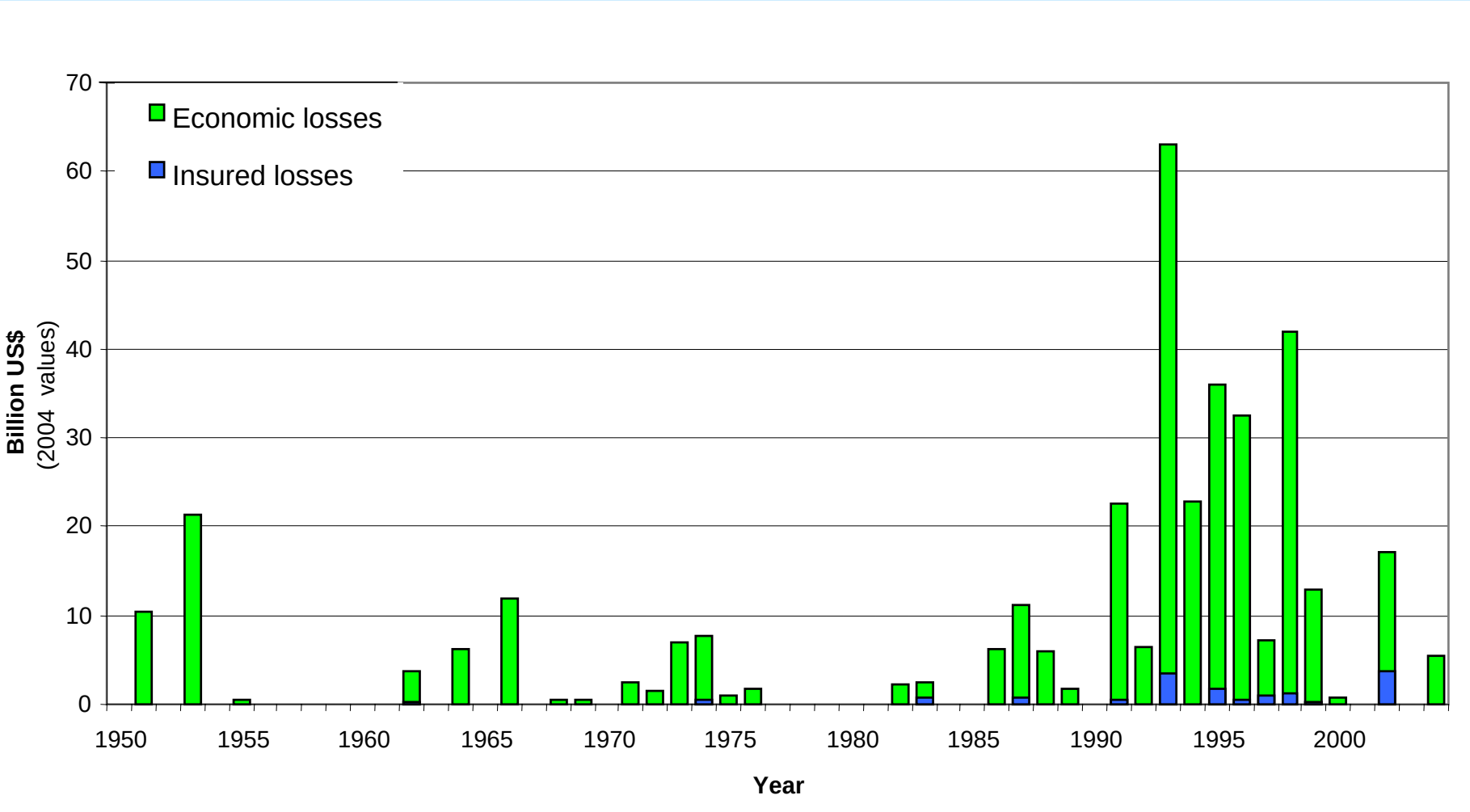
- Flood losses and trends
- Hazard vs. risk
- Causes of increasing losses
- Strategies for risk reduction

