Environmental Hazards – Overview

Read Chapter 4 in text (Keller, 2000)

Objectives

- To know the conditions that make some earth processes hazardous
- To understand how a natural process that leads to disasters may also be beneficial
- To become acquainted with natural processes that constitute hazards
- To understand the requirements for predicting natural disasters
- To know the basic components of risk assessment
- To become familiar with human perception and adjustments to hazards
- To be able to discuss the impact and recovery from natural disasters and catastrophes

Table 4.1 Effects of selected hazards in the United States

Hazard	Deaths per Year	Occurrence Influenced by Human Use	Catastrophe Potential[b]
Flood	86	Yes	H
Earthquake[a]	50+?	Yes	H
Landslide	25	Yes	M
Volcano[a]	<1	No	H
Coastal erosion	0	Yes	L
Expansive soils	0	No	L
Hurricane	55	Perhaps	H
Tornado and windstorm	218	Perhaps	H
Lightning	120	Perhaps	L
Drought	0	Perhaps	M
Frost and freeze	0	Yes	L

[a]Estimate based on recent or predicted loss over 150-year period. Actual loss of life and/or property could be much greater.
[b]Catastrophe potential: high (H), medium (M), low (L).

Source: Modified after G. F. White and J. E. Haas. 1975. *Assessment of Research on Natural Hazards*. Cambridge, MA: The MIT Press.

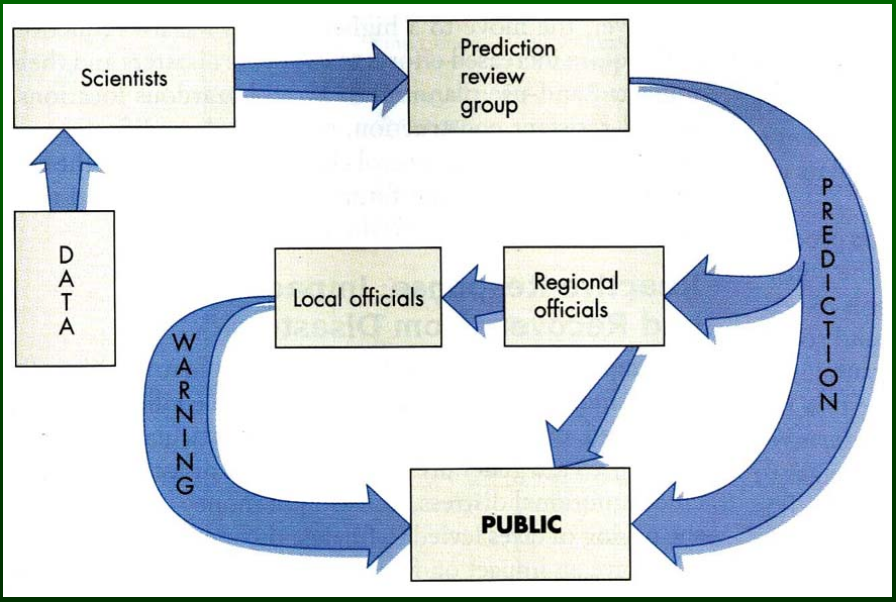
NATURAL HAZARDS

Compare the hazards that cause the greatest loss of human life to those that cause the most property damage.

How do scientists predict disasters and warn people before it happens?

What is the difference between a forecast and a warning?

