SEMINAR: SYDNEY COASTAL COUNCILS GROUP FORUM

MANAGING THE UNAVOIDABLE:

NATURAL CATASTROPHES, CLIMATE CHANGE AND IPCC

Data, trends, analysis

Sandra Schuster

Munich RE

Who is Munich RE?

Munich RE

- Insurer of Insurances
- Founded 1880
- The world's largest re-insurer
- Premium income ca. € 22 bn
- Leading role in insurance of natural catastrophes

Geo Risks Research of Munich Re –
Analyses of natural disasters since 1974 (staff today 30)

Core business of insurance industry is quantification of risks!

Insurance Industry, one of the First Alerter's of Global Warming

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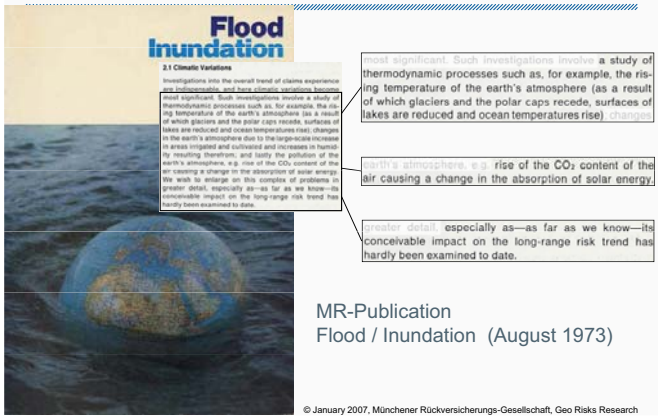

MR-Publication
Flood / Inundation (August 1973)

Outline

Munich RE

- Global review of Natural catastrophes
  - data – trends – analysis
- Australian Natural catastrophes
  - data – trends – analysis
- Improving Community Resilience to Extreme Weather Events
  - ICA paper

Where next?

- Munich Re's approach to climate change
- the insurance sector's role … and implications

IPCC involvement

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Weather disasters

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The last years have brought records in weather disasters in respect to:

- Intensities
- Frequencies
- Damages and losses

NatCatSERVICE

One of the world's most comprehensive database on natural catastrophes

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- from 1980 until today all loss events
- retrospectively, all "great" natural catastrophes since 1950
- all major events starting from 79 AD – eruption of Mt. Vesuvio (3,000 historical data sets)
- currently more than 27,000 events documented
- The Munich Re NatCatSERVICE records up to 1,000 loss events per year.

NatCatSERVICE

Natural Catastrophes 2010

960 loss events

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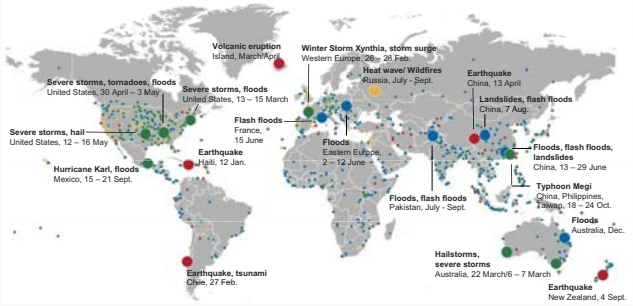

- Natural catastrophes
- Selection of significant loss events (see table)
- Geophysical events (earthquake, tsunami, volcanic activity)
- Meteorological events (storm)
- Hydrological events (flood, mass movement)
- Climatological events (extreme temperature, drought, wildfire)

2010: The year of fire, water, air and ...

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Wildfires in Russia: July to Sept

Fatalities	56,000
Overall losses (US$ m)	3,600
Insured losses (US$ m)	20
Number of homes destroyed	2,500
Burned area *	>12,500 km²

* Black Saturday: 4,300 km2

Flooding Pakistan: July to Sept

Fatalities	1,760
Homeless	6 million
Overall losses (US$ bn)	9.5
Insured losses (US$ m)	100
Number of homes destroyed/damaged	approx. 1.5 million
Flooded fields, one-fifth of the country was flooded	>69,000 km²

Winter storm Xynthia - Spain, France, Germany: February

Overall losses (US$ m)	6,100
Insured losses (US$ m)	3,100

2010 hurricane season most active, but luckily benign losses.