Great **Natural** Disasters 1950 – 2004

Economic and insured losses



Great Flood Disasters 1950 – 2004
Economic and insured losses



Great Natural Disasters 1950 - 2004

Decade comparison

	Decade 1950 - 1959	Decade 1960 - 1969	Decade 1970 - 1979	Decade 1980 - 1989	Decade 1990 - 1999	last 10 1995 – 2004	Factor last 10:60ies
Number	20	27	47	63	91	63	2,3
Economic losses	45	80	148	228	704	562	7,0
insured losses	-	6,5	14	29	132	101	15,5

losses in bn. US$ (2004 values)

MRNatCat*SERVICE*

Great Flood Disasters 1950 - 2004

Decade comparison

	Decade 1950 - 1959	Decade 1960 - 1969	Decade 1970 - 1979	Decade 1980 - 1989	Decade 1990 - 1999	last 10 1995 - 2004	Factor last 10:60ies
Number	6	6	8	18	26	15	2,5
Economic losses	32	23	21	30	245	154	6,7
insured losses	-	0,25	0,4	1,6	8,8	8,3	33

losses in bn. US$ (2004 values)

MRNatCat*SERVICE*

Why only “great natural disasters“?

. . . because neglecting the development
in worldwide communication activity
during the past decades
extremely biases the statistics
of ALL loss events.

It may even lead to wrong trends.

What are “great natural disasters“?

The affected region's ability to help itself is distinctly overtaxed

- **Interregional or international assistance is necessary**
- **Thousands are killed**
- **Hundreds of thousands are made homeless**
- **Substantial economic losses**
- **Considerable insured losses**

Natural Disasters in Europe 1970 – 2004

Economic losses

Mio. Euro

2002	Floods (Elbe, Danube)	Europe	21 500
2003	Heat wave, drought	Europe	13 000
1980	Earthquake	Italy	11 800
1999	Winter storm „Lothar“	W, C Europe	11 500
1994	Floods	Italy	9 300
2000	Floods, Landslides	Italy, Switzerland	8 500
1990	Winter storm „Daria“	W Europe	6 800
1997	Earthquake	Italy	6 000
1997	Flood (Odra)	Czech Rep, Poland, Germ.	5 900
1995	Drought	Spain	4 500
1999	Earthquake	Greece	4 200
1999	Winter storm „Martin“	France, Switzerland	4 100
1987	Winter storm 87J	W Europe	3 700
1976	Earthquake	Italy	3 600
1995	Flood	Germany, The Netherlands	3 500
1990	Winter storm „Vivian“	W, C Europe	3 200
1999	Drought	Spain	3 200
1999	Winter storm „Anatol“	Denmark	2 900
1979	Earthquake	Yugoslavia	2 700

Natural Disasters in Europe 1970 – 2004

Economic losses

Floods

			Mio. Euro
2002	Floods (Elbe, Danube)	Europe	21 500
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Natural Disasters in Europe 1970 – 2004

Insured losses

Mio. Euro

1999	Winter storm „Lothar“	W, C Europe	5 900
1990	Winter storm „Daria“	W Europe	5 100
2002	Floods (Elbe, Danube)	Europe	3 400
1987	Winter storm 87J	W Europe	3 100
1999	Winter storm „Martin“	France, Switzerland	2 500
1999	Winter storm „Anatol“	Denmark	2 330
1990	Winter storm „Vivian“	W, C Europe	2 100
1990	Subsidences	UK	1 900
1990	Winter storm „Jeanette“	W, C Europe	1 500
1990	Winter storm „Wiebke“	W, C Europe	1 330
1990	Winter storm „Herta“	W Europe	1 300
2000	Floods	UK	1 100
2003	Flood	France	1 000
1995	Flood (Rhine)	Germany, The Netherlands	910
1993	Flood (Rhine)	Germany	800
1997	Flood (Odra)	Czech Rep, Poland, Germ.	795
2002	Flood	France	700
1996	Snow storm	UK	675
1989	Subsidences	UK	655