Environmental Hazards -- Overview



Magnitude vs. Frequency

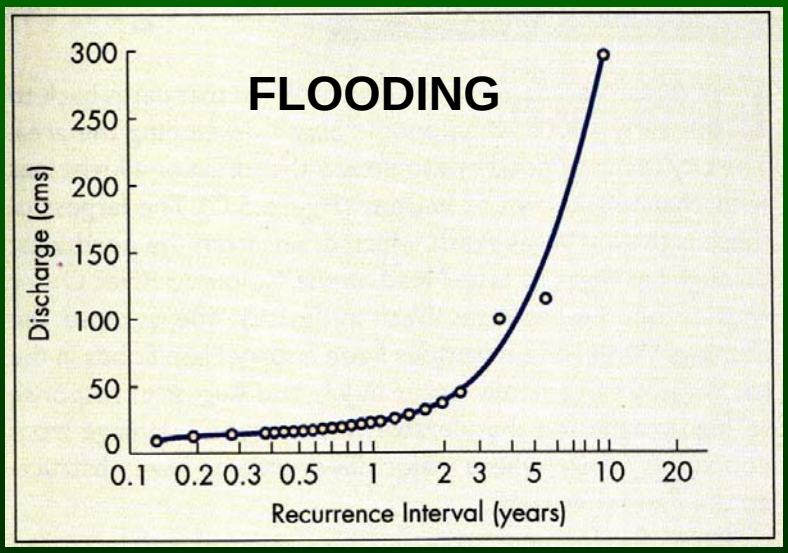
log (Size of Event)

volcanic eruptions
landslides
floods
earthquakes
storms
drought

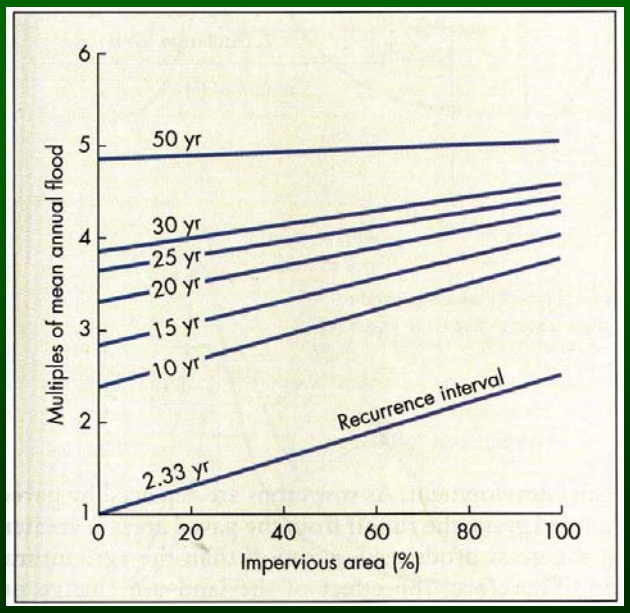
What effects do humans have on the magnitude and frequency of natural events?

log (Frequency of Event)

Environmental Hazards -- Overview



Environmental Hazards -- Human Impacts



Example:

Variation of flood frequency with percentage of impervious area.

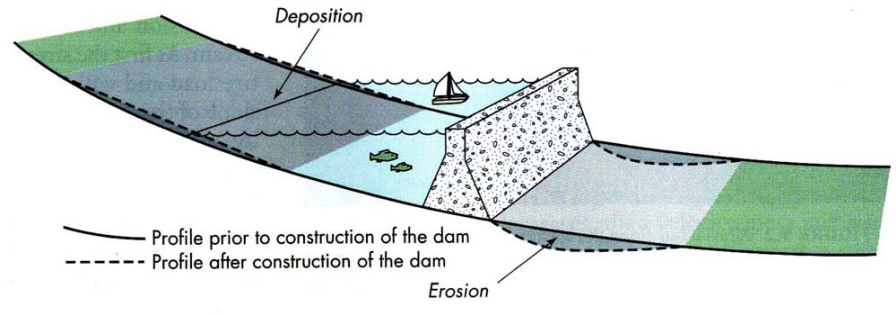
The mean annual flood is the average of the largest flow that occurs each year.