2010: a year of earthquakes

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Haiti, 12 January (magnitude 7.0)

Second deadliest EQ with 222,570 fatalities

Chile, 27 February (magnitude 8.8)

Second costliest EQ with US$ 8bn insured losses

China, 13 April (magnitude 7.0)

22 Feb 2011:
magnitude 6.3
5km depth
10km SE of Christchurch

New Zealand, 40km west of Christchurch, 4 September (magnitude 7.1, 10km depth)

Fatalities	-
Injured	2
Overall losses (US$ bn)	6.5
Insured losses (US$ bn)	5

Costliest insured natural catastrophe in NZ history.

NatCatSERVICE

Breakdown into catastrophe categories

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Catastrophe category		Overall losses					and/or fatalities
		Loss profile	1980s*	1990s*	2000s*	2010*	
0	Natural event	No property damage	-	-	-	-	none
1	Small-scale loss event	Small-scale property damage	-	-	-	-	1-9
2	Moderate loss event	Moderate property and structural damage	-	-	-	-	>10
3	Severe catastrophe	Severe property infrastructure and structural damage	US$ >25m	US$ >40m	US$ >50m	US$ >60m	>20
4	Major catastrophe	Major property, infrastructure and structural damage	US$ >90m	US$ >160m	US$ >200m	US$ >250m	>100
5	Devastating catastrophe	Devastating losses within the affected region	US$ >275m	US$ >400m	US$ >500m	US$ >650m	>500
6	Great natural catastrophe „GREAT disaster"	Region's ability to help itself clearly overtaxed, interregional/international assistance necessary, thousands of fatalities and/or hundreds of thousands homeless, substantial economic losses (UN definition). Insured losses reach exceptional orders of magnitude.					

* Losses adjusted to the decade average

Grouping and Terminology

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Generic Group	Disaster Group	Disaster Main type
Geophysical	Earthquake	Earthquake (Ground shaking)
	Volcanic eruption	Fire following
	Mass movement dry	Tsunami
Meteorological		Volcanic eruption
Hydrological		Subsidence
		Rockfall
Climatological		Landslide

Grouping and Terminology

Munich RE

Generic Group	Disaster Group	Disaster Main type
Geophysical		
Meteorological	Storm	Tropical cyclone Winter storm (extratropical cyclone) Tempest/Severe storm Hail storm Lightning Tornado Local windstorm (orographic storm) Sandstorm/Dust storm Blizzard/Snowstorm
Hydrological		
Climatological		

Grouping and Terminology

Munich RE

Generic Group	Disaster Group	Disaster Main type
Geophysical		
Meteorological		
Hydrological	Flood Mass movement wet	General flood Flash flood Storm surge Glacial lake outburst flood
Climatological		Subsidence Avalanche Landslide

Grouping and Terminology

Munich RE

Generic Group	Disaster Group	Disaster Main type
Geophysical		
Meteorological		
Hydrological	Extreme temperature Drought Wildfire	Heat wave Cold wave / frost Extreme winter conditions
Climatological		Drought
		Wildfire Unspecified

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Natural catastrophes worldwide 1980 – 2010

Number of events with trend

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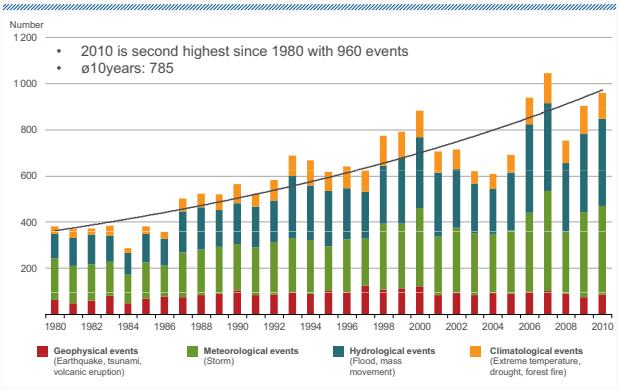

NatCatSERVICE

Natural catastrophes worldwide 1980 – 2010

Number of events by peril with trend

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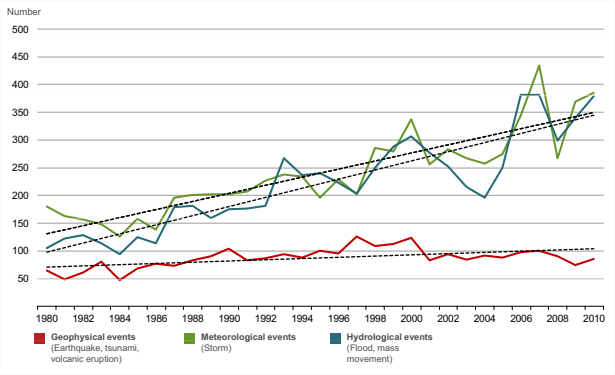

NatCatSERVICE

Natural catastrophes worldwide 1980 – 2010

Overall and insured losses with trend

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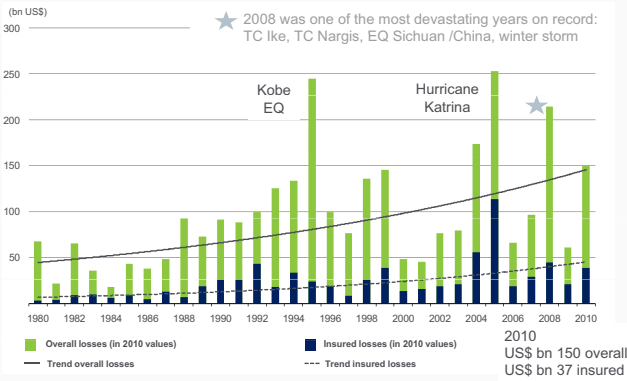

2010
US$ bn 150 overall
US$ bn 37 insured

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Natural catastrophes 2010

Insured losses US$ 38bn - Percentage distribution per continent

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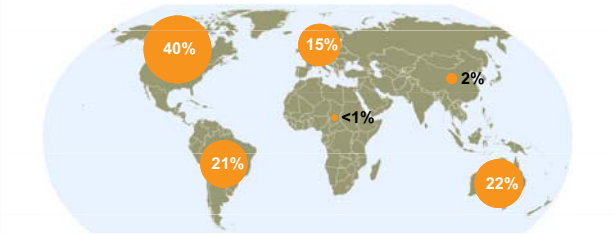

Continent	Overall losses [US$ m]	Insured losses [US$ m]	Fatalities
Africa	110	Minor losses	1,300
America (North and South America)	75,000	23,600	225,000
Asia	36,000	900	12,400
Australia/Oceania	16,000	8,200	40
Europe	22,000	5,600	56,500

11% of premium income was paid by MR for natural catastrophes in 2011
(avg. 6-7% in normal year!)

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Natural catastrophes 1980 - 2010

Insured losses US$ 740bn - Percentage distribution per continent

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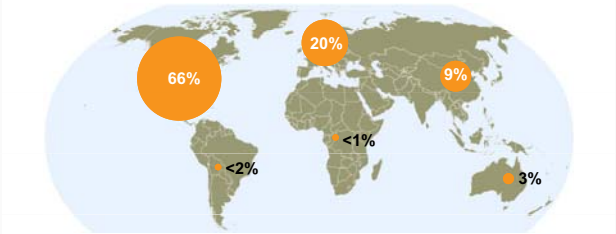

Continent	Insured losses* [US$ m]
Africa	2,000
America (North and South America)	496,000
Asia	66,000
Australia/Oceania	23,000
Europe	148,000

