Fundamentals of Disaster Risk Reduction and Management and Climate Change

Fundamentals of Disaster Risk Reduction and Management and Climate Change

Module 05 – Youth Ecological Camp

Module Outline

Chapter 1: Disasters and Ecosystems

A. History and Background
   - Geographical Context
   - Social Context

B. Disaster Statistics
   - Global statistics
   - Philippine statistics

Chapter 2: Introduction to disasters, risk reduction, and climate change

A. Concepts and Definitions
   - Ecosystem, Livelihoods, Disaster, Disaster Risk, Hazard, Vulnerability, Capacity / Resilience, Risk

Chapter 3: Linking disasters, climate change, and ecosystems

A. Ecosystem services and Human well-being
B. Provisioning, regulating, and cultural ecosystem services

Chapter 4: Disaster management, resilience, and ecosystems

A. Ecosystem-based Disaster Risk Reduction and Adaptation Framework
B. Disaster Risk Reduction Management Framework

Chapter 5: Disaster Town Watching

A. Introduction to Disaster Town Watching
B. Fieldwork exposure trip

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Chapter 1: Disasters and Ecosystems

Module 02 – Youth Ecological Camp

Fundamentals of Disaster Risk Reduction and Management and Climate Change

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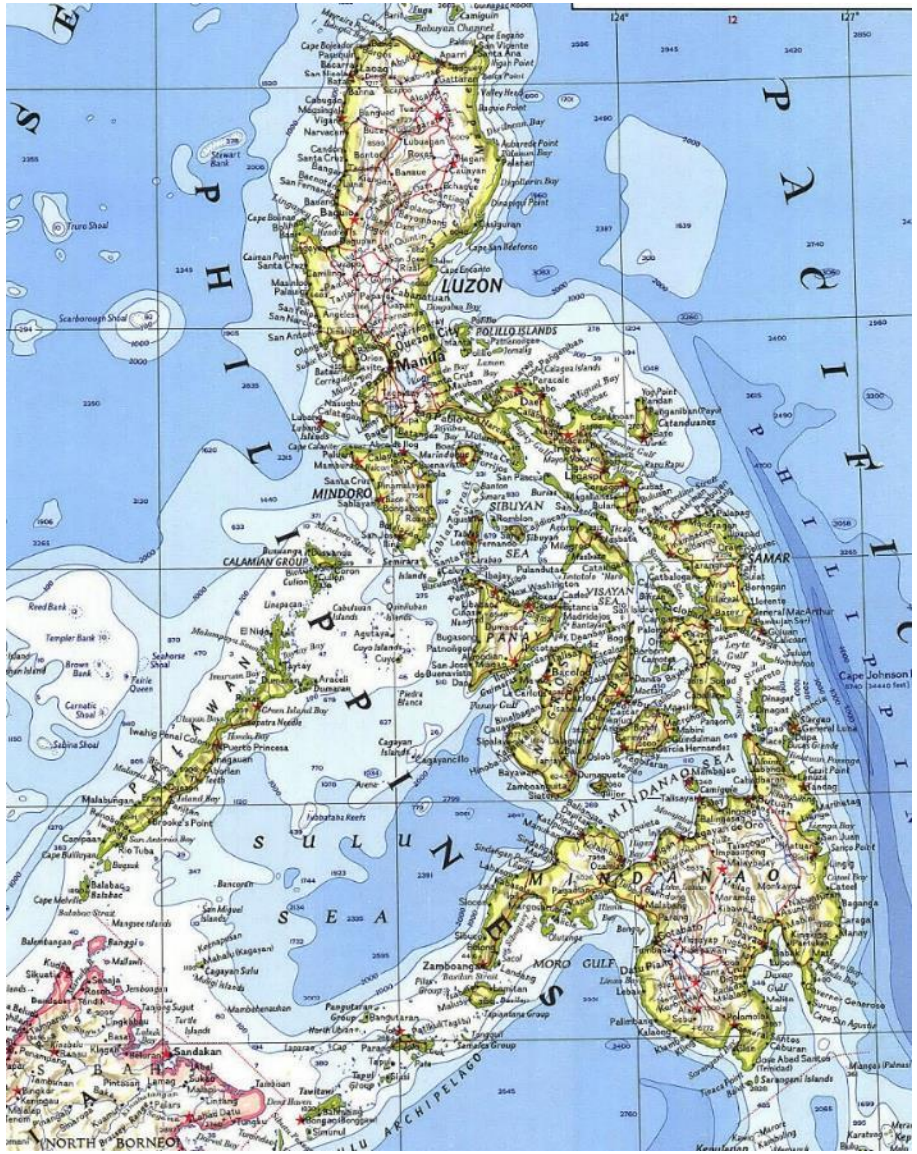
Chapter 1: Disasters and Ecosystems

History and Background

Geographical Context

- One of the most disaster-prone countries in the world
- Divided into 7,107 islands with low-lying coasts
- Ranks 3rd in the UNU's list of countries most vulnerable to disaster risks and natural hazards



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http://news.nationalgeographic.com/news/2013/11/131111-philippines-dangers-haiyan-yolanda-death-toll-rises/
https://www.cia.gov/library/publications/the-world-factbook/geos/rp.html

Chapter 1: Disasters and Ecosystems

History and Background – Geographical Context

- Within the Pacific Ring of Fire
- 452 volcanoes and is home to over 75% of the world's active and dormant volcanoes.
- About 90% of the world's earthquakes and 81% of the world's largest earthquakes occur along the Ring of Fire.

http://www.kids-fun-science.com/images/400xNxrf4-anak-krakatoa.jpg.pagespeed.ic.uHATuh1gUl.jpg

http://www.inewmedia.org/wp-content/uploads/2013/11/The-Pacific-Ring-of-Fire.jpg

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Chapter 1: Disasters and Ecosystems

History and Background – Geographical Context

https://en.wikipedia.org/wiki/File:MajorVolcanoes Of ThePhilippines-USGS.gif

http://www.balita.com/wp-content/uploads/2011/10/PIN_96861.jpg

https://upload.w ikimedia.org/w ikipedia/commons/8/81/Mt.Mayon_tam3rd.jpg

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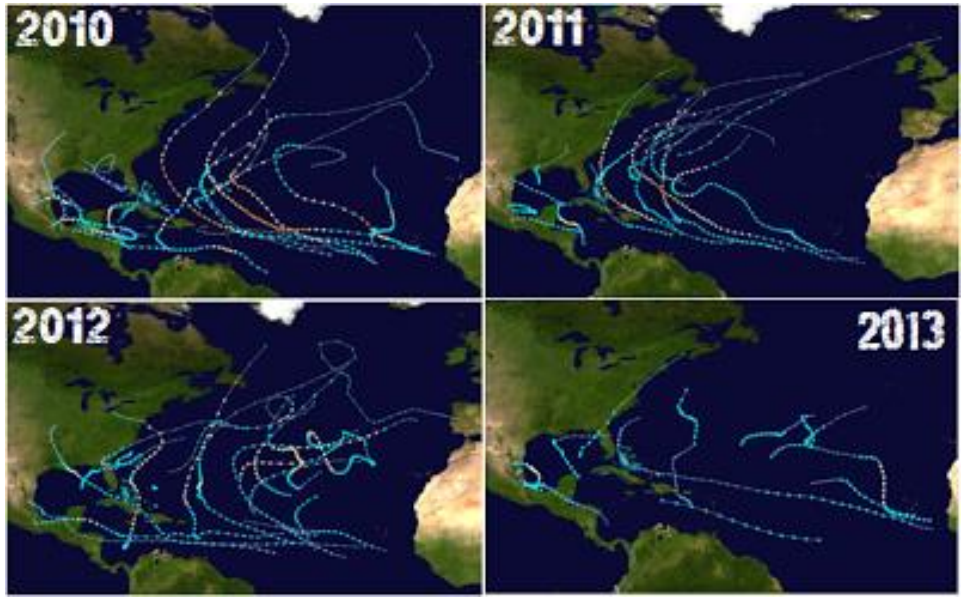
Chapter 1: Disasters and Ecosystems

