



MS Frontier Re Modeling Research Pte. Ltd.

Catastrophe Risk Assessment in Asia

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31 May 2012



MSIG | MS Frontier Re



“One of life’s most painful moments comes when we must admit that we didn’t do our homework, that we are not prepared.”

Merlin Olsen, Athlete



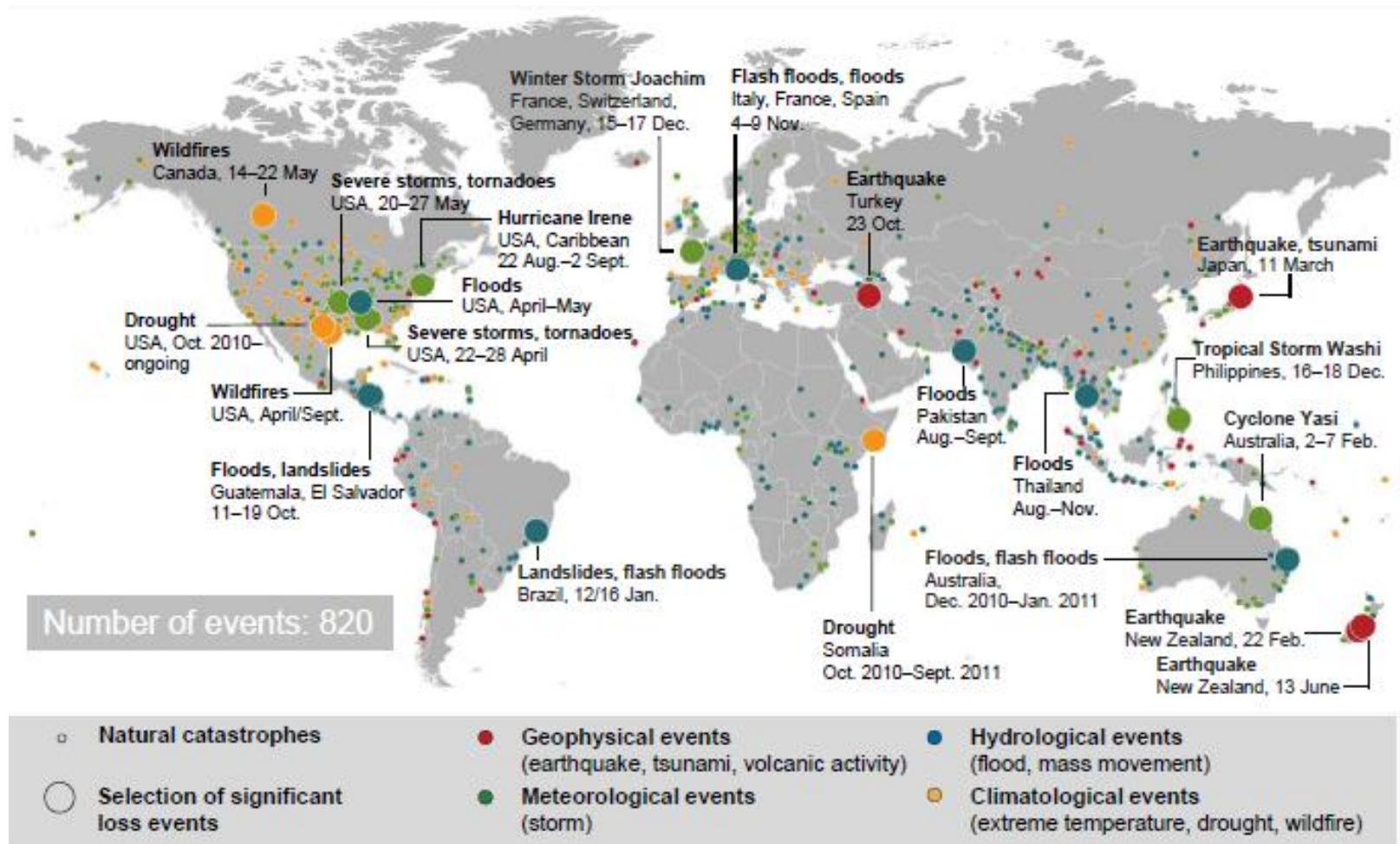
Agenda

- **Overview of Natural Disasters in 2011**
- **How Badly Was Asia Effected?**
- **Why Are The Numbers Bigger Now?**
- **Growing Threat of Flood in Asia**
- **Flood Profiles – Asia**
- **Uncertainties And Challenges in Flood Modeling**
- **Summary**

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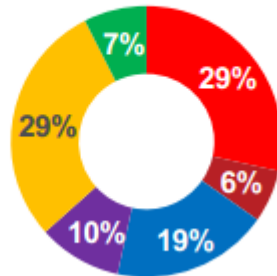
World Map of Natural Disasters 2011



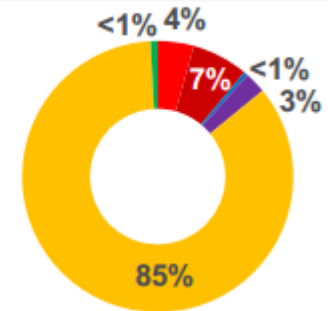
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2011 Distribution of Losses by Continent