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NatCatSERVICE

Natural catastrophes in Australia/Oceania 1980 – 2010

Geographical overview in US$

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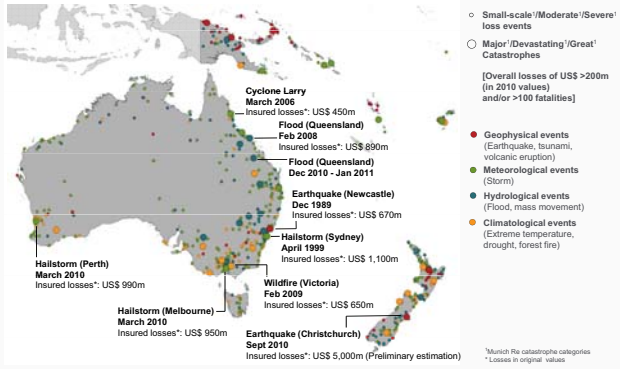

Natural Catastrophes in Australia

Australia 2010 Hailstorms

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Melbourne, 6th March 2010	Perth, 22nd March 2010
▪ Grapefruit size hail	▪ Tennis ball size hail
▪ Wind gusts of more than 100km/h	▪ Wind gusts of more than 120km/h
▪ 45mm of rain in 30min	▪ 63mm of rain in 2h
▪ Over 6000 requests for assistance	▪ Over 3000 requests for assistance
▪ AUD 1,044m; 130,000 claims	▪ AUD 1,053m; 150,000 claims
▪ Com/Motor/Home 10%/45%/45% (MR estimates)	▪ Com/Motor/Home 5%/55%/40% (MR estimates)

What do we know about Hail?

- Very few studies globally as to how hail risk will change
- Sydney study: increase in frequency & intensity of hailstorms
- Australian wide study: similar increase in hail frequency along the eastern seaboard
- Little work has been done to quantify the relation of hailstorms and ENSO
- Comprehensive and detailed analysis of past and future hailstorms is crucial in order to improve risk management strategies

With 9 out of the largest 24 losses in Australia, Hail presents the most underestimated peril!

Current Disaster Statistics - estimates

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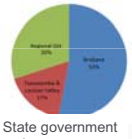
Event	Preliminary insured losses (AUD m)	Number of Claims
Dec/Jan Qld floods Rockhampton Rural Toowoomba, Lockyer Valley, Brisbane	1998 m (incl.mining) 77% of initial claims assessment	43,755
Jan Vic floods	67m 65% of initial claims assessment	5,590
Feb Qld TC Yasi	517.5m (TC Larry 540m)	30,600
Feb Vic severe st. Melbourne and suburbs	175m	24,802
Feb Bushfires Perth and surroundings	34.5m	410

Source: Insurance Council of Australia

Geographical spread of claims



State government estimate:
AUD 5.8bn
(damage to road infrastructure about half of that)

Climate Change projections:

- more fires and droughts are expected in some regions
- extreme daily rainfall may become more intense & frequent, higher risk of resultant flooding

Queensland Floods – Is there a link to climate change?

Rainfall anomalies can not be alone attributable to La Nina

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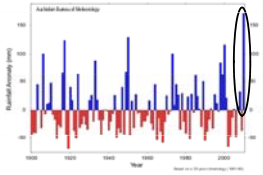
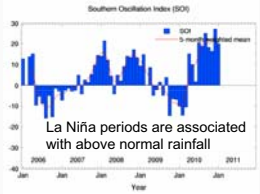
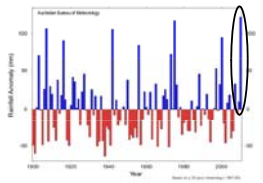
Queensland: Spring (Sept-Nov) Rainfall Anomaly



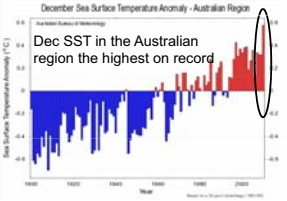
Southern Oscillation Index (SOI)



Queensland: December Rainfall Anomaly



December Sea Surface Temperature Anomaly - Australian Region



Natural catastrophes in Australia / Oceania 1980 – 2010

Number of events and trend; 65 in 2010

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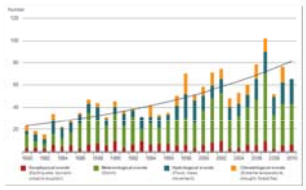
Number of events



Overall and insured losses

Significant trend for weather related perils

Increasing ratio of insured / overall losses

NatCatSERVICE

Natural catastrophes in Australia/Oceania 1980 – 2010

Annual number of events according to catastrophe classification

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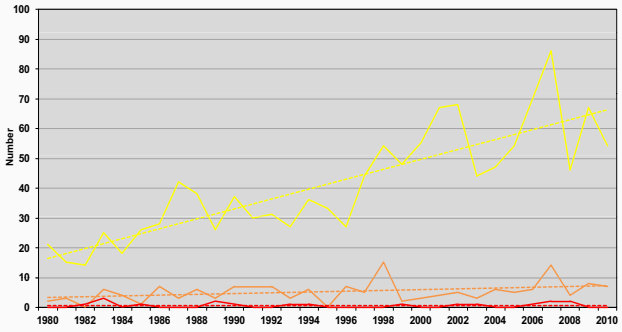

Munich Re's catastrophe classifcation:

- Damaging events: <20 deaths, up to considerable property damage
- Severe catastrophes: 20-500 deaths, AU$ 55-550m overall losses
- Major catastrophes: >500 deaths, >AU$ 550m overall losses

Reasons for globally increasing losses caused by natural disasters

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- Rise in population
- Better standard of living
- Increasing insurance density

In general no problem for insurance as premiums should rise proportionally with risk!

- Settlement in extremely exposed regions
- Increased vulnerability of modern societies and technologies to natural hazards
- Change in environmental conditions - Climate Change

Problem for insurance, if risk models are not adapted to the changes!

Example of population change & settlement in extremely exposed regions: South East Queensland (SEQ)

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- SEQ: Brisbane, Gold and Sunshine Coast
- > 2.7m residents, 66% of states population
- Strongest population growth in Qld (71% within the last 5 years!)
- Australia's highest exposed values concerning TC's, highest loss potential.

Sunshine Coast

1961 population 33,500 → 2006 > 295,000

Gold Coast – Surfers Paradise

1961 population 33,700 → 2006 > 507,500

Climate Change projections: Tropical Cyclones in Australia

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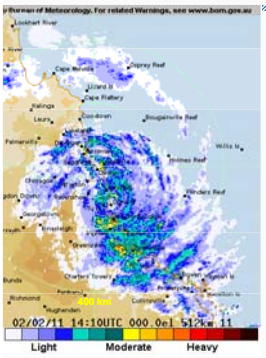

TC Yasi, 3 Feb 2011, Cat 4-5 (wind gusts of about 285 km/h; 5m tidal surge, 941hPa), one of the most powerful TC on record (stronger and larger than Larry)!

Stronger tropical cyclones, with uncertainty about changes in frequency

Southwards shift of forming/decay regions.

Larger oceanic storm surges, superimposed on sea-level rise

TC Larry, 20 March 2006, Cat 4 (240 km/h, 2.3m recorded – but was sign. Higher, 940hPa)

BoM, Climate Change in Australia – Technical Report 2007

Should this worry us?

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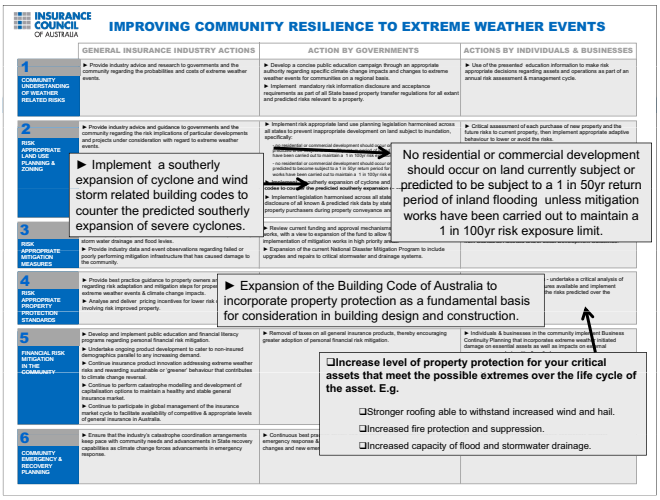
INSURANCE COUNCIL OF AUSTRALIA