History and Background

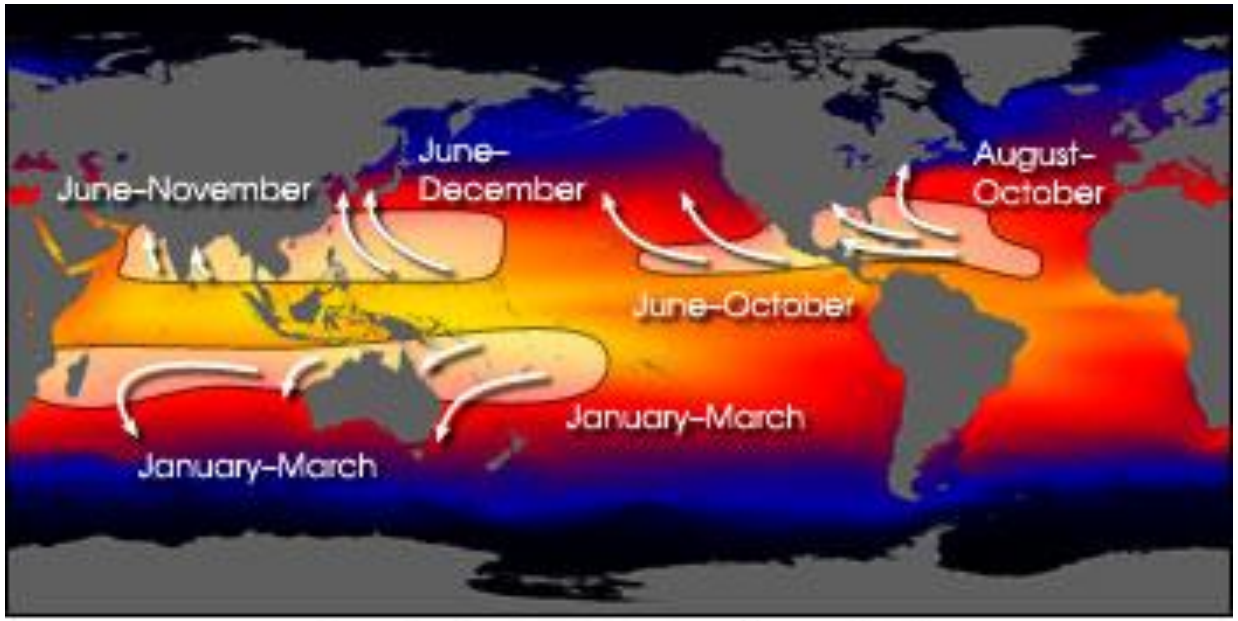
Geographical Context

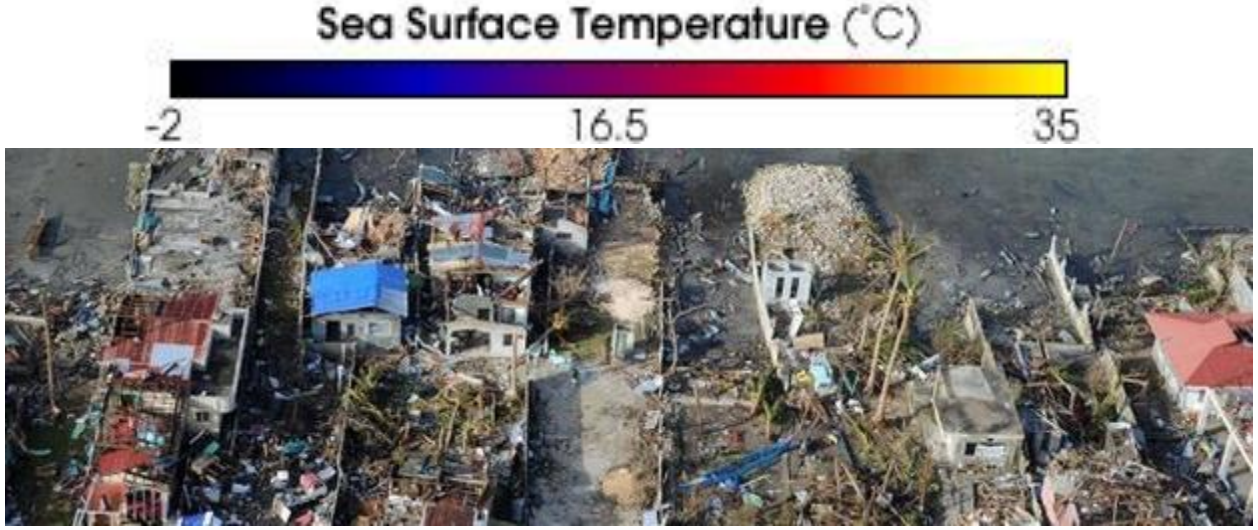
- Within the Pacific Typhoon Belt
- Average of 20 typhoons yearly, 5-7 are destructive



http://blog.emergencyoutdoors.com/tala/uploads/2013/12/img4.png

http://earthobservatory.nasa.gov/Features/Hurricanes/Images/hurricane_formation.jpg





http://news.bbcimg.co.uk/media/images/71034000/jpg/_71034309_7b1253f9-f8b4-40b5-972c-8fc5bf279e6d.jpg

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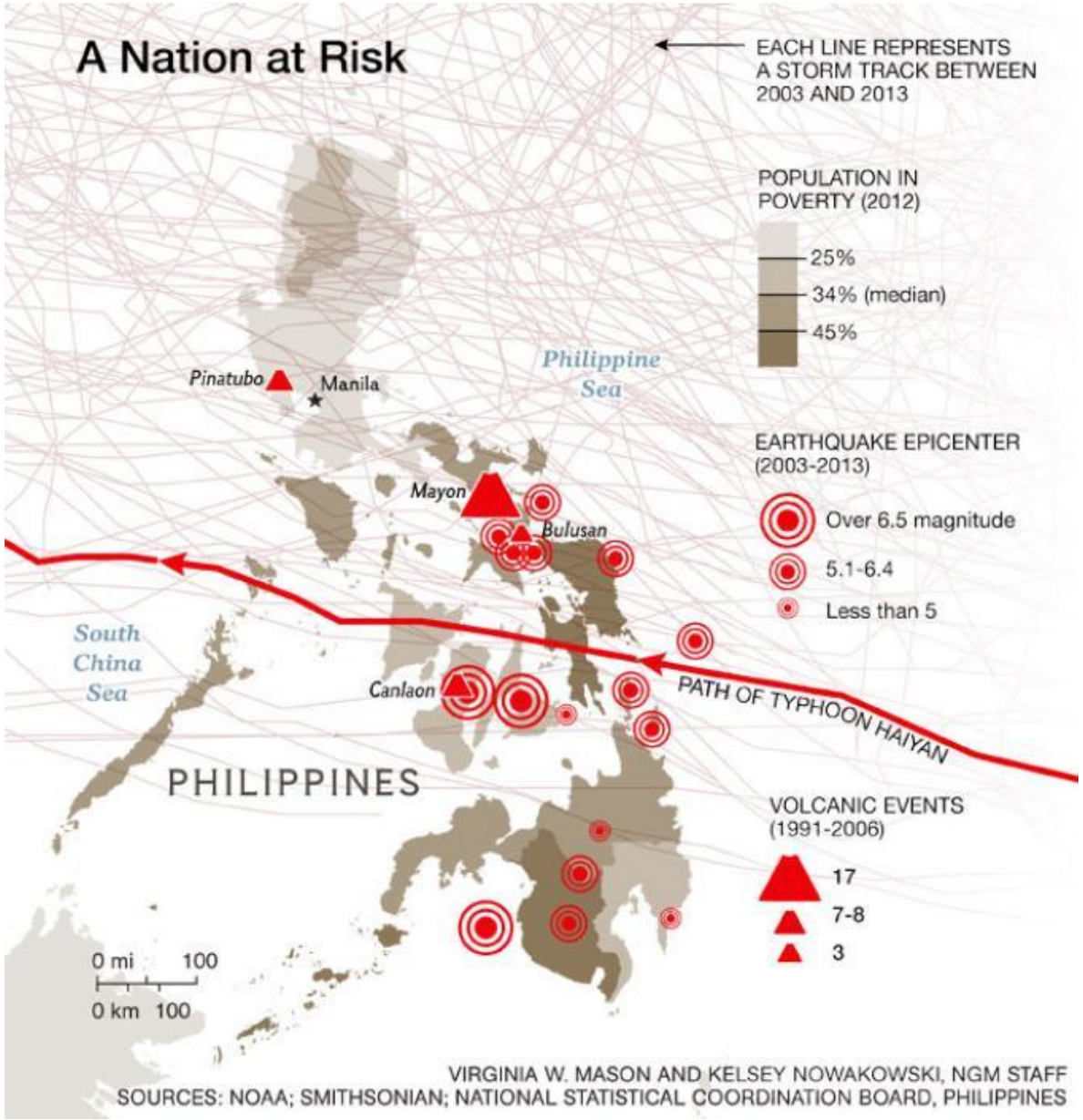
Chapter 1: Disasters and Ecosystems

History and Background

- Social Context
  - Widespread poverty
  - Coastal Livelihood
  - Settlement pressure leading to deforestation
  - Population shifts combined with underdevelopment

http://getrealphilippines.com/blog/wp-content/uploads/2014/09/philippines_squatter.jpg