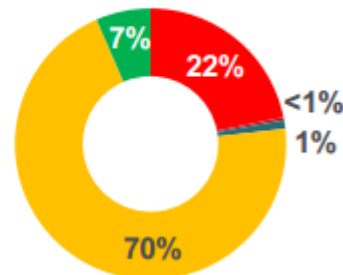
820 Loss events



27,000 Fatalities



Overall losses* US\$ 380bn



*in 2011 values

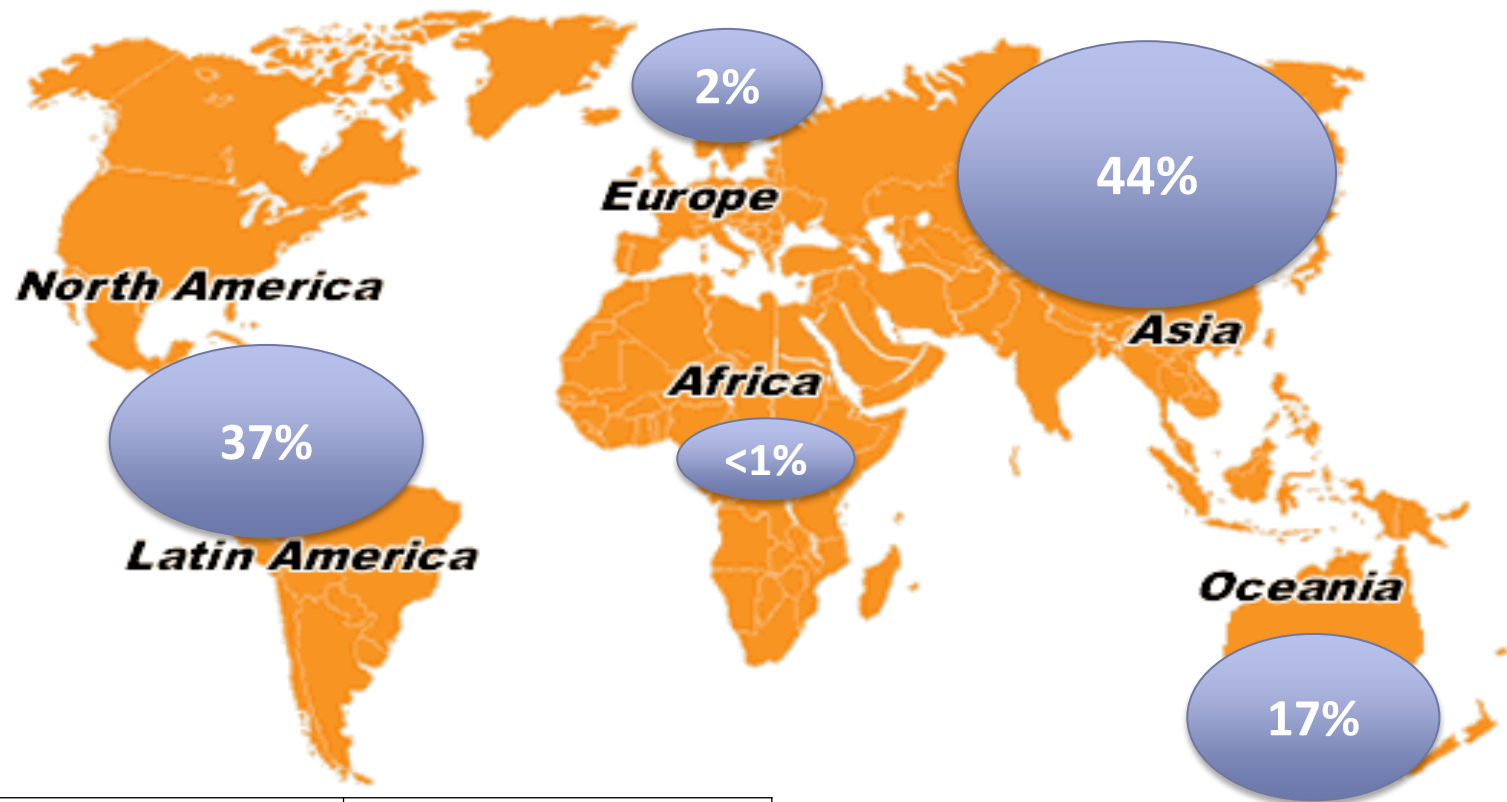
Source: 2012 Münchener
Rückversicherungs-Gesellschaft, Geo
Risks Research, NatCatSERVICE
-As at March 2012



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2011 Insured Losses Percentage Distribution per Continent

