Class 14a: Natural hazards

- Vulnerability and disaster
- Geologic events
- Climatic events
Natural hazards and disasters

• Natural disaster: damage to life or property
• Natural hazard: risk of natural disaster
• Combination of physical and human geography
• Droughts, floods, hurricanes, earthquakes, volcanoes
Natural hazards and disasters

• Trigger events are natural
• But “disasters” are man-made
• Humans can increase risk
  – Building on a hillside
• Or increase vulnerability
  – Building in a floodplain
Four types of impacts

• Direct damage
• Emergency response hampered
• Short-term service interruptions
• Long-term economic loss
1906 San Francisco Earthquake

- Sunday 5 A.M.; 40 seconds; 8.2 magnitude
- 3000 dead; 3/5 of housing, all of CBD
- Multiple, interrelated hazards
  - Earthquake led to fire
- Failure of “lifelines”
  - Water mains and tanks ruptured
1906 San Francisco Earthquake

• Learning from mistakes
  – Structural damage $\rightarrow$ stronger codes
  – Larger water supply (Hetch Hetchy)
• Or not!
  – Reservoir on fault line
  – Fire debris became Marina District
1989 Loma Prieta Earthquake

• Weekday, 5 P.M; 15 sec.; 7.1 magnitude
• 62 dead; 12,000 homeless; $6 billion
• Interrelated hazards
  – Worst damage on fill from 1906
• Failure of lifelines (Bay Bridge)
Natural hazards and disasters

- Most deaths in poor countries
- Squatter settlements, unclaimed land
- Few warning systems, evacuation plans
- Few building codes
- Deliberate risks
Hurricane Jeanne (2004)

- 2,000 dead in Haiti; 12 in Dominican Rep.
- Haiti is 98% deforested
- Very poor, very high birth rates
- French land system: land divided by heirs
- 71% of fuel from charcoal (wood)
- No early warning system
Natural hazards and disasters

- Most property damage in rich countries
- Loss of life avoided
- Prime real estate often disaster-prone
- More reporting, reimbursement
- “Solutions” may give false sense of security
1991 East Bay Hills Fire

- Oct. 20: 25 dead, 2,700 homes, $1.5 billion, 5,100 homeless: 9 hours
- Risk factors
  - Vegetation (flammable eucalypts)
  - Fire suppression policy
  - Wood houses, decks
  - Narrow, winding roads
1991 East Bay Hills Fire

- Interrelated hazards: drought, fire
- Failure of lifelines: narrow roads, incompatible fire equipment
- Rebuilt immediately (high property values)
- But with vegetation, material restrictions
Four stages of response

- Preparation and readiness
- Emergency response
- Recovery (short- and long-term)
- Mitigation
Types of mitigation

• Warning systems, evacuation planning
• Building regulations
• Land use planning and land acquisition
• Education
• Habitat protection/restoration