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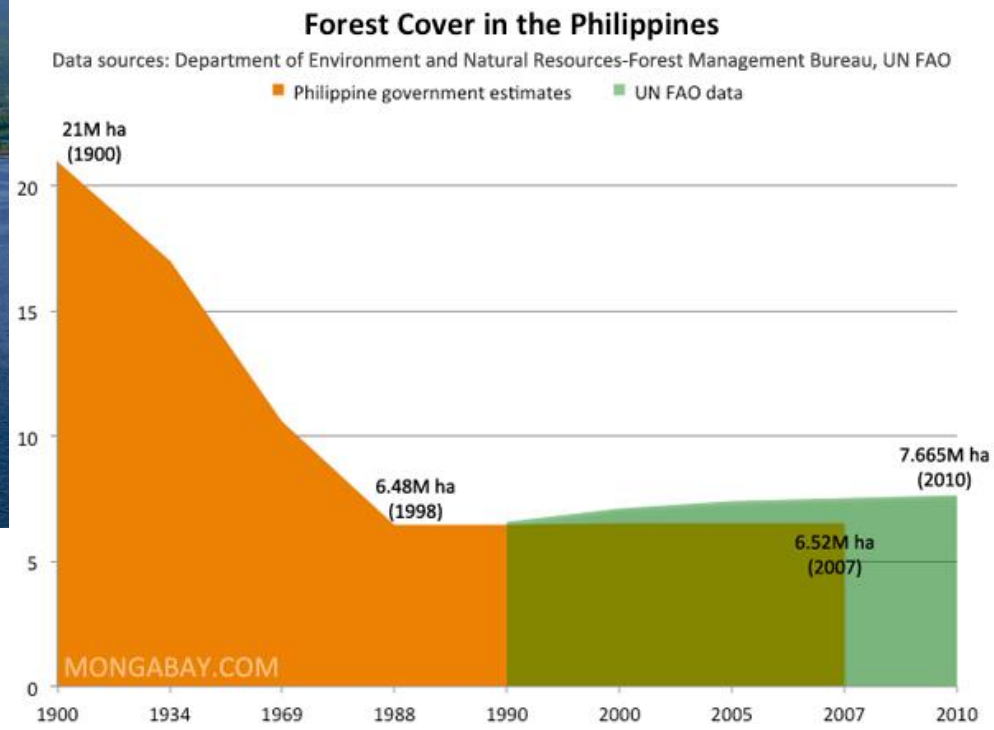
Chapter 1: Disasters and Ecosystems
History and Background

http://2.bp.blogspot.com/-d7leVArJsjc/TbXOSKWXSFI/AAAAAAAAgFc/WYxFu_OdUzI/s1600/Mayon_Volcano%252C_Luzon_Islands%252C_Philippines.jpg

http://oneocean.org/fish/images/boys-with-fish-net.jpg



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Chapter 1: Disasters and Ecosystems

Disaster Statistics

- Global Statistics

HOW MANY LIVES WERE LOST TO DISASTERS IN THE PAST 12 YEARS?

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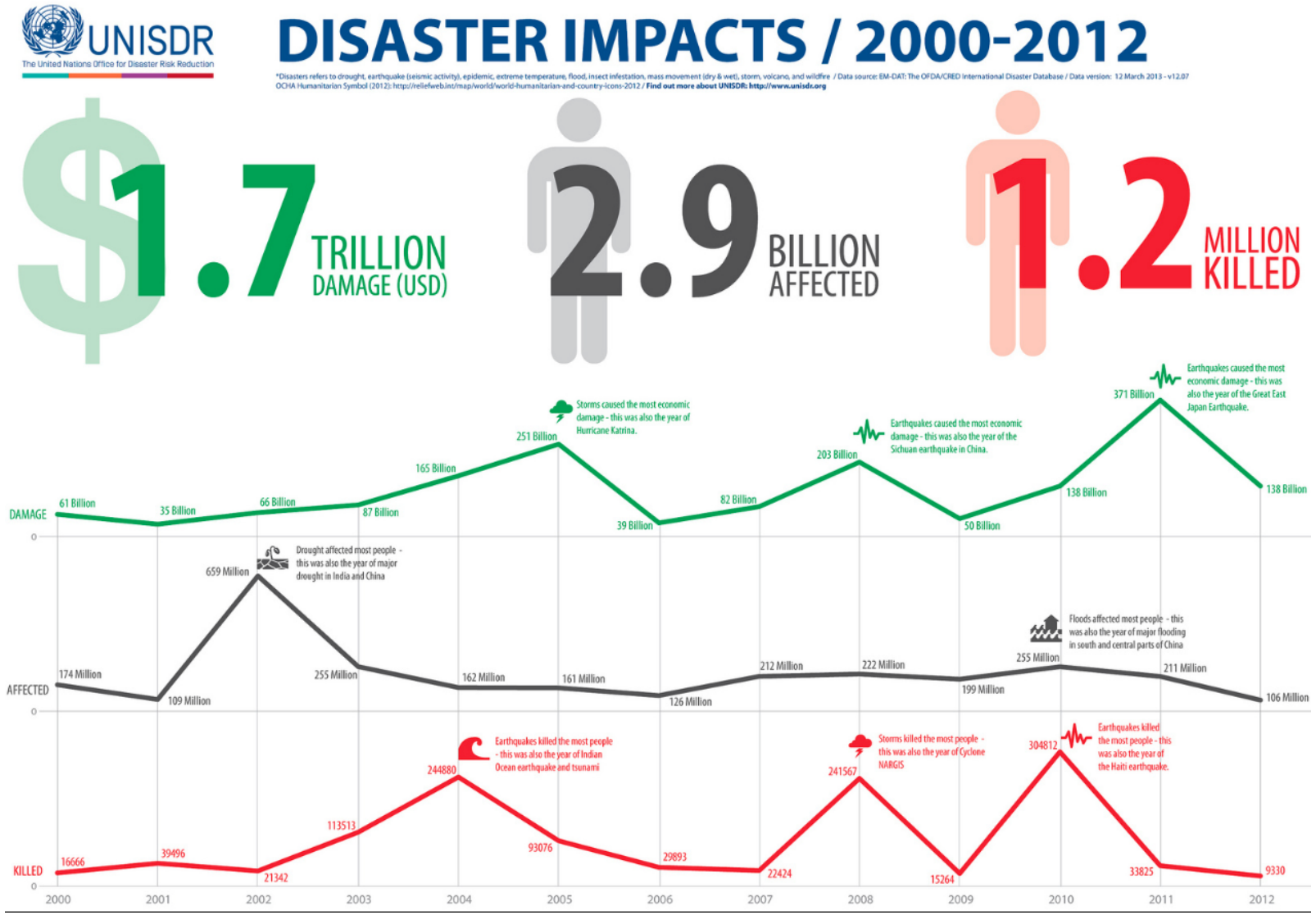
Chapter 1: Disasters and Ecosystems

Disaster Statistics – Global Statistics



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Chapter 1: Disasters and Ecosystems

Disaster Statistics – Global Statistics 2000-2012

Disaster type	Occurrence	Deaths	Total affected	Total damage('000 USD)
Drought	220	1518	900406555	63705293
Earthquake (seismic activity)	343	701802	91720656	469468682
Epidemic	583	68180	6159666	0
Extreme temperature	286	149501	90430045	38556034
Flood	2046	66128	1263714386	285174877
Insect infestation	16	0	500000	0
Mass movement dry	8	287	4083	0
Mass movement wet	226	10841	3817435	1844785
Storm	1218	178569	449536359	619128786
Volcano	68	563	1550908	175655
Wildfire	132	754	2151537	25985554

http://www.emdat.be/database

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Chapter 1: Disasters and Ecosystems
Disaster Statistics – Global Statistics

- What do these statistics mean?

Most Frequent Hazard	Flood
Deadliest Hazard	Earthquake
Hazard that affects the most people	Flood
Hazard with greatest economic damage	Earthquake

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Chapter 1: Disasters and Ecosystems

Disaster Statistics – Philippine Statistics

On the average, how many...

1. Typhoons do we have each year?
2. Earthquakes do we have each day?
3. Strong earthquakes do we have each year?
4. Flood disasters do we have each year?

Choices: a) 3 b) 20 c) 100 d) 1

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Disaster Statistics – Philippine Statistics

- Philippine Disaster Statistics for 1980-2010

No of events:	363
No of people killed:	32,956
Average killed per year:	1,063
No of people affected:	116,212,416
Average affected per year:	3,748,788
Economic Damage (US$ X 1,000):	7,417,145
Economic Damage per year (US$ X 1,000):	239,263

Emergency Management Database (EM-DAT) http://www.emdat.be/database; http://www.preventionweb.net/english/countries/statistics/?cid=135

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Disaster Statistics – Philippine Statistics

- Average Deaths per Event in the Philippines (1980-2010)

Drought:	1.14
Earthquake*:	211.67
Epidemic:	59.60
Extreme temp:	...
Flood:	23.21
Insect infestation:	...
Mass mov. dry:	120.33
Mass mov. wet:	94.79
Volcano:	51.36
Storm:	123.21
Wildfire:	2.00

Emergency Management Database (EM-DAT) http://www.emdat.be/database; http://www.preventionweb.net/english/countries/statistics/?cid=135

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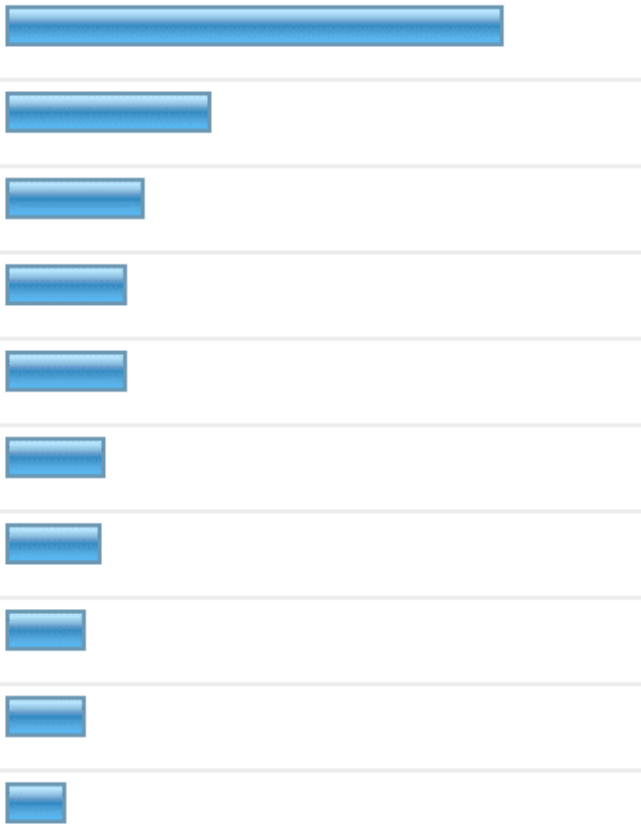
Chapter 1: Disasters and Ecosystems

Disaster Statistics – Philippine Statistics

- Top 10 Disasters in the Philippines by Lives Lost, 1980-2010

Disaster	Date	Killed (no. of people)
Storm	1991	5,956
Earthquake*	1990	2,412
Storm	2004	1,619
Storm	1984	1,399
Storm	2006	1,399
Mass mov. wet	2006	1,126
Storm	1984	1,079
Storm	1987	882
Storm	1995	882
Storm	2008	644



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Disaster Statistics – Philippine Statistics

- Economic Damage per Event, 1980-2010

Drought:	9,207.57
Earthquake*:	31,668.75
Epidemic:	...
Extreme temp:	...
Flood:	10,475.37
Insect infestation:	...
Mass mov. dry:	...
Mass mov. wet:	1,386.71
Volcano:	15,448.71
Storm:	29,129.03
Wildfire:	...