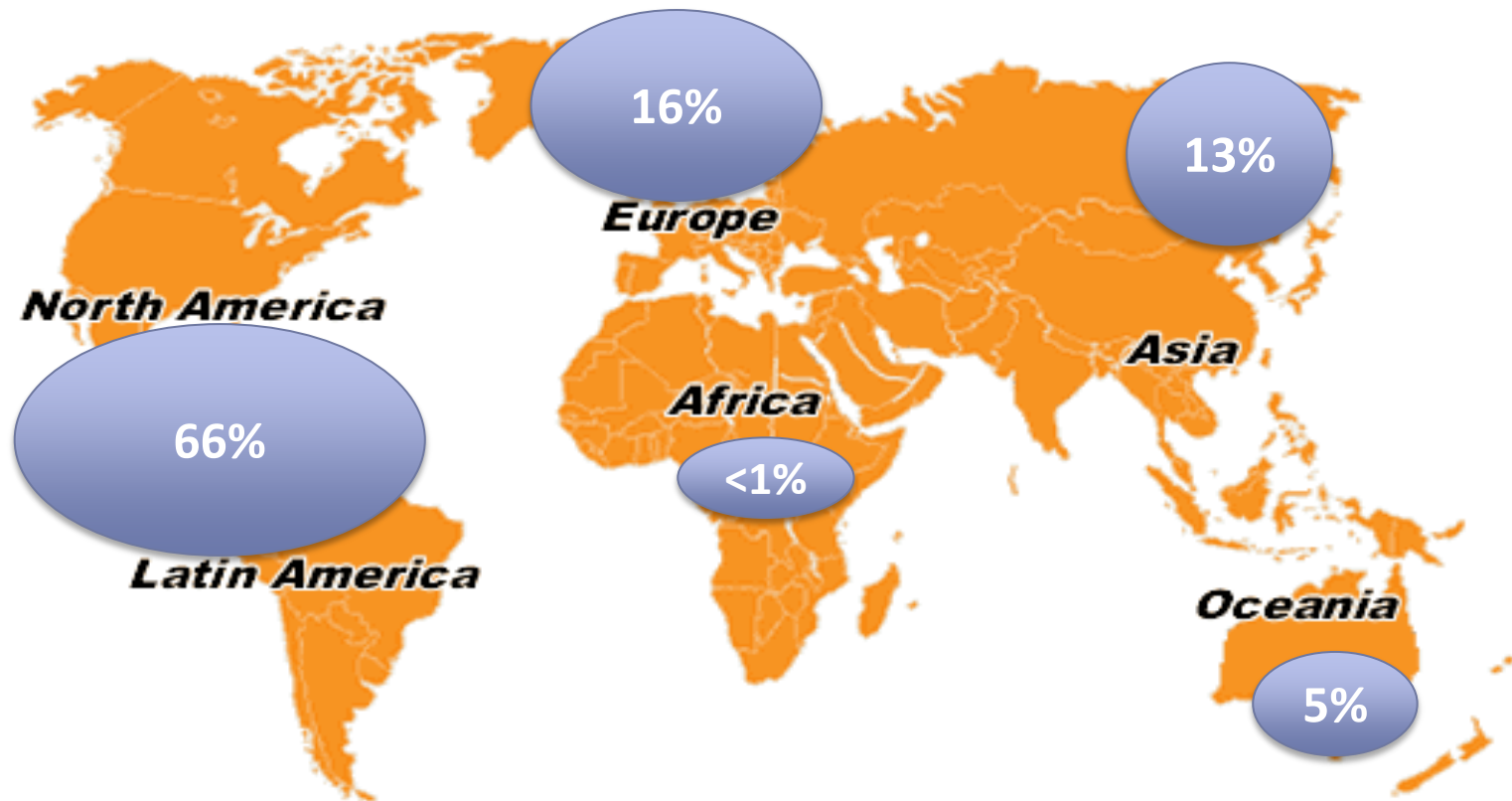


Continent	Insured losses in US\$m
America(North and South America)	40,000
Europe	2,000
Africa	Minor damages
Asia	45,000
Australia/Oceania	18,000

Source: MR NatCatSERVICE

Historical Trend (1980-2011)