Natural Disasters in Europe 1970 – 2004

Insured losses Floods

Mio. Euro

1999	Winter storm „Lothar“	W, C Europe	5 900
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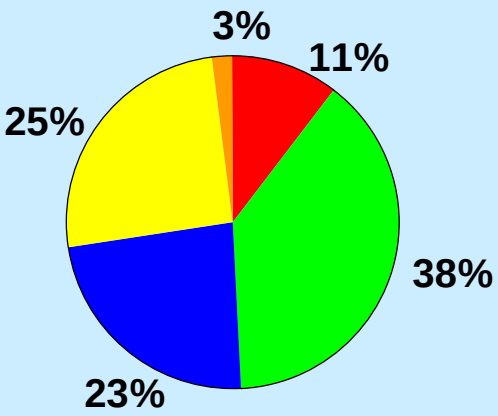
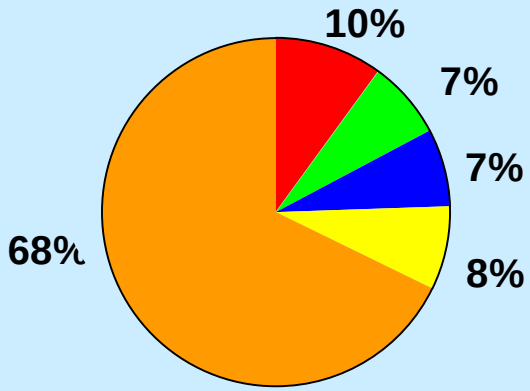
Natural disasters in Europe 1980 - 2003

2.850 events

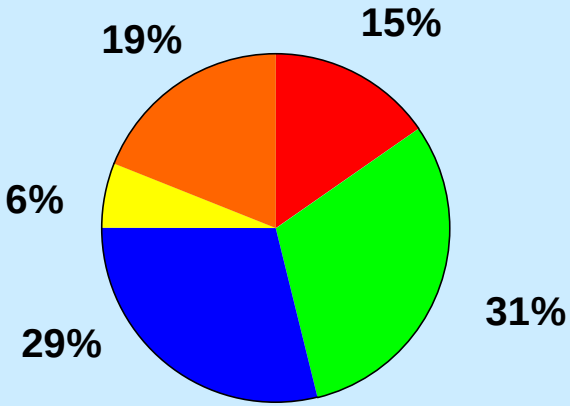


- Earthquake
- Storm
- Flood
- Other
- Heat wave/drought

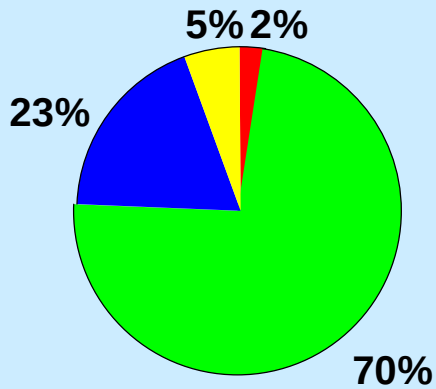
34 100 deaths



economic losses: 220 bn. US$*



insured losses: 54 bn. US$*



*based on original values as of February 2004

August 2002 Floods in Germany

The losses (as of: 1.4.2005)

- Deaths: >100
- Economic losses:
  - Austria: 3.0 bn €
  - Czech Republic: 3.1 bn €
  - Germany: 11.8 bn €
  - Europe: 21.5 bn €
- Insured losses:
  - Austria: 0.4 bn €
  - Czech Republic: 1.2 bn €
  - Germany: 1.8 bn €
  - Europe: 3.4 bn €