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Disaster Statistics – Philippine Statistics

- Philippines' worst storms from Sep 2009 to Aug 2013

http://image.slidesharecdn.com/typesofdisasters-141001232710-phpapp01/95/types-of-disasters-12-638.jpg?cb=1412206865

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Disaster Statistics – Philippine Statistics

- Most destructive typhoons in the Philippines

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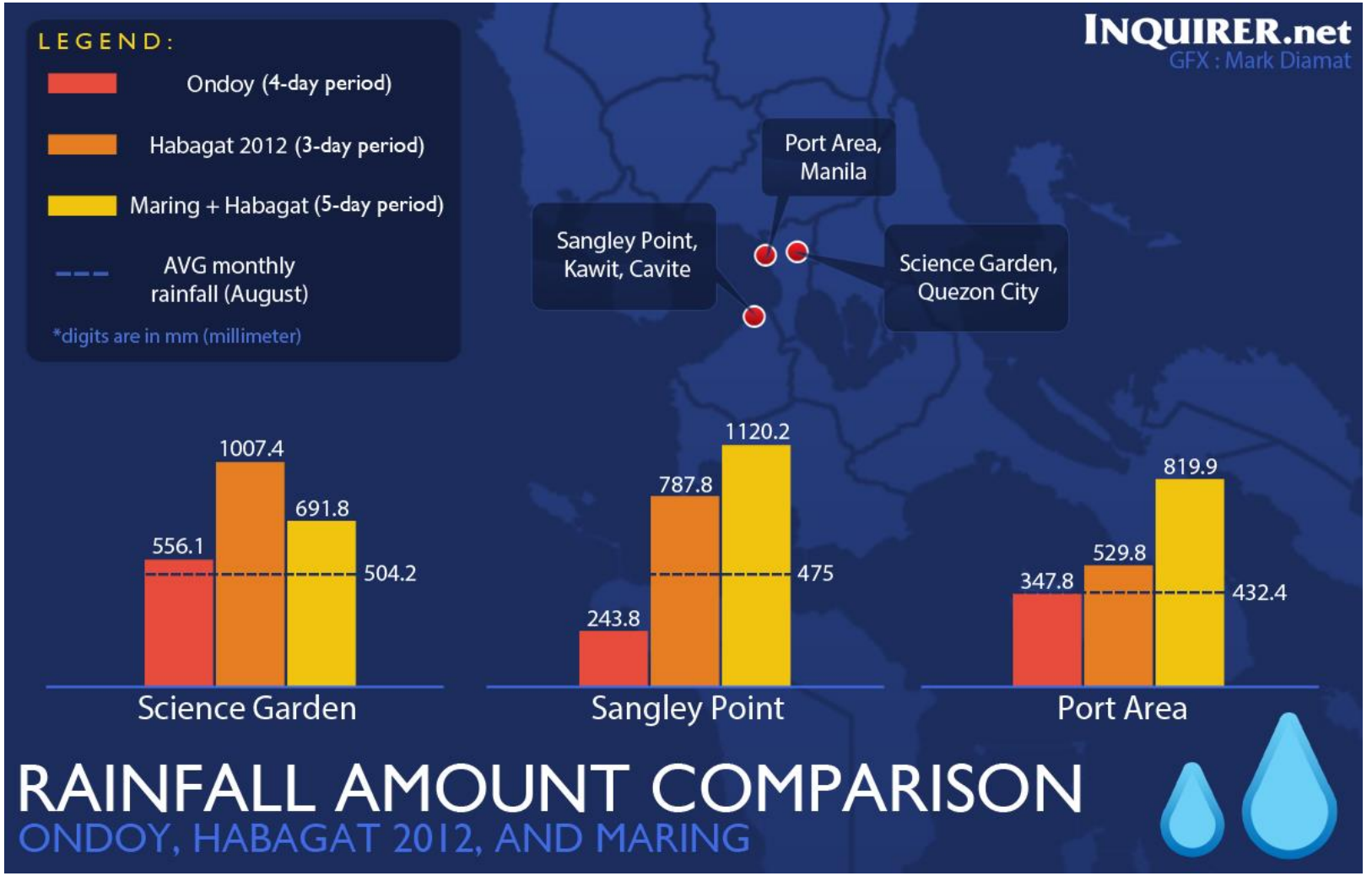
Disaster Statistics – Philippine Statistics



http://newsinfo.inquirer.net/files/2013/08/Rainfall-Comparison-Infographics.jpg

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Disaster Statistics – Philippine Statistics

- Damage and losses: Ondoy and Pepeng (in PhP million)

Sector	Damage	Losses	Total
Productive sectors	557.8	2,661.7	3,219.5
Social sectors	706.5	212.5	919.0
Infrastructure	181.1	56.2	237.3
Local government	6.3	0.9	7.1
Total (1USD = 47PhP)	68,228.4	137,770.3	205. 998.7

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http://image.slidesharecdn.com/internationalresearchforumusecpanaderopresentationoct2013-131028052222-phpapp01/95/international-research-forum-local-governance-and-accountability-the-mitigating-factor-by-usec-austere-a-panadero-undersecretary-department-of-interior-local-government-3-638.jpg?cb=1382941842

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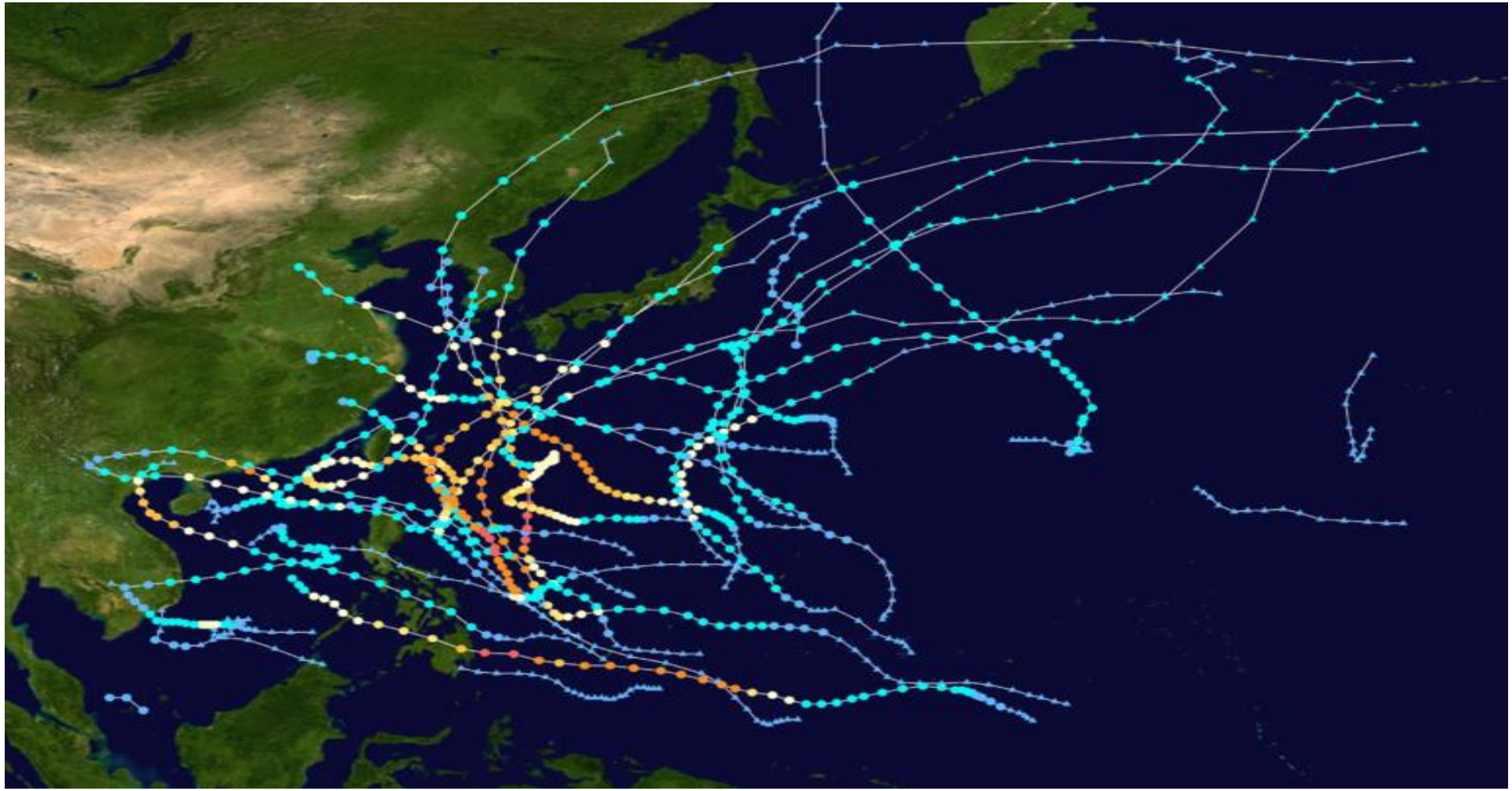
Disaster Statistics – Philippine Statistics