Insured Losses Percentage Distribution per Continent

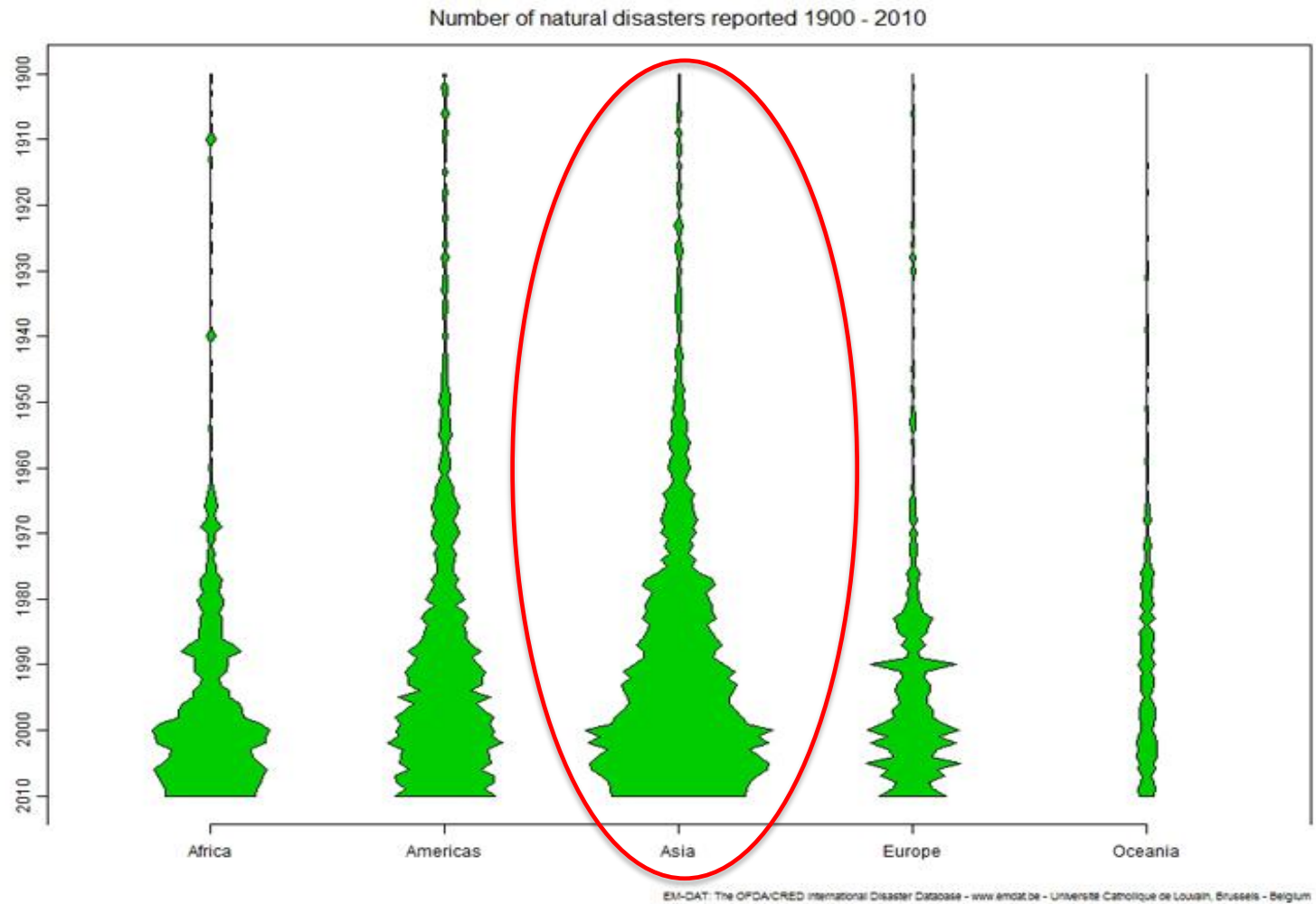


Continent	Insured losses in US\$m
America(North and South America)	566,000
Europe	146,000
Africa	2,000
Asia	115,000
Australia/Oceania	41,000

Source: MR NatCatSERVICE

Historical Trend (1900-2010)