August 2002 Floods in Germany

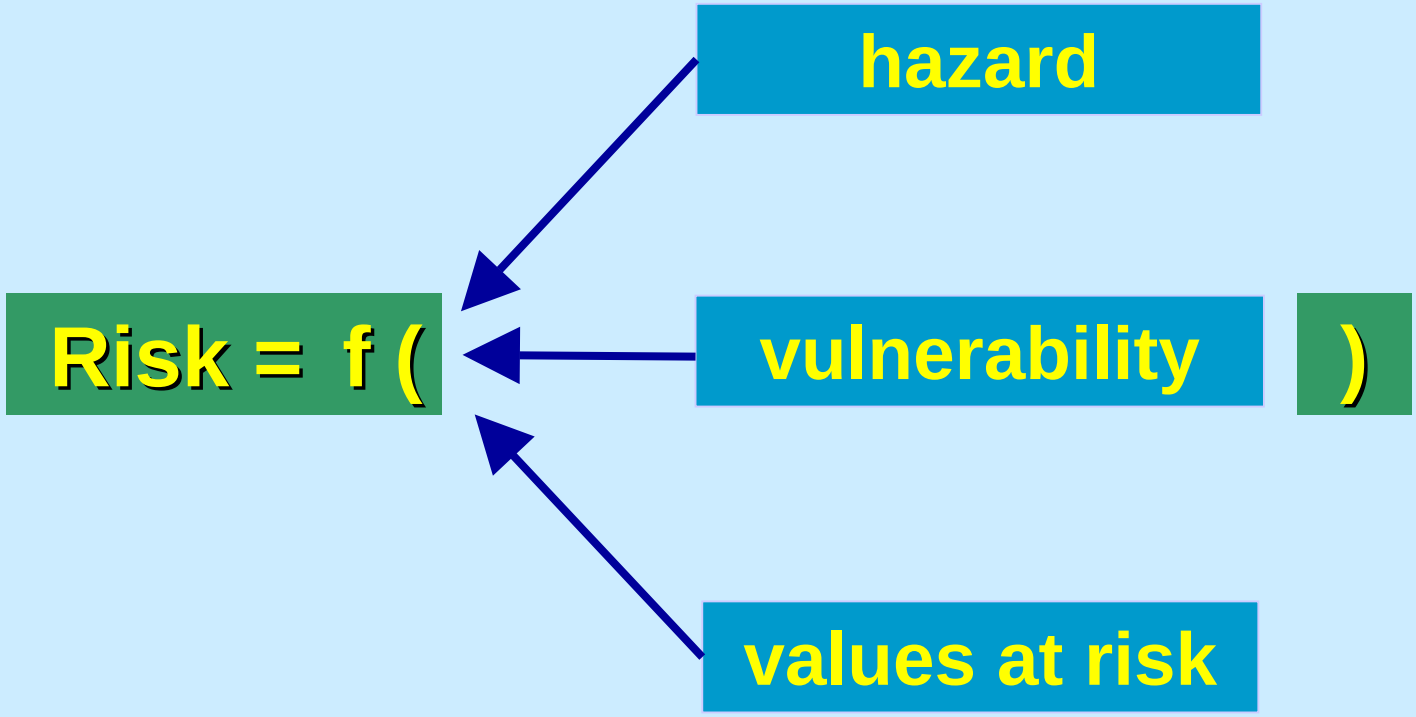
	€ m	
Saxony	8 700	State of Sax. Feb. 04
Saxony-Anhalt	1 187	IKSE July 04
Brandenburg	242	IKSE July 04
Lower Saxony	185	IKSE July 04
Thuringia	60	BMI Dec. 02
Mecklenb.-W. Pomerania	41	IKSE July 04
Schleswig-Holstein	4	IKSE July 04
Bavaria	198	State of Bav. Dec. 04
Federal (Railw., Roads.)	979	IKSE July 04
Total Germany	11 596	

losses as of 1.10.2004, after IKSE report


Hazard
Man

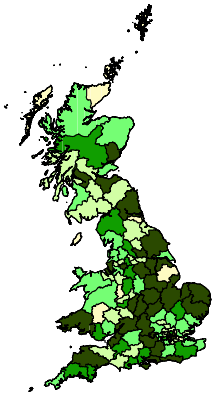
Risk → Disaster

What determines the risk?

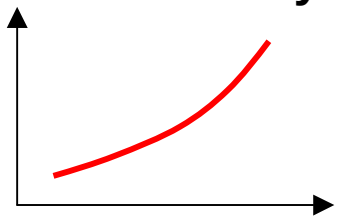


Risk assessment

value distribution

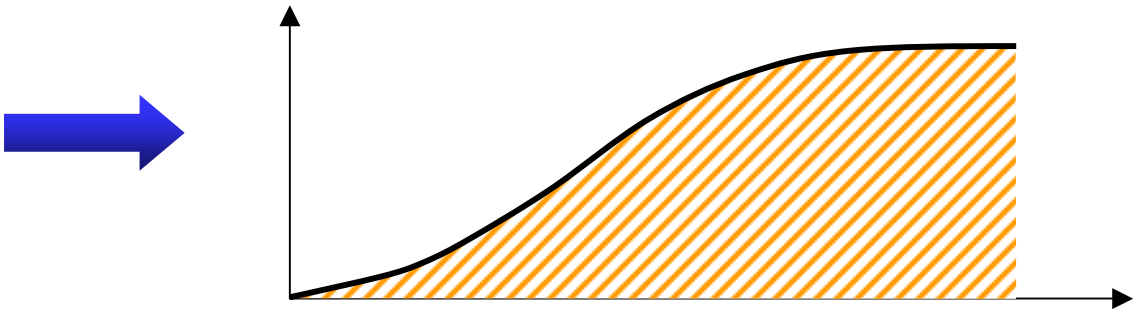


vulnerability

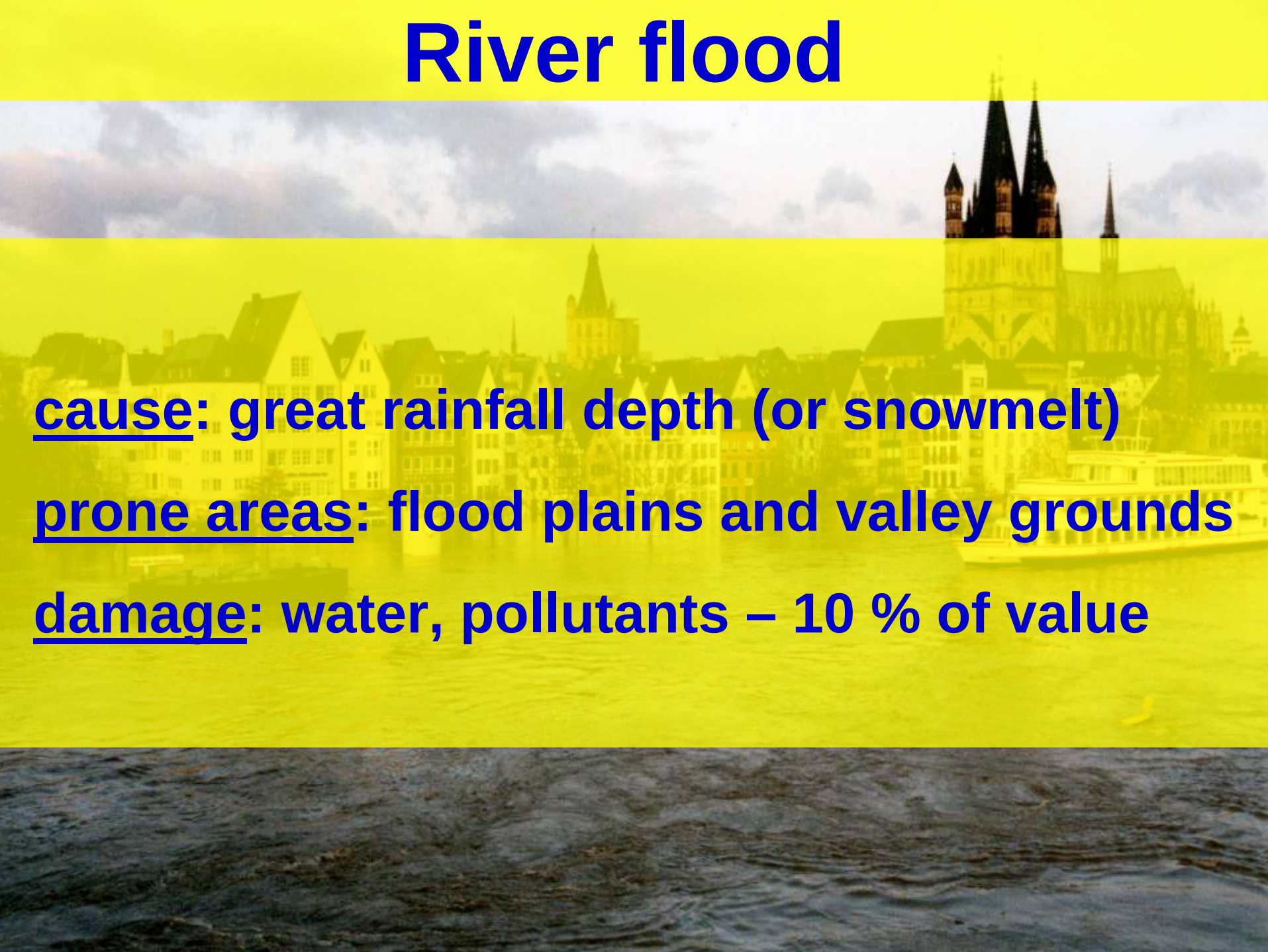


event scenarios

risk curve



River flood



cause: great rainfall depth (or snowmelt)

prone areas: flood plains and valley grounds

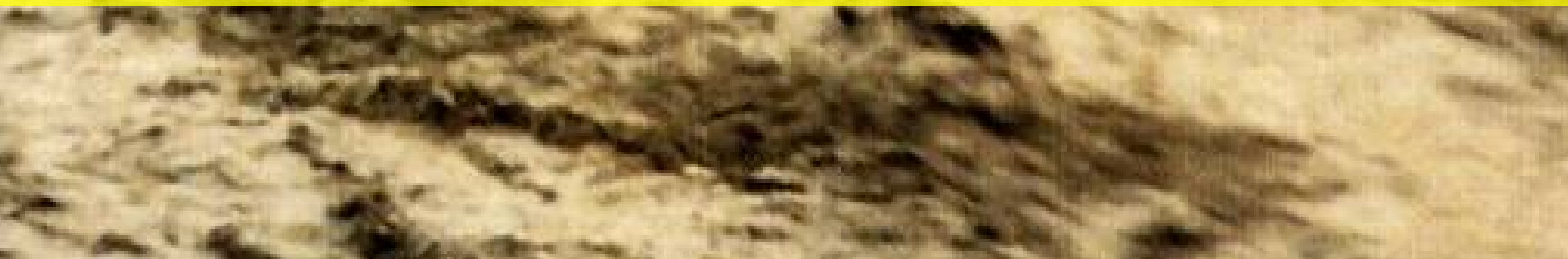
damage: water, pollutants – 10 % of value

Flash flood

cause: high rainfall intensity

prone areas: everywhere

damage: water, erosion – up to 100 % of value



Causes of increasing flood losses

- Population trends
- Change in environmental conditions
- Settling on flood-plains
- High accumulation of values
- More values in the lower parts of buildings
- Higher vulnerability of values
- Less risk awareness and risk perception
  („the feeling of safety behind the dyke“)
- Climate change
  (more extremes, more loss events, higher losses)

Flood Preparedness

1. **Preparing for floods**
   Avoiding high flood peaks

2. **Preparing for flooding**
   Preventing high-value areas from flooding

3. **Preparing for losses**
   Limiting and reducing damage

4. **Preparing for risk**
   Preparing (financially) against ruin

Partnership for risk reduction

Public authorities/organisations

basic prevention measures → - avoiding frequent losses
- mitigation during rare events

People concerned/affected

actions during rare events → - loss reduction/limitation

Insurance industry

securing existence → - prevention of ruinous consequences for personal/ business property
- information about the risk

Often, the mono-causal effects of measures influencing floods are over-estimated:

„negative“

- anthropogenic sealing
- river training
- flow acceleration
- soil compaction
- deforestation
- climate change
- etc.