- Typhoons in 2012



http://upload.wikimedia.org/wikipedia/commons/thumb/1/19/2009_Pacific_typhoon_season_summary.png/300px-2009_Pacific_typhoon_season_summary.png

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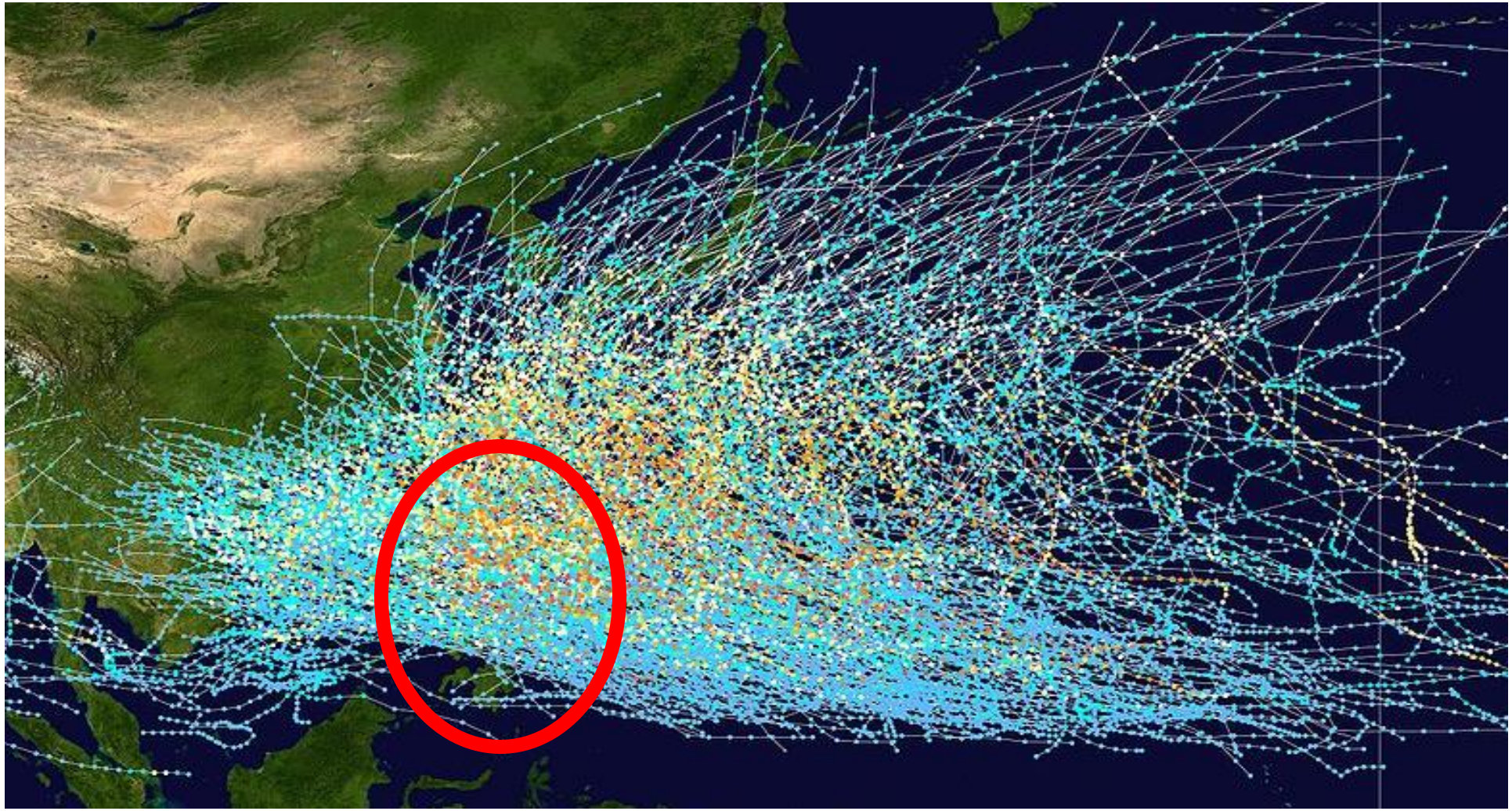
Chapter 1: Disasters and Ecosystems
Disaster Statistics – Philippine Statistics

- Typhoons from 1980- 2005



http://upload.wikimedia.org/wikipedia/commons/thumb/1/19/2009_Pacific_typhoon_season_summary.png/300px-2009_Pacific_typhoon_season_summary.png

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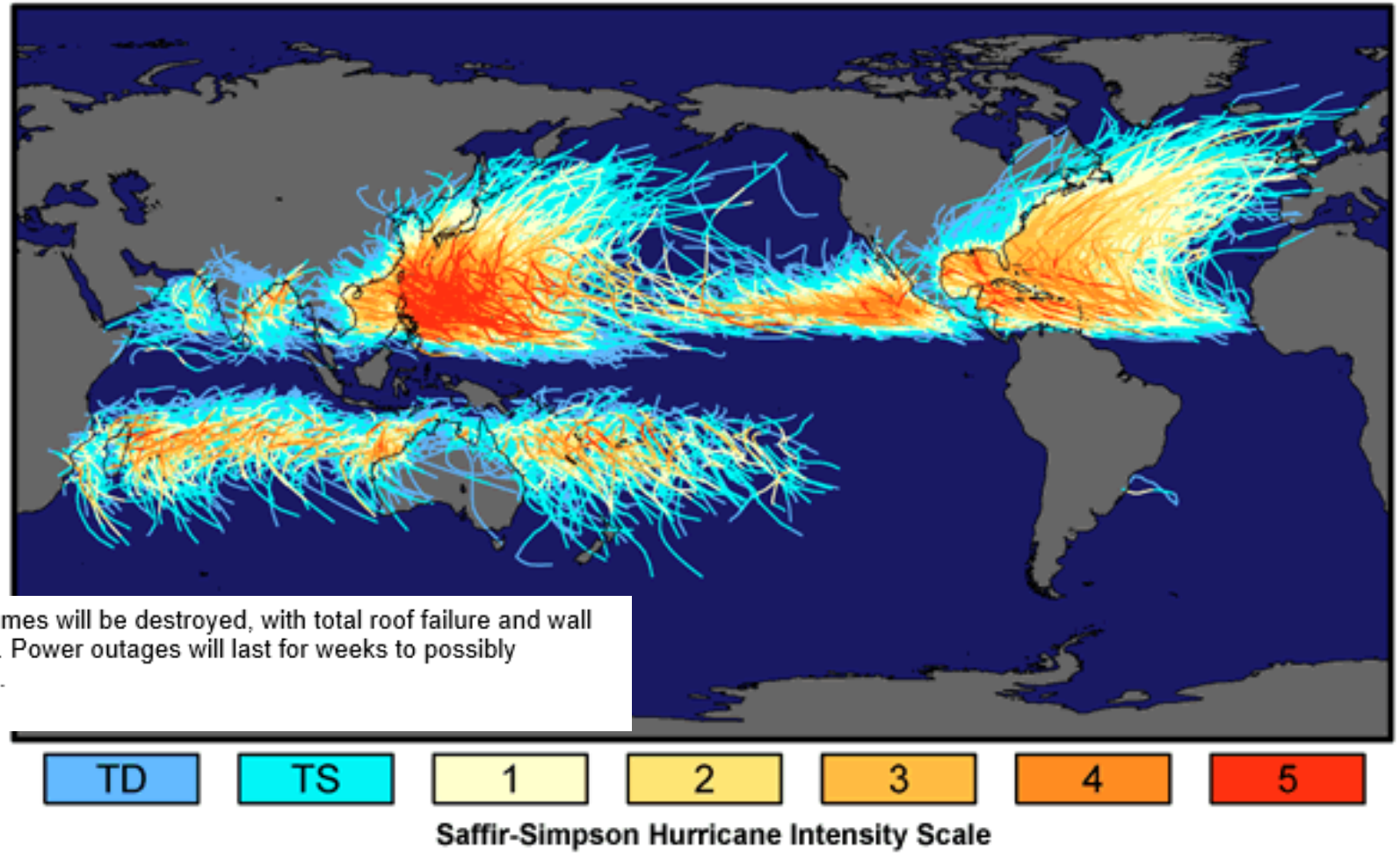
Chapter 1: Disasters and Ecosystems

Disaster Statistics – Philippine Statistics

- Tracks and Intensity of Tropical Cyclones, 1851-2006

The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous, however, and require preventative measures. In the western North Pacific, the term "super typhoon" is used for tropical cyclones with sustained winds exceeding 150 mph.

