collapse of civilizations
- population crash...
- population dispersal...
- population dislocation and urban abandonment...
- state collapse...
- cultural collapse...
the BIG theoretical issues
- levels of organization...
- is system collapse common?
- internal vs. external
- social vs. ecological
- proximate vs. ultimate causes
  - proximate = how...
  - ultimate = why...
- rate of collapse

Classic Maya collapse
- evidence from Copán
- drop in agricultural yield...
  - overpopulation/soil degradation
  - increased aridity AD 800-1000
- Moche IV-V transformation
- evidence...
- collapse of agricultural yield...
  - 30-60 year drought ca. AD 600
proximate causes
- drop in K- falling food production
ultimate causes
- populations grow exponentially
- K is never stationary
- social complexity is not a complete solution

Papers due TODAY!

- Hand in papers in Anthropology
Main Office, Haines 341, by 4PM.

defining the collapse of civilizations...
- population crash = local/regional population size is dramatically reduced
- urban abandonment = the permanent abandonment of one or more cities
- population dispersal = formerly dