國立臺北大學自然資源與環境管理研究所
106 學年度第二學期『環境災害與風險管理』

課程講義（03-04）：天然災害與巨災
Natural Disasters and Catastrophes

- CATEGORIES OF NATURAL DISASTERS
  - Natural Disasters Discussed in Smith (2013)
    - ⇨ Tectonic Hazards: Earthquakes and Tsunamis, Volcanoes
    - ⇨ Landslide and Avalanche Hazards
    - ⇨ Severe Storm Hazards, Weather Extremes, Disease Epidemics and Wildfires
    - ⇨ Hydrological Hazards: Floods and Droughts
  - Natural Disasters Covered in the Book of *World Atlas of Natural Disaster Risk*
    http://www.springer.com/gp/book/9783662454299
    - ⇨ Earthquake, Volcano and Landslide Disasters
    - ⇨ Flood and Storm Surge Disasters
    - ⇨ Sand-dust Storm and Tropical Cyclone Disasters
    - ⇨ Heat Wave and Cold Wave Disasters
    - ⇨ Drought Disasters => Impacts on Crops Production
    - ⇨ Wildfire Disasters => Forest Wildfire and Grassland Wildfire

- NATURAL DISASTER HOTSPOTS: A GLOBAL RISK ANALYSIS
  http://documents.worldbank.org/curated/en/621711468175150317/Natural-disaster-hotspots-A-global-risk-analysis
  - Natural Disasters
    - ⇨ Geophysical hazards: earthquakes and volcanoes
    - ⇨ Hazards driven by hydro-meteorological processes: floods, cyclones, and landslides
    - ⇨ Drought
  - Indexes of Disaster Risk:
    1. Mortality risks, assessed for global gridded population
    2. Risks of total economic losses, assessed for global gridded GDP per unit area
    3. Risks of economic losses expressed as a proportion of the GDP per unit area for each grid cell
  - Three components that contribute to the overall risk of natural hazards:
    1. The *probability of occurrence* of different kinds and intensities of hazards
    2. The *elements exposed* to these hazards
    3. The *vulnerability* of the elements exposed to specific hazards.
  - 國家災害防救科技中心：2016 年報、天然災害紀實

- SEISMIC (TECTONIC) HAZARDS (**S**. Chp.6&7)
  - Earthquake and Tsunami
    - ⇨ Ground shaking
    - ⇨ Soil liquefaction, Landslides, Tsunamis, *etc.*
  - Volcanoes
    - ⇨ Pyroclastic flows and Volcanic gases
    - ⇨ Ground deformation, Lahars, *etc.*
    - ⇨ Volcanic ashes

- MASS MOVEMENT HAZARDS (**S**. Chp.8)
  - Rock Falls, Landslides and Debris Flows
  - Snow Avalanches => *c.f.* Land Subsidence

- SEVERE STORM HAZARDS / ATMOSPHERIC HAZARDS (**S**. Chp.9)
  - Tropical Cyclones
  - Severe Summer Storms
  - Severe Winter Storms

- WEATHER EXTREMES, DISEASE EPIDEMICS AND WILDFIRE (**S**. Chp.10)
  - Extreme Temperature
  - Disease Epidemics => Infectious Diseases and Climate
  - Wildfire

- HYDROLOGIC HAZARDS (**S**. Chp.11&12)
  - Floods
    - ⇨ River floods vs. Costal floods => *c.f.* Forecasting vs. Warning
  - Droughts
    - ⇨ Meteorological, Hydrological, Agricultural, and Famine droughts

- CATASTROPHE AND CATASTROPHE BOND
  - Definition of Catastrophe
    - ⇨ An unexpected or unanticipated natural or man-made event that has wide ranging negative socioeconomic impacts; also known as a disaster.
  - Stakeholders: Property owners, Insurers, Reinsurers, Capital markets, Societies, and Governments

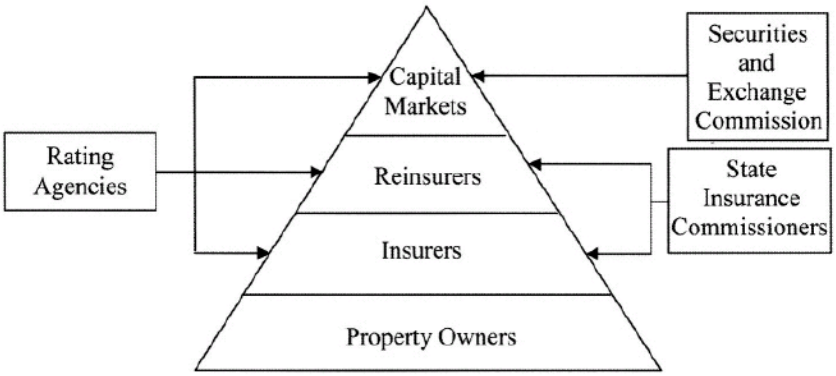

Figure 1.3. Key private sector stakeholders in the management of risk

  - Catastrophe Bond
    - ⇨ Catastrophe bonds (also known as cat bonds) are risk-linked securities that transfer a specified set of risks from a sponsor (insurer or reinsurer) to investors. They were created in the mid-1990s in the aftermath of Hurricane Andrew and the Northridge earthquake.
    - ⇨ Formosa Re Cat Bond (in 2003): USD 100 Million, Mature period: 3 years.

- Homework Assignment #2
  請下載並閱讀 World Economic Forum 發行之Global Risks Report 2018，以利後續課程討論。