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 mph 64-82 kt 119-153 km/h	**Very dangerous winds will produce some damage:** Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110 mph 83-95 kt 154-177 km/h	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129 mph 96-112 kt 178-208 km/h	**Devastating damage will occur:** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156 mph 113-136 kt 209-251 km/h	**Catastrophic damage will occur:** Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	157 mph or higher 137 kt or higher 252 km/h or higher	**Catastrophic damage will occur:** A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.



Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

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http://www.goes-r.gov/users/comet/tropical/textbook_2nd_edition/media/graphics/GlobalTropicalCycloneMap.gif/ http://www.nhc.noaa.gov/aboutsshws.php

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Disaster Statistics – Philippine Statistics

- Effects of Typhoon Bopha (December 2012)

Photos: Hannah Tankard, 2012 (Typhoon Bopha)

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Chapter 1: Disasters and Ecosystems

Disaster Statistics – Philippine Statistics

- Effects of Typhoon Habagat Flood (August 2012)

Photo: Buklod Tao, 2012

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Disaster Statistics – Philippine Statistics

- Effects of Typhoon Ketsana (Ondoy, August 2012)

http://inapcache.boston.com/universal/site_graphics/blogs/bigpicture/ketsana_09_30/k06_20517827.jpg

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Chapter 1: Disasters and Ecosystems

Disaster Statistics – Philippine Statistics

- Effects of Typhoon Yolanda (November 2013)

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Chapter 1: Disasters and Ecosystems

Disaster Statistics – Philippine Statistics

- Any Questions so far??

Chapter 1: Disasters and Ecosystems

A. History and Background
   - Geographical Context
   - Social Context

B. Disaster Statistics
   - Global statistics
   - Philippine statistics

Figure 1: Number of people reported killed by "natural" disasters 1900-2010. Source: EM-Dat. Université Catholique de Louvain, Belgium

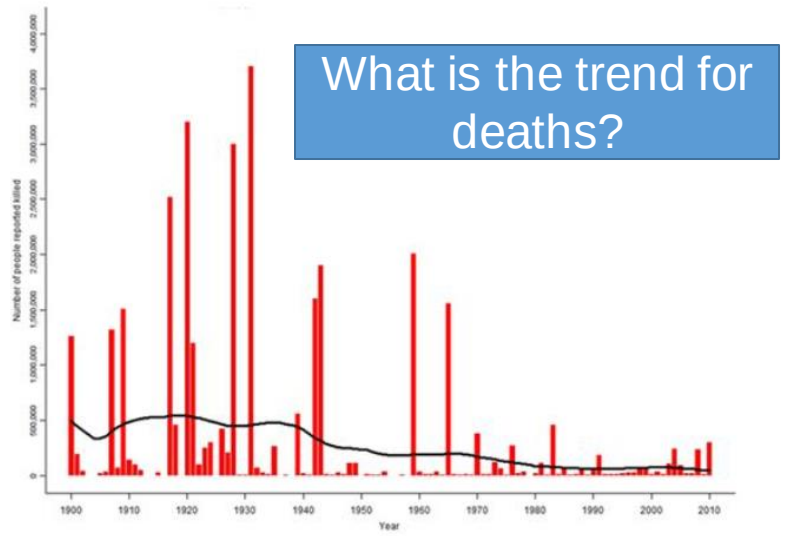
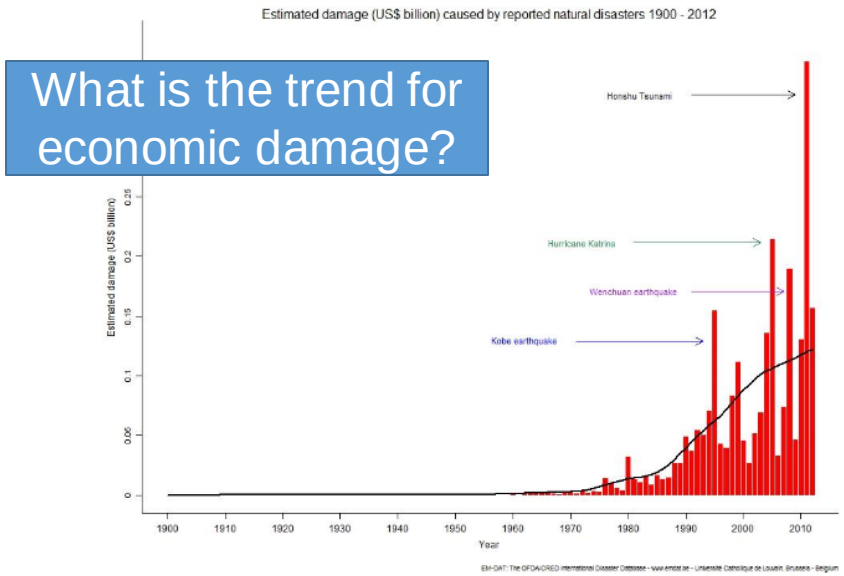


Figure 2 : Estimated economic damage caused by "natural" disasters 1900-2010. Source: EM-Dat. Université Catholique de Louvain, Belgium



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Chapter 2: Introduction to disasters, risk reduction, and climate change

Module 02 – Youth Ecological Camp

Fundamentals of Disaster Risk Reduction and Management and Climate Change

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Chapter 2: Introduction to disasters, risk reduction, and climate change
Concepts and Definitions

Ecosystem, Ecosystem Services, Livelihoods, Disaster, Risk, Disaster Risk, Hazard, Vulnerability, Exposure, Capacity / Resilience

$$\text{RISK} = \text{HAZARD} \times \frac{\text{VULNERABILITY}}{\text{CAPACITY}} \times \text{EXPOSURE}$$

ECOSYSTEM

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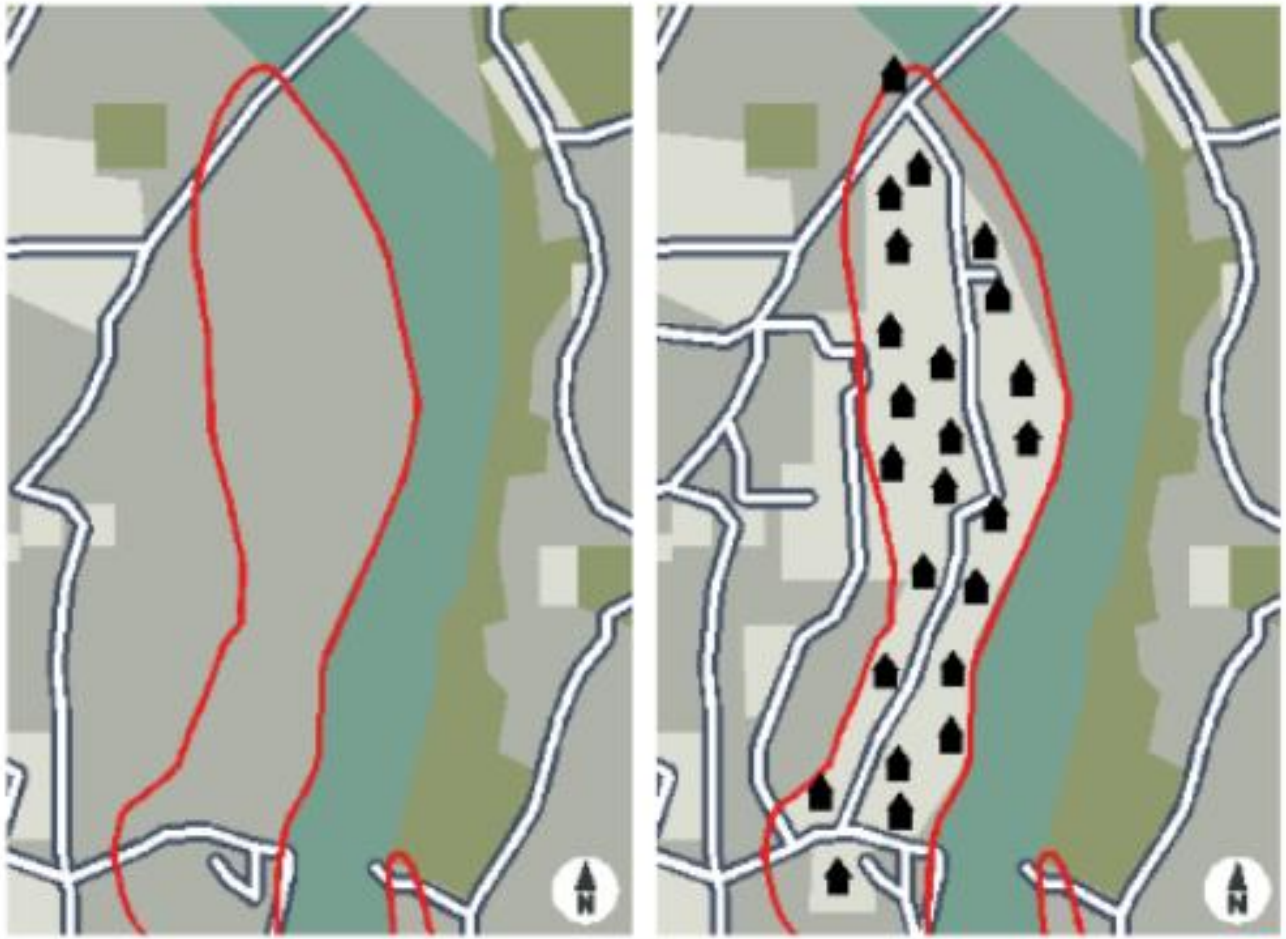
Chapter 2: Introduction to disasters, risk reduction, and climate change
Concepts and Definitions