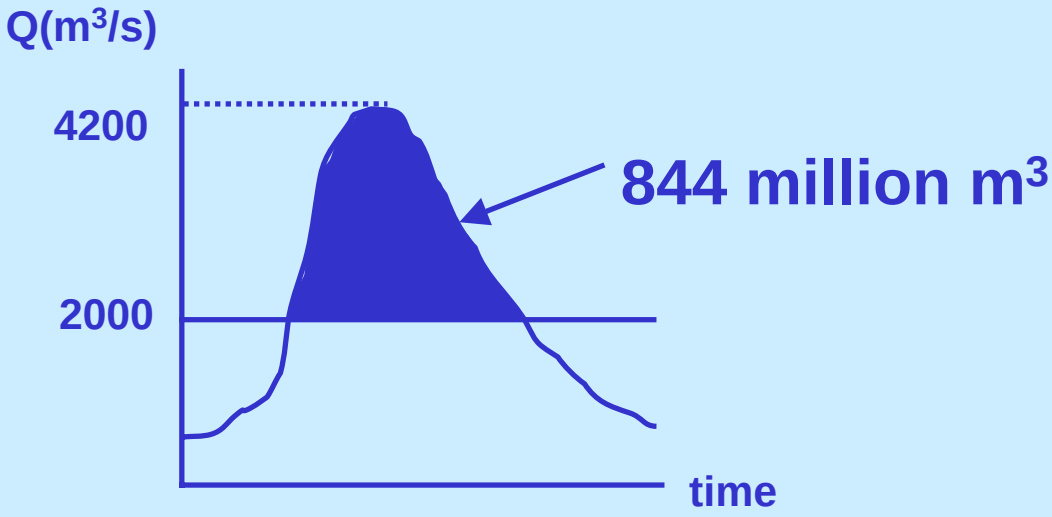
„positive“

- restoration
- polders
- retention basins
- decentral retention
- on-site-infiltration
- dykes
- etc.

Christmas Flood 1993

MOSEL

significant damage occurs above 2000 m^3/s at Cochem gauge



This volume would have raised the water level in Lake Constance by 1,56 m

Measures for flood control and flood preparedness

Frequent floods (T < 20 years)

" Natural" or "soft" measures

- **Improved infiltration, removal of impervious surfaces**
- **Decentralized retention**
- **River restoration**
- **Dyke relocation, widening of river cross-sections**
- **Simple dykes**

Measures for flood control and flood preparedness

Rare floods (T = 20 – 100 years)

Technological measures

- Retaining basins, retention areas
- Engineered dykes
- Polders
- Dyke relocation, widening of river cross-sections

Measures for flood control and flood preparedness

Very rare floods (T > 100 years)

Organisational measures

- **Flood management**
- **Flood response**
- **Emergency relief**
- **Financial provisions (insurance)**

Conclusions

- **Flood losses are increasing.**
- **The main driving factors are:**
  - settling in flood-prone areas,
  - higher and more vulnerable values,
  - climatic and environmental changes,
  - too low risk awareness and too short memory.
- **Efficient risk reduction is only achievable by a partnership of all relevant parts of a society.**
- **Strategies for flood control must consider - and distinguish between - high, medium and low frequency events.**
- **Disasters can happen only where vulnerable values are exposed to a hazard.**
- **Therefore . . .**

Keep awareness awake !

. . . on all levels and within all groups of the society

Pub in Cologne:

Water level

Chrstmas Eve 24.12.1993

10,64 m

Thank you

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Münchener Rück
Munich Re Group