In a natural river basin:

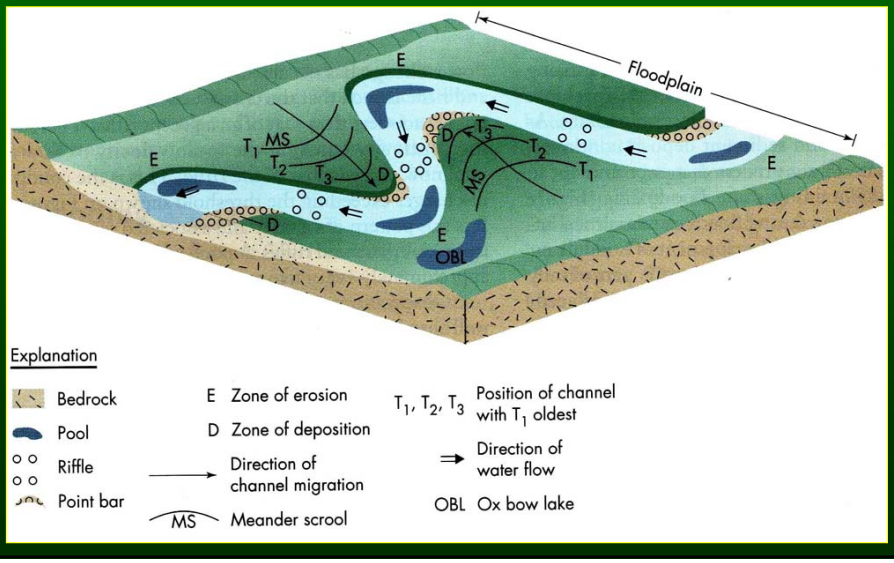
R. I. = 2.33 yr.

Environmental Hazards -- Human Impacts

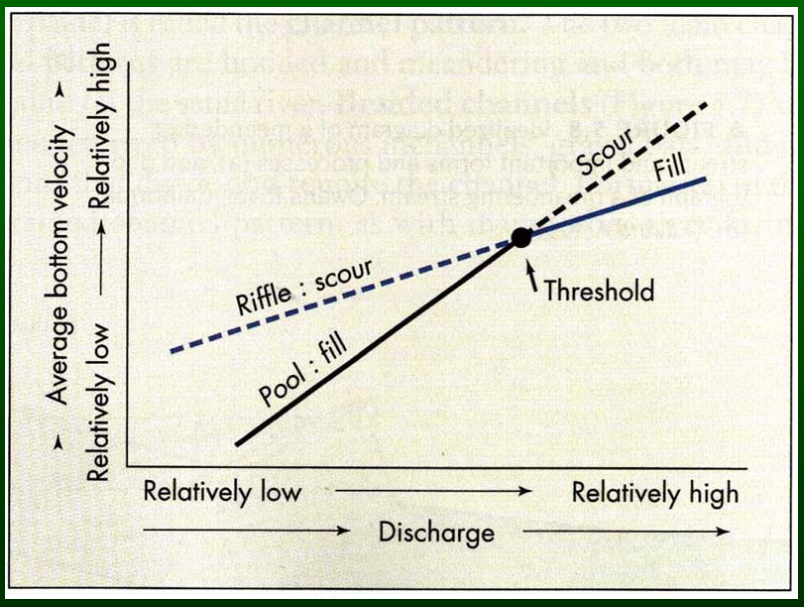
Example: Effect of dam construction on erosion and deposition -- change of stream profile.



Example: Reconstruction of stream channel -- loss of natural meanders, pools, riffles, and asthetics.

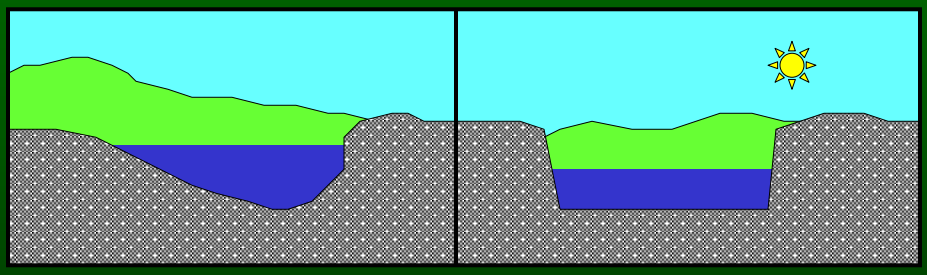


Pools and Riffles



Stream Channels

Natural **Channelized**



What are the flow conditions for each system?

1. High flow?
2. Low flow?
3. Flood control?
4. Pools and riffles?
5. Habitat?