Figure 4: Redrawn maps. Left: Seuti Khola River, Dharan Nepal in 2004; Right Seuti Khola River, Dharan Nepal in 2009.



https://iversity.org/en/my/courses/disasters-and-ecosystems-resilience-in-a-changing-climate/lesson_units/35255

Ecosystem: **Riverbank**

Hazard: Reduced natural protection from ecosystem due to degradation / Climate Change Impacts on certain hazards and Regions - **Flood, Landslide, Erosion**

Vulnerability: Poverty, Shanty Houses, Underdevelopment, Overcrowding, Poor Governance,

Capacity: Community Cohesion

Exposure: Houses, People

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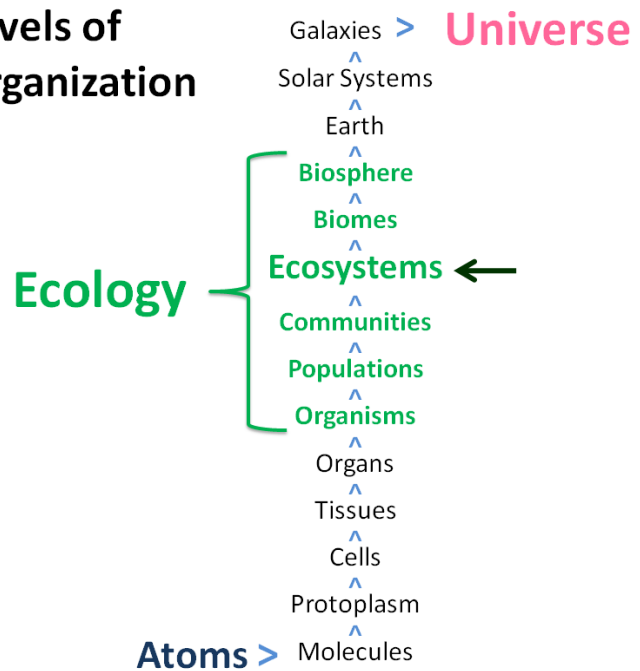
Ecosystem

An ecosystem is a community of organisms interacting with each other and with their environment such that energy is exchanged and system-level processes, such as the cycling of elements, emerge.

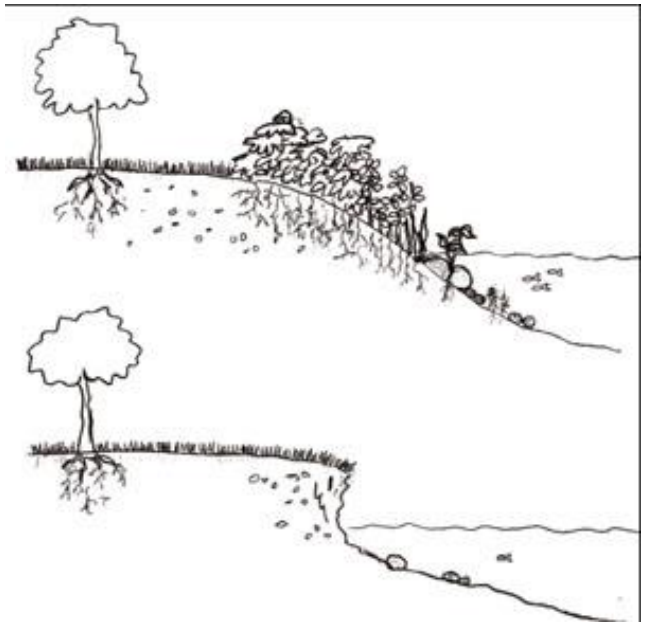


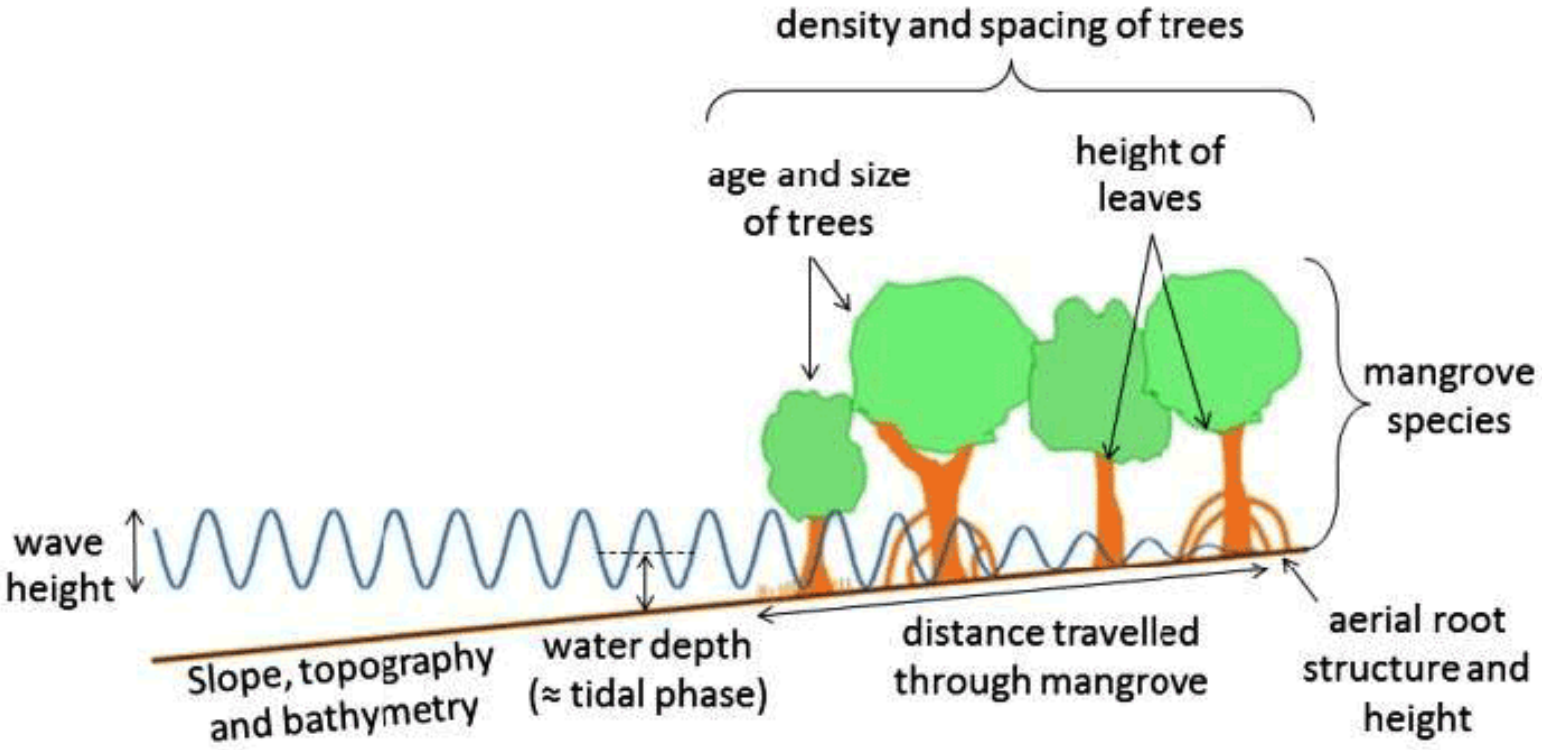
http://www.eoearth.org/view/article/152248/

Chapter 2: Introduction to disasters, risk reduction, and climate change
Concepts and Definitions

Ecosystem Services

The benefits that people and communities obtain from ecosystems.





http://www.eoearth.org/view/article/152248/; http://www.dec.ny.gov/images/permits_ej_operations_images/shorediagram.jpg

Ecosystem Services

- **"regulating services"** such as regulation of floods, drought, land degradation and disease, along with
- "**provisioning services"** such as food and water,
- **"supporting services"** such as soil formation and nutrient cycling, and
- **"cultural services"** such as recreational, spiritual, religious and other non-material benefits.

Integrated management of land, water and living resources that promotes conservation and sustainable use provide the basis for maintaining ecosystem services, including those that contribute to reduced disaster risks.

http://www.eoearth.org/view/article/152248/

Chapter 2: Introduction to disasters, risk reduction, and climate change
Concepts and Definitions

Livelihoods

- A livelihood is a means of making a living.
- It encompasses people's capabilities, assets, income and activities required to secure the necessities of life.

A livelihood is sustainable when it enables people to cope with and recover from shocks and stresses (such as natural disasters and economic or social upheavals) and enhance their well-being and that of future generations without undermining the natural environment or resource base.

