Natural hazards, risks and asset protection: a WMO perspective

Presented at the 28th Annual Caribbean Insurance Conference by

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PRESENTATION OUTLINE

✓ Natural hazards

- Disaster risk management & early warning systems
- ✓ The Role of WMO & the NMHSs
- ✓ Multi-hazard early warning systems for infrequent threats
- ✓ Climate change
- ✓ The uncertainty factor
- ✓ Summing up







WMO - then and now

- ✓ 1853 (Brussels): First International Meteorological Conference
- ✓ 1873 (Vienna): International Meteorological Organization (IMO)
- ✓ 1950: IMO becomes WMO
- ✓ 1951: A specialized agency of UN System
 ✓ 2008: 188 Mombors
- ✓ 2008: 188 Members

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✓ A mandate in weather, climate and water



Natural hazards

- Earthquakes & volcanoes
- Tsunami
- Swarming (Locusts,...)
- 90% are hydrometeorological
- Tropical cyclones
- Floods
- Droughts
- Storms & tornadoes
- Heat waves & cold spells
- Mudflows & landslides
- Waves & storm surges
- Avalanches
- Dust storms







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Most disasters are related to hydrometeorological hazards...

Distribution of events, 1980-2005:



Global distribution of disasters caused by natural hazards and their impacts (1980-2005)







- ✓ Supporting scientific research
- ✓ Disaster risk reduction: a key component of adaptation
- ✓ Climate change mitigation monitoring

The need for more and better observations



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Space-Based observations





Tropical cyclones



Other Key Responsibilities of NMSs

VEnergy production & usage ✓ Services to maritime, aerial & terrestrial transportation ✓ Public weather services ✓ Agriculture & food ✓ Climate & health ✓ Water resources & quality ✓ Support to tourism ✓ Public information and community awareness ✓ Capacity building

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Disaster Risk Management



Advantages of multi-hazard early warning systems

- ✓ Hazards can lead to disasters
- Need to prevent & mitigate the impacts
- ✓ Some hazards more frequent than others
 - A multi-hazard approach is most cost-effective
- ✓ Risk identification
- ✓ Political recognition
- ✓ Strategic partnerships
- ✓ Integrated planning





The need for a Tsunami Early Warning System in the Caribbean

- ✓ Geological conditions in the Caribbean for seismic events
- ✓ Active seaside & submerged volcanoes
- ✓ No major tsunami episodes since 1946 (1865 lives lost)
- ✓ Scarce tsunami awareness
- ✓ Coastal population growth
- ✓ Expansion of tourism
- ✓ Attractive warm waters, flat beaches, no refuge
- ✓ Need for a <u>multi-hazard</u> EWS







Climate and natural disasters



Climate change: a major issue for WMO

✓1979-1st WCC ✓ 1988-WMO & UNEP coestablish the IPCC ✓1990- 2nd WCC ✓ 1992- UNFCCC established ✓ 2007- IPCC 4AR approved ✓ Key conclusions: >Warming unequivocal >Human activities very likely responsible > Increasing frequency & intensity of extreme events

✓ All sectors to be affected



21 September 2005



16 September 2007

Recent & future events

IPCC report approved

- ✓ 1998-2007 warmest decade on record
- ✓ 2007 global mean sea level rise ~ 20 cm > 1870 estimate
- ✓ No longer a scientific issue: world peace relevant & the potential to induce migration

Nobel Peace Prize 2007

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 ✓ UNFCCC COP-13 (Dec. 2007): the "Bali roadmap"
 ✓ 2009: WCC-3 - the integration of early warnings in decision-making





Climate change synthesis: key issues

- Rising average temperatures
- ✓ Melting snow/ice
- ✓ Sea-level rise
- ✓ Milder winters
- ✓ Warmer summers
- ✓ Heatwaves & droughts
- ✓ > Frequency & intensity of severe weather
- ✓ Changing ecosystems

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Climate change & uncertainty

- **Not a transition between 2 stable systems at different temperatures**
- ✓ Uncertainty and climate change are inextricable
- Enhanced research will contribute to reduce but not remove uncertainties
- ✓A new paradigm in adaptation & decision-making





Model uncertainties

Major European cities are seen displaced to locations having today climate regimes comparable (in temperature & precipitation cycles) to those anticipated for end of XXIst century, according to the models of: 1) MeteoFrance 2) Hadley Centre





Ref: S. Hallegatte

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Climate hotspots



✓Nations must address both extreme weather & the more gradual global warming

✓ Some areas are especially vulnerable

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The role of the National Meteorological and Hydrological Services in financial risk transfer

- Availability and accessibility of historical and realtime data critical for market development
- ✓ Data quality assurance, filling data gaps, homogenization and analysis
- ✓ Independent, reliable and authoritative data for contract design and settlement
- ✓ Forecasts for risk portfolio management
 ✓ Technical support and service delivery

Risk assessment/partnerships: floods, droughts, tropical cyclones and severe storms

- Partnerships with World Bank, UNDP, World Food Programme,...
 Standardized hazard data analysis and mapping methodologies
- Mainstreaming risk assessment in sectoral planning (partners)
- ✓ Capacity development and training
- Demonstration projects in selected regions and countries

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FLOODS



SEVERE STORMS TROPICAL CYCLONES



DROUGHTS

Summing up:

- ✓ Major issues: climate change and natural disasters
- A multi-hazard approach to ensure sustainability effectiveness for less frequent threats (tsunami)
- ✓ A vital role in adaptation to climate change
- ✓ Strong multidisciplinary partnerships needed
- Expenditures in NMHSs to be seen as investments
 - Madrid Conference (March 2007)

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Banda Aceh (Indonesia) 23 June 2004



Banda Aceh (Indonesia) 28 December 2004



Thank you Dank u Danki **Merci** Gracias



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2007 disasters in numbers

Natural disaster occurrence by disaster type



- ✓ 399 disasters
- ✓ 16,517 deaths
- ✓ 197 million affected
- ✓ US\$ 62.5 billion in damages
- ✓ A marked increase in the number of floods
- ✓ Asia hit the hardest: 4,234 killed by Sidr in Bangladesh (Nov.2007)

✓ The number affected continued to increase

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- ✓ However, deaths lower than average
- ✓ High economic impacts could have been reduced through more extensive prevention investments

Top 10

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

| ALC LP C | | | | 1 11 | 0007 |
|-------------------|----|--------|----|--------|--------|
| Natural disasters | by | number | OŤ | deaths | - 2007 |

| Cyclone Sidr, November | Bangladesh | 4234 |
|----------------------------|------------------|-------|
| Flood, July-August | Bangladesh | 1 110 |
| Flood, July - September | India | 1 103 |
| Flood, August | Korea, Dem P Rep | 610 |
| Flood, June-July | China, P Rep | 535 |
| Earthquake, August | Peru | 519 |
| Heat Wave, July | Hungary | 500 |
| Cyclone Yemyin, June | Pakistan | 242 |
| Flood and landslides, June | Pakistan | 230 |
| Flood, July | India | 225 |