Six Key Actions of Resilience

1. Community Understanding of Weather Related Risks
2. Risk Appropriate Land Use Planning & Zoning
3. Risk Appropriate Mitigation Measures
4. Risk Appropriate Property protection Standards
5. Financial Risk Mitigation in the Community
6. Community Emergency & Recovery Planning

Climate Change: Improving Community Resilience to Extreme Weather Events, April 2008

http://www.insurancecouncil.com.au/



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The impact of changing hazards on risk modelling

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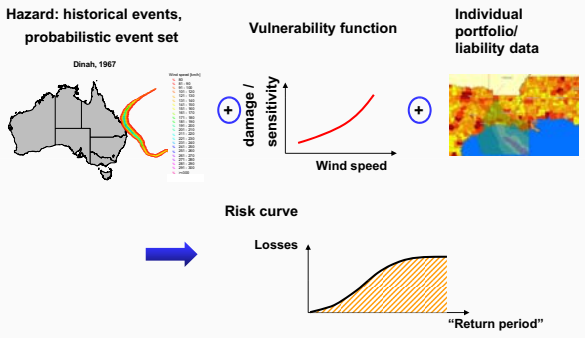
From hazard to risk: Principle of NatCat modelling, Tropical Cyclones



How does it all fit together?

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Where to from here … the insurance sector's role in partnership with society

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- Provision of data on weather-related losses to science, political decision makers and the public
- Transparency of risks via risk measurement & risk adequate premiums
  - ➢ sound actions, prevention, reduced loss loads for society
- Products promoting society's emissions reduction goals (mitigation)
- Products enhancing society's hazard-adaptive capability (adaptation)

Globe of Natural Hazards 2009 – Products Wall map/Folding map

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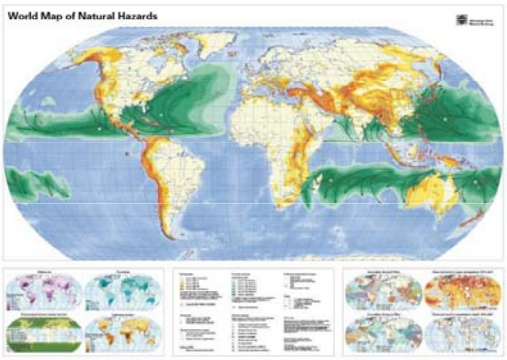

Natural hazards: MR has shared its knowledge for 30 years

Globe of Natural Hazards 2009 – Products Globe of Natural Hazards DVD

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Topics Geo Natural catastrophes – Analyses, assessments, positions

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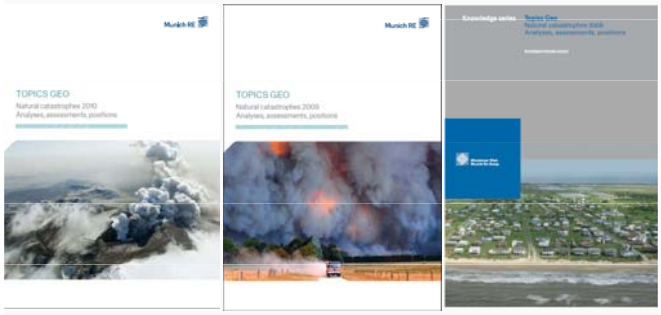

Topics Geo presents the results of our annual worldwide survey of natural catastrophes, plus practice-oriented analyses and evaluations. Topics Geo has been published for the past 15 years.

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IPCC involvement

United Nation's
Intergovernmental Panel on Climate Change

- The IPCC is an intergovernmental body. It is open to all member countries of the United Nations (UN) and WMO.
- Currently 194 countries are members of the IPCC. Governments participate in the review process and the plenary Sessions, where main decisions about the IPCC work programme are taken and reports are accepted, adopted and approved.
- For AR5 a unique team of 831 climate change experts across all working groups will volunteer their time over the next four years.
- The aim of the report is to genuinely synthesise and assess the current state of knowledge in a product of unparalleled influence.

Working Group II
Impacts, Adaptation, and Vulnerability

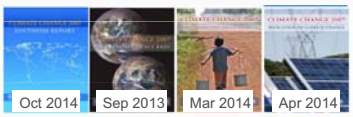
www.ipcc.ch

- My involvement: Lead Author , WG2, Chapter 25 'Australasia'

The IPCC WGII AR5
Summary Statistics
Total Number of Confirmed Writing Team Members: **310**
Total Number of Nationalities Represented on Writing Teams: **73**
Developing Country and Economy-in-Transition Writing Team Members: **127 (41%)**
Female Writing Team Members: **83 (27%)**
Writing Team Members New to the IPCC Process: **187 (60%)**
Young Scientists Engaged in the Process: **71 (23%)**

"New" connotes an expert not engaged in the AR4 or the IPCC Special Report currently being prepared by Working Group II (i.e., SREX).

"Young" connotes an individual who obtained highest degree in 2001 or later.



- End 2011: special report "Managing the risks of extreme events and disaster to advance climate change adaptation".

Working Group II
Impacts, Adaptation, and Vulnerability

www.ipcc.ch

Outline of the Working Group II Contribution to the IPCC Fifth Assessment Report

Summary for Policymakers
Technical Summary

PART A: GLOBAL AND SECTORAL ASPECTS

Context for the AR5
- Ch. 1 — Point of departure
- Ch. 2 — Foundations for decisionmaking

Natural and Managed Resources and Systems, and Their Uses
- Ch. 3 — Freshwater resources
- Ch. 4 — Terrestrial and inland water systems
- Ch. 5 — Coastal systems and low-lying areas
- Ch. 6 — Ocean systems
- Ch. 7 — Food production systems and food security

Human Settlements, Industry, and Infrastructure
- Ch. 8 — Urban Areas
- Ch. 9 — Rural Areas
- Ch. 10 — Key economic sectors and services

Human Health, Well-Being, and Security
- Ch. 11 — Human health
- Ch. 12 — Human security
- Ch. 13 — Livelihoods and poverty

Adaptation
- Ch. 14 — Adaptation needs and options
- Ch. 15 — Adaptation planning and implementation
- Ch. 16 — Adaptation opportunities, constraints, and limits
- Ch. 17 — Economics of adaptation

Multi-Sector Impacts, Risks, Vulnerabilities, and Opportunities
- Ch. 18 — Detection and attribution of observed impacts
- Ch. 19 — Emergent risks and key vulnerabilities
- Ch. 20 — Climate-resilient pathways: adaptation, mitigation, and sustainable development

PART B: REGIONAL ASPECTS

- Ch. 21 — Regional context

Regional Chapters
- Ch. 22 — Africa
- Ch. 23 — Europe
- Ch. 24 — Asia
- Ch. 25 — Australasia

Regional Chapters (continued)
- Ch. 26 — North America
- Ch. 27 — Central and South America
- Ch. 28 — Polar Regions
- Ch. 29 — Small Islands
- Ch. 30 — Open Oceans

Conclusions

Natural catastrophes and insured losses rising – but definitely an insurable risk!

Munich RE

- Natural catastrophes, especially weather related events, are increasing dramatically in number and magnitude, both globally and in Australia.
- There is more and more scientific evidence for causal links between global warming and increasing frequencies and intensities of natural catastrophes.
- For Australia/Oceania the Southern Oscillation Index shows a correlation with loss frequency and severity.
- We have to mitigate global warming and adapt to the changing risks in respect to the regionally specific risk patterns.
- Mitigation and adaptation measures open up great economic chances for companies and countries being on the forefront in these processes.
- Natural catastrophes are still insurable. However we have to adapt our risk assessment, our modeling, our rates, our risk selection and accumulation control continuously.
- With our long experience we have created a unique expertise on natural catastrophe risks in the changing world and are happy to share this within our industry, with government authorities and the UNFCCC- community.

Munich RE

Thank you for your attention!

sschuster@munichre.com

Dr. Sandra Schuster