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http://www.ifrc.org/en/what-we-do/disaster-management/from-crisis-to-recovery/what-is-a-livelihood/

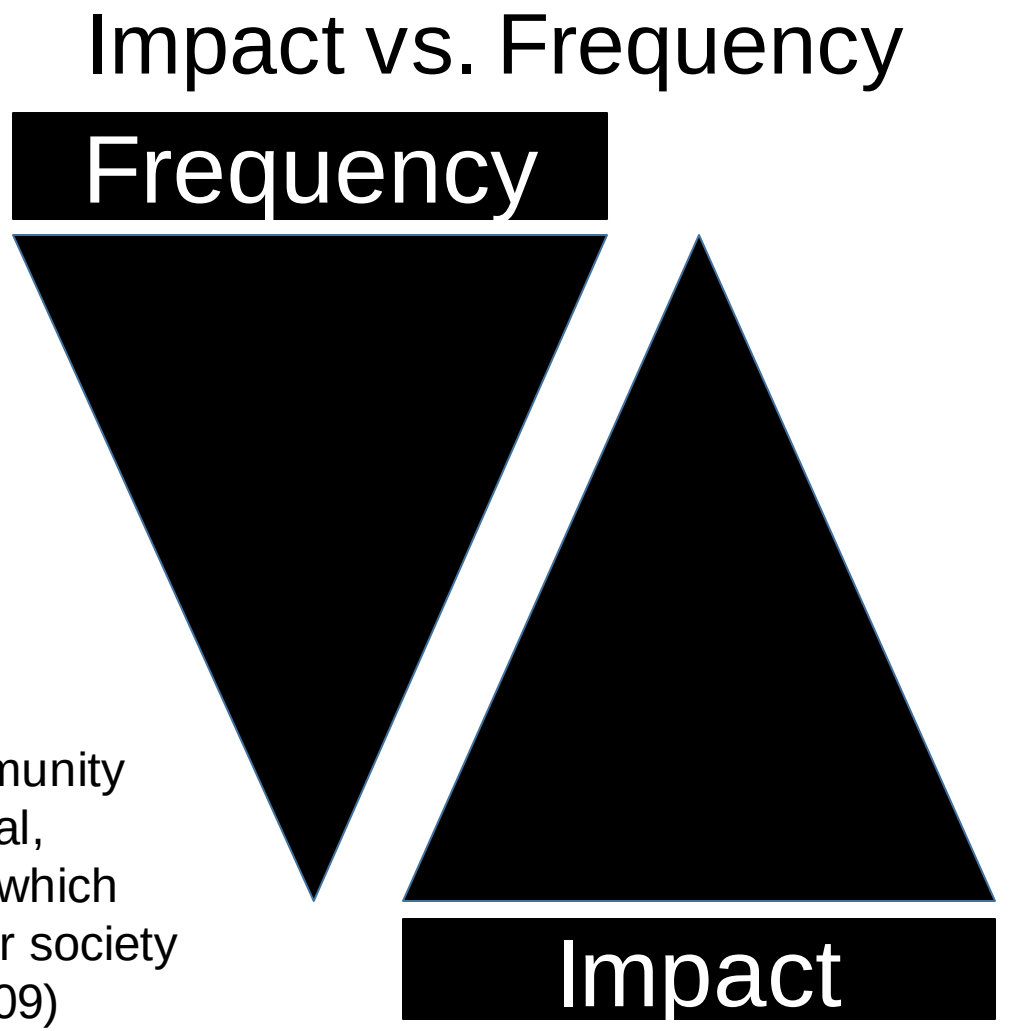
Chapter 2: Introduction to disasters, risk reduction, and climate change
Concepts and Definitions

Disaster

For a disaster to be entered into the official database on disasters, EM-Dat, the International Disaster Database (http://www.emdat.be/), it must meet at least one of four criteria:

- Ten (10) or more people reported killed.
- Hundred (100) or more people reported affected.
- Declaration of a state of emergency.
- Call for international assistance.

"A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which Ex ceeds the ability of the affected community or society to cope using its own resources." (UNISDR, 2009)



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https://iversity.org/en/my/courses/disasters-and-ecosystems-resilience-in-a-changing-climate/lesson_units/35255

Chapter 2: Introduction to disasters, risk reduction, and climate change
Concepts and Definitions

Disaster

- **Man-made disasters** (chemical accidents, oil spills, industrial pollution) as caused by technological hazards versus disasters associated with natural hazards.
- **Sudden (Intensive)** versus **Slow Onset (Extensive)** Disasters

Earthquakes, tsunamis or sudden landslides

soil erosion, droughts and slow moving landslides

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Chapter 2: Introduction to disasters, risk reduction, and climate change
Concepts and Definitions

Risk

The combination of the probability of an event and its negative consequences.

https://leadershipfreak.files.wordpress.com/2012/07/risk.jpg

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Disaster Risk

The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period.

https://www.unisdr.org/we/inform/terminology#letter-d

Chapter 2: Introduction to disasters, risk reduction, and climate change
Concepts and Definitions

Hazard

- **Natural (Physical) hazards:** can be classified in several ways but are usually broken down into the two broad categories:
  1. **geophysical** and
  2. **biological hazards** (Burton et al. 1993).

GEOPHYSICAL
- Earthquakes
- Volcanic eruptions
- Tsunamis

HYDRO-METEOROLOGICAL
- Avalanches
- Floods
- Tsunamis
- Cyclonic storms
- Droughts
- Heat waves
- Wind storms
- Landslides

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https://iversity.org/en/my/courses/disasters-and-ecosystems-resilience-in-a-changing-climate/lesson_units/35255

Chapter 2: Introduction to disasters, risk reduction, and climate change
Concepts and Definitions

Hazard

1. Geophysical Hazards

- Geophysical hazards include **geological** and **geomorphological phenomena**, such as earthquakes, tsunamis, volcanic eruptions, landslides, as well as meteorological phenomena such as and avalanches, cyclonic storms, droughts, heat waves, and wind storms.
- Landslides can be triggered either by earthquakes or most commonly by hydro-meteorological events.
- Floods and wildfires can be related to a combination of **geological, hydrological and meteorological phenomena.**

GEOPHYSICAL

- Earthquakes
- Volcanic eruptions
- Tsunamis

HYDRO-METEOROLOGICAL

- Avalanches
- Floods
- Tsunamis
- Cyclonic storms
- Droughts
- Heat waves
- Wind storms
- Landslides

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Concepts and Definitions

ATMOSPHERIC
Hailstorms
Hurricanes
Lightning
Tornadoes
Tropical storms

SEISMIC
Fault ruptures
Ground shaking
Lateral spreading
Liquefaction
Tsunamis
Seiches

OTHER GEOLOGIC/ HYDROLOGIC
Debris avalanches
Expansive soils
Landslides
Rock falls
Submarine slides
Subsidence

HYDROLOGIC
Coastal flooding
Desertification
Salinization
Drought
Erosion and sedimentation
River flooding
Storm surges

VOLCANIC
Tephra (ash, cinders, lapilli)
Gases
Lava flows
Mudflows
Projectiles and lateral blasts
Pyroclastic flows

WILDFIRE
Brush
Forest
Grass
Savannah

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Hazard

2. Biological Hazards

- Examples of biological hazards include outbreaks of epidemic diseases, plant or animal contagion, insect or other animal plagues and infestations.

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http://www.sabc.co.za/wps/wcm/connect/5fa1cc804c5f27b5aa04aa22588e3e24/cholera(R).jpg?MOD=AJPERES&CACHEID=5fa1cc804c5f27b5aa04aa22588e3e24

Vulnerability

The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

Chapter 2: Introduction to disasters, risk reduction, and climate change

Concepts and Definitions

PHYSICAL
Human Age (child, elderly)
Body physical attributes (health status and disability)
Building Structure

ECONOMIC
Livelihood
Education
Energy sources
Access to resources

ENVIRONMENTAL/ GEOGRAPHIC
Places to live and work
Land ownership
Weather
Climate

SOCIAL
High risk group
Marginalised sector
Education
Social networks
Access and Entitlement
Gender and class
Ethnicity and race

POLITICAL / GOVERNANCE
Lacking policies, laws, or ordinances
Unclear responsibilities
Access and Entitlement

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Exposure

People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses.

Comment: Measures of exposure can include the number of people or types of assets in an area. These can be combined with the specific vulnerability of the exposed elements to any particular hazard to estimate the quantitative risks associated with that hazard in the area of interest.

https://www.unisdr.org/we/inform/terminology#letter-c

Capacity / Resilience

Capacity: The combination of all the strengths, attributes and resources available within a community, society or organization that can be used to achieve agreed goals.

Resilience: The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions

Chapter 2: Introduction to disasters, risk reduction, and climate change

Concepts and Definitions

Capacity / Resilience

PHYSICAL
Human Age
Body physical attributes
Building Structure

ECONOMIC
Livelihood
Education
Energy sources
Access to resources

ENVIRONMENTAL/ GEOGRAPHIC
Places to live and work
Land ownership
Weather
Climate

SOCIAL
Education
Social networks
Access and Entitlement
Gender and Class

POLITICAL / GOVERNANCE
Good policies, laws, or ordinances
Clear responsibilities
Access and Entitlement

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Concepts and Definitions

Any Questions So Far?

- Ecosystem,
- Ecosystem Services,
- Livelihoods,
- Disaster,
- Risk,
- Disaster Risk,
- Hazard,
- Vulnerability,
- Exposure,
- Capacity / Resilience

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GAME: True OR False

Instructions on how to answer are in red

All massive floods are a disaster?

If False: sit down; If True: Raise your hands!

All earthquakes are a disaster?

If False: Squat! ; If True: Sit on your chair!

There is no such thing as a natural disaster?

If False: Raise one leg! ; If True: Sit on your chair and raise your hands!

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End of Chapters 1 and 2

Fundamentals of Disaster Risk Reduction and Management and Climate Change

Module 05 – Youth Ecological Camp

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