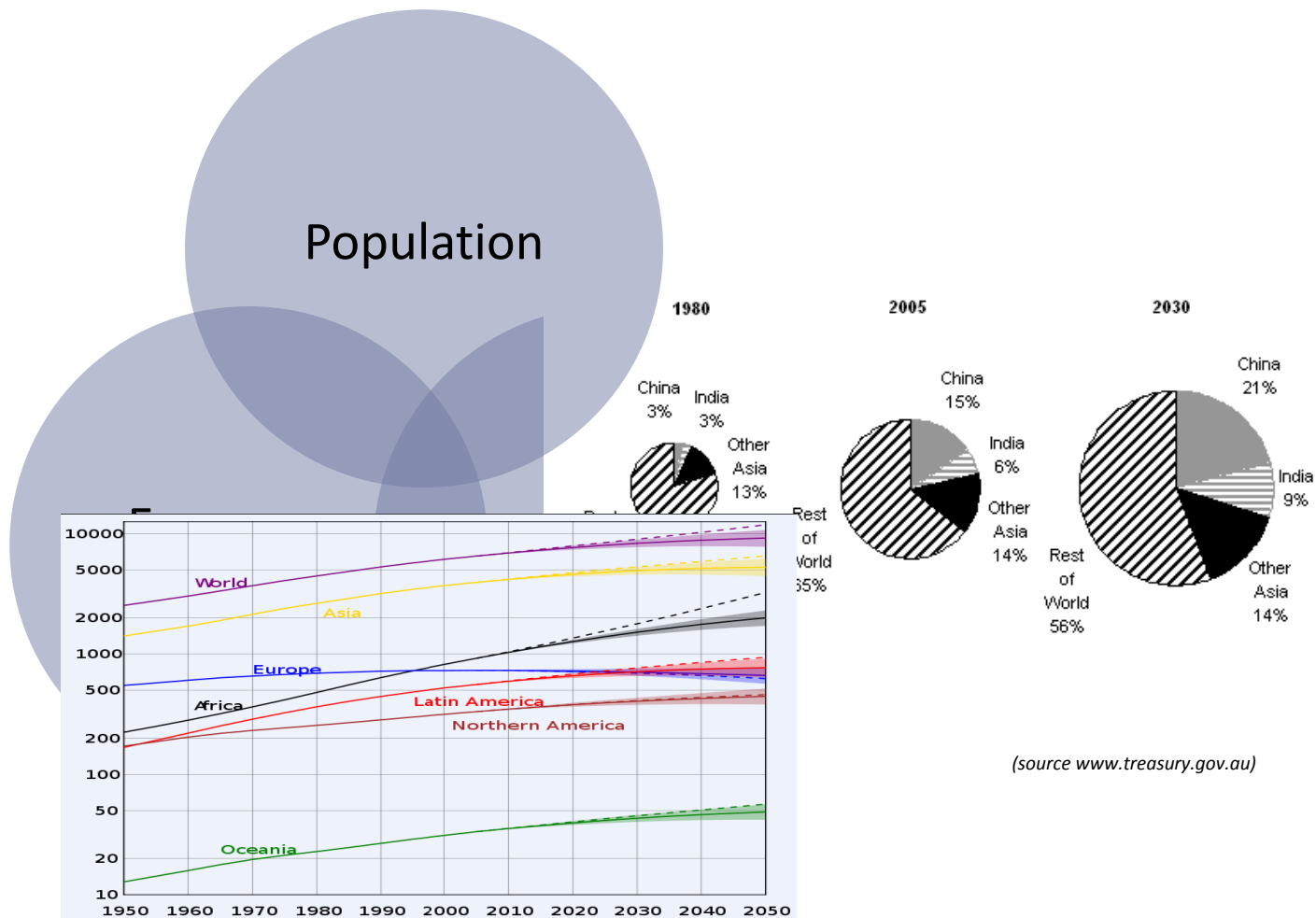
Growing Pie of Asian Catastrophes



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Why Are The Numbers Bigger Now?

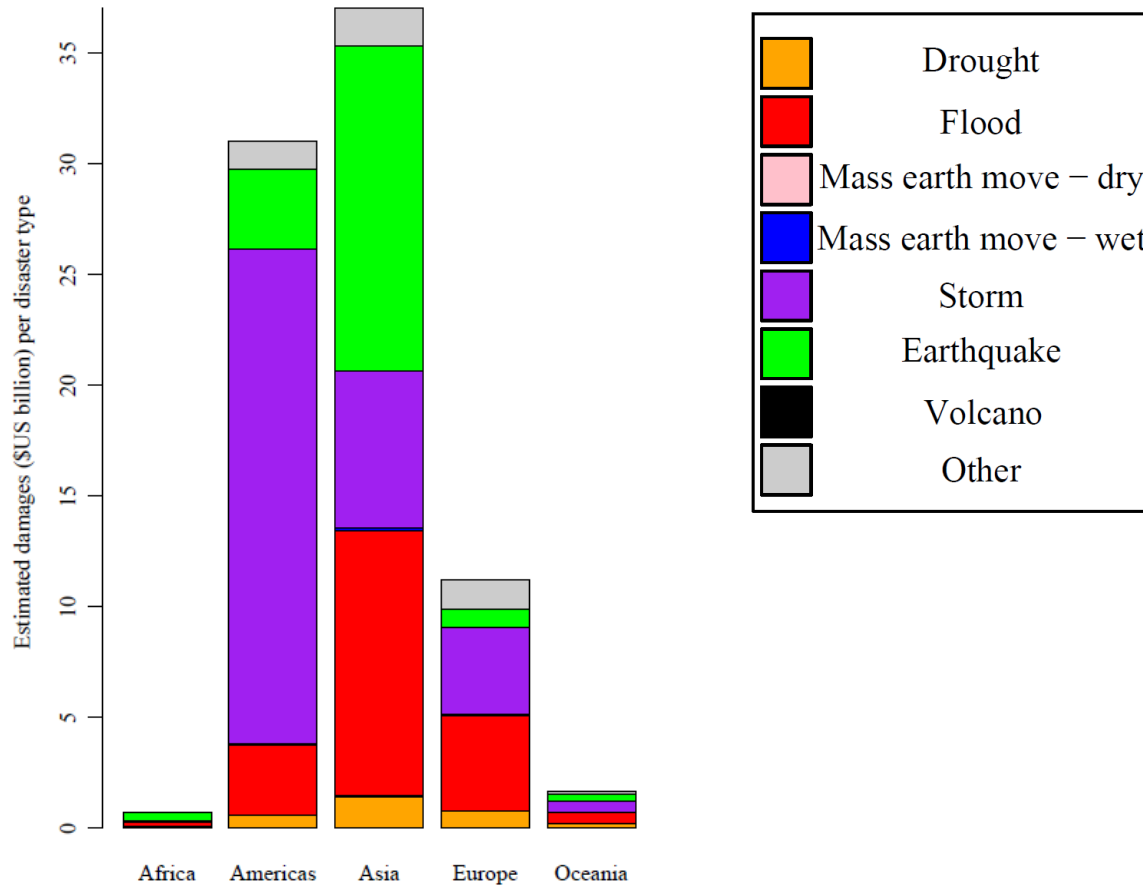


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Growing Threat of Flood in Asia

Annual Average Damage (\$US billion): 1990-2010



Source: "EM-DAT: The OFDA/CRED International Disaster Database, Universite catholique de Louvain, Brussels, Belgium"

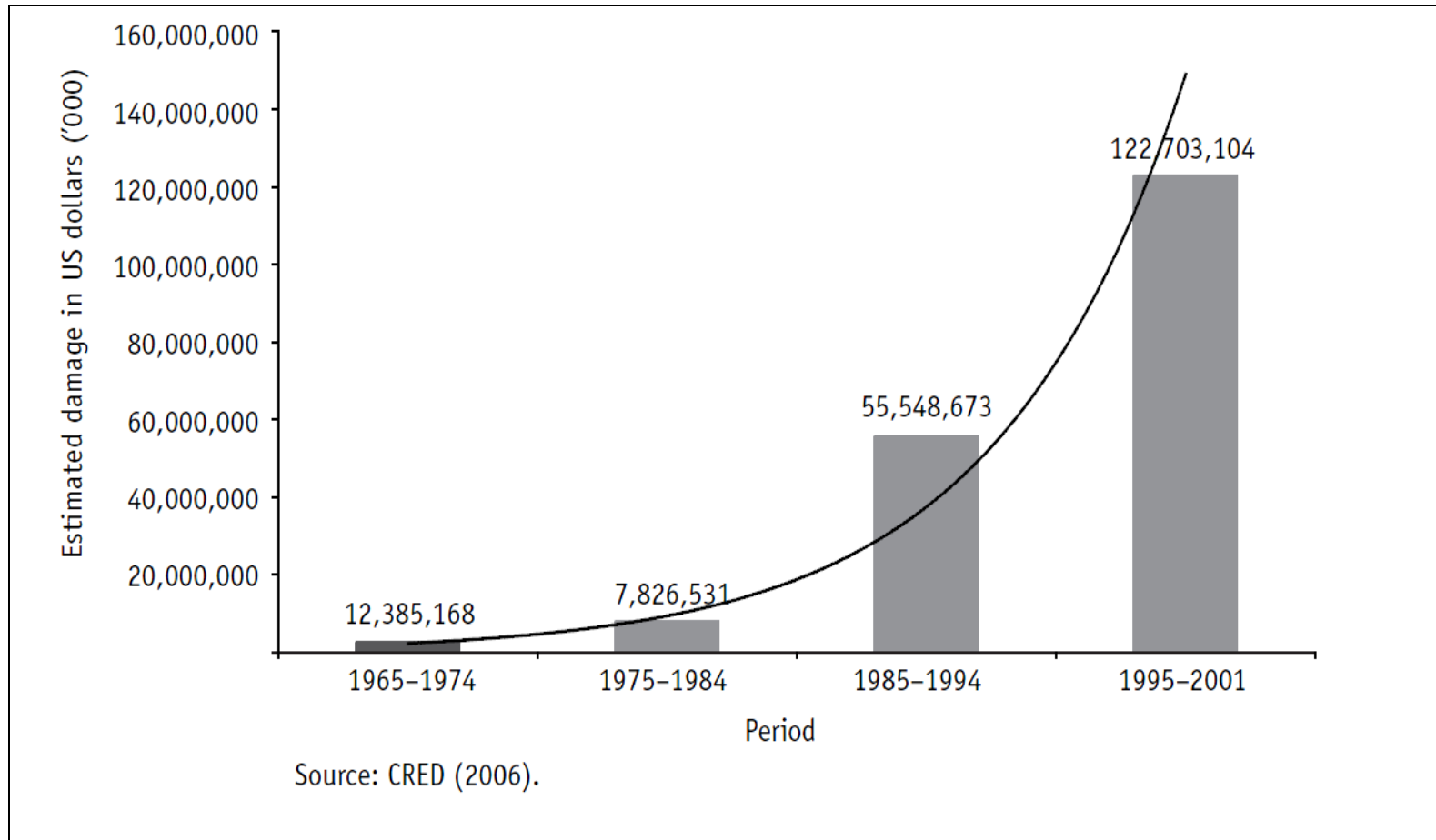
Model Availability in Asia

Country	AIR		EQECAT			RMS		Risk Frontiers	
	Tropical Cyclone	Earthquake	Tropical Cyclone	Earthquake	Typhoon rainfall – flooding	Tropical Cyclone	Earthquake	Riverine Flood	Hail
Australia	✓	✓	✓	✓		✓	✓	✓	✓
China	✓	✓	✓	✓	✓	✓	✓		
Guam						✓	✓		
Hong Kong*	✓		✓	✓		✓	✓		
India			✓	✓			✓		
Indonesia		✓		✓			✓		
Japan	✓	✓	✓	✓	✓	✓	✓		
Macau*						✓	✓		
Malaysia			✓	✓	✓				
New Zealand		✓		✓			✓		
Pakistan			✓	✓					
Philippines	✓	✓	✓	✓	✓		✓		
Saipan**							✓		
Singapore				✓					
South Korea	✓		✓	✓	✓				
Taiwan	✓	✓	✓	✓	✓		✓		
Thailand			✓	✓	✓				

* Included in China EQ

** Included in Guam EQ

Economic Losses Due to Floods in Asia (1965 – 2001)



World Flood Profile

Absolute human exposure

	Average people exposed per year	Country
1	19,279,960	Bangladesh
2	15,859,640	India
3	3,972,502	China
4	3,403,041	Viet Nam
5	1,765,674	Cambodia
6	1,101,507	Indonesia
7	819,822	Thailand
8	788,572	Philippines
9	579,732	Pakistan
10	444,450	Myanmar
11	390,594	United States of America
12	333,224	Nepal
13	265,260	Brazil
14	233,320	Russian Federation
15	226,622	Nigeria

Absolute economic exposure

	Average GDP ¹ exposed per year	Country
1	21.86	United States of America
2	12.58	China
3	9.74	Bangladesh
4	9.39	India
5	4.72	Germany
6	4.56	Japan
7	4.17	France
8	3.09	Thailand
9	2.57	Philippines
10	2.21	Viet Nam
11	2.18	Argentina
12	1.98	United Kingdom
13	1.84	Spain
14	1.82	Netherlands
15	1.76	Canada

<http://www.preventionweb.net/english/hazards/statistics/risk.php?hid=62>

¹: In billions US\$

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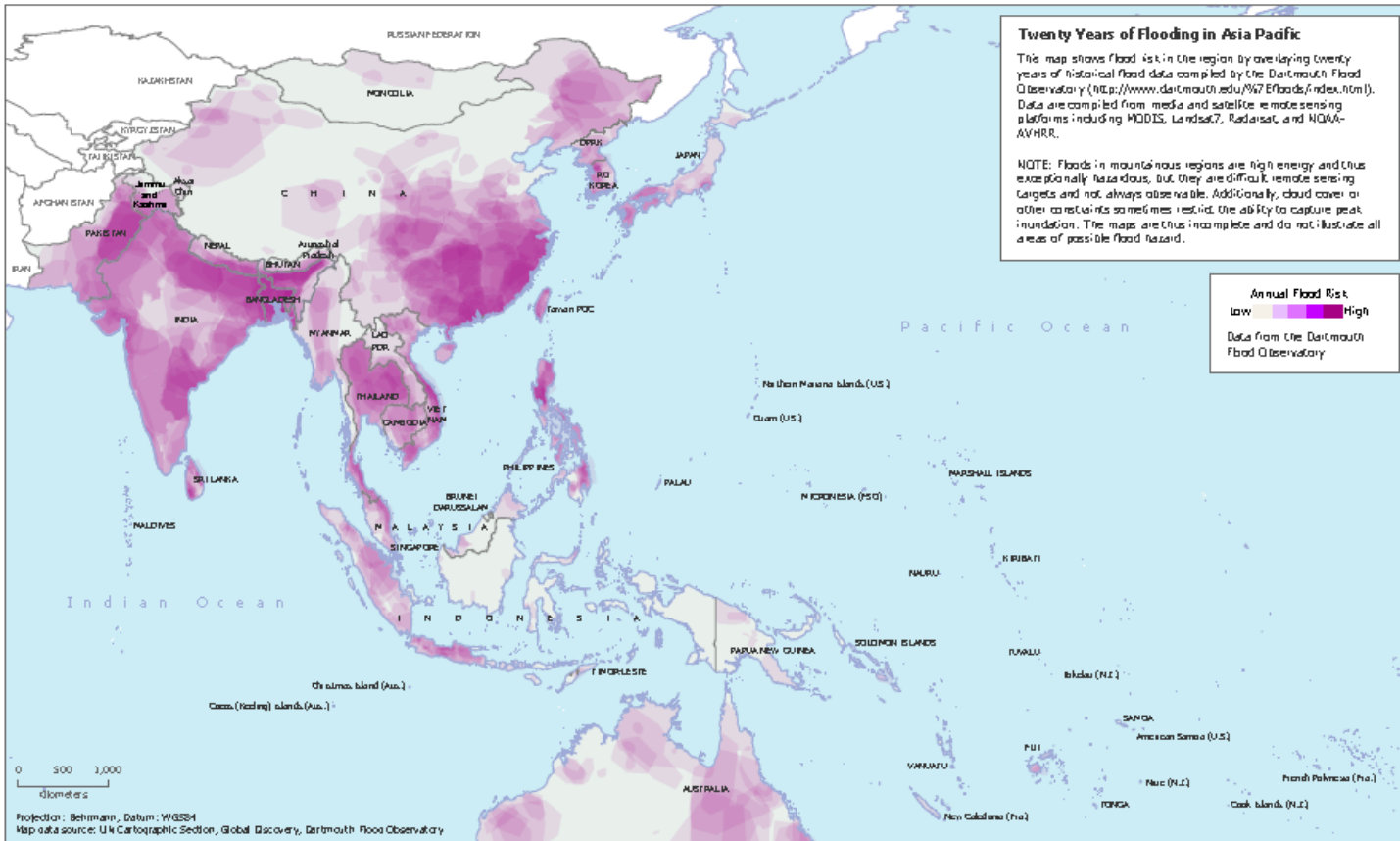
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Flood Profiles - Asia



OCHA Regional Office for Asia Pacific
Flooding in Asia Pacific: 1985 - 2005
 Issued: 16 August 2006

United Nations Office for the Coordination of Humanitarian Affairs (OCHA)
 Regional Office for Asia Pacific (ROAP)
 Executive Suite, 2nd Floor, U MCC Building,
 Rajamannin Road, Bangkok 10200, Thailand
<http://www.ochaonline.un.org/roap>

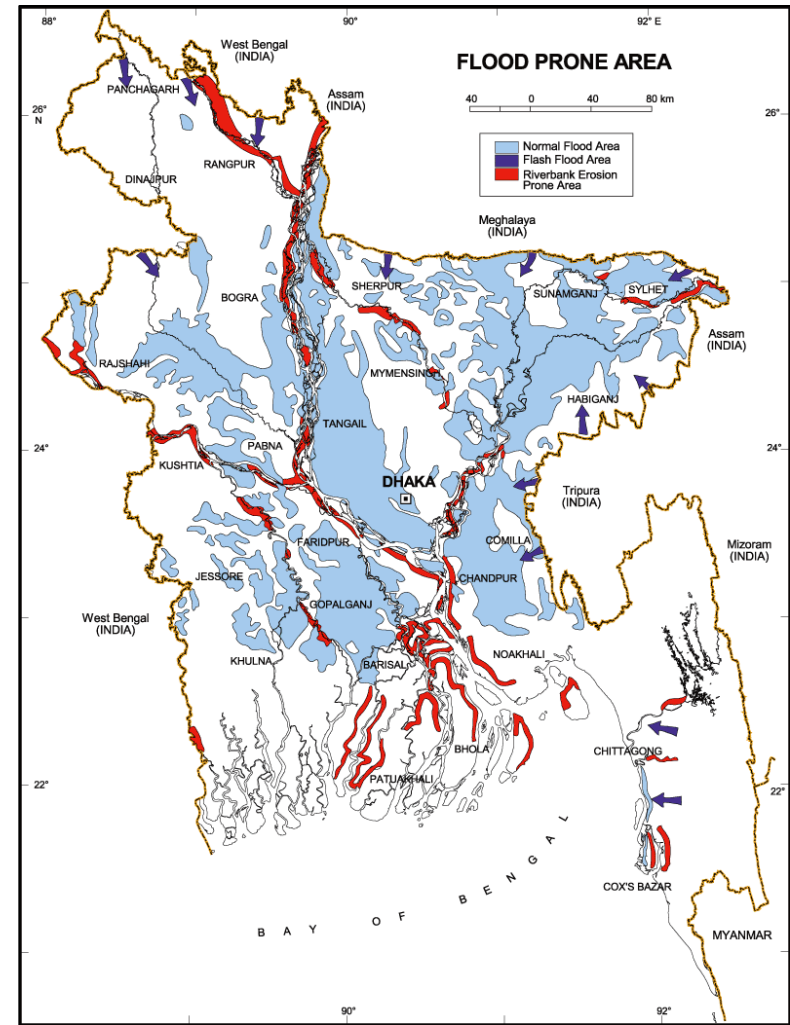


The names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations

Map Ref: OCHA_ROAP_Flood_History_v1_060816

Flood Profile - Bangladesh

- Situated on the Ganges Delta and the many tributaries flowing into the Bay of Bengal.
- 75% of Bangladesh is less than 10m above sea level and 80% is flood plain
- Flash flood, local flood, monsoon flood and floods due to storm surge



Source :<http://www.banglapedia.org/httpdocs/>

Flood Profile - India

- Out of the country's total geographical area of 329 million hectares about 45 million hectares is flood prone.



Source : UNDP flood zone map

Flood Profile - China

Summarized Table of Floods in China P Rep from 1900 to 2011

Types of Flood	No of Events	Killed	Total Affected	Damage (000 US\$)
Unspecified	50	2,254,492	165,018,799	16,865,744
Flash flood	20	2,099	89,073,073	4,493,090
General flood	131	4,340,199	1,584,815,300	137,890,499
Storm surge/coastal flood	5	391	1,000,015	-

Source: "EM-DAT: The OFDA/CRED International Disaster Database

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Uncertainties and Challenges in Flood Modeling

- **Metrological and hydrological data - availability and gaps**
- **Large amount of data – heavy to process**
- **Resolution of data**
- **Loss data for historical events**
- **Construction Standards**
- **Lack of adequate funding / interest in research and initiative from Governments**

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Summary

- **2011 – Rude Awakening for Asian Insurance Industry**
- **Asia's potential for large catastrophe losses is increasing due to**
 - growing population
 - economic growth
 - increasing insurance penetration
- **Flood models are the most complex models – large amounts of high resolution datasets are needed**
- **Currently no standalone Flood Model available in Asia**
- **Data quality : Garbage in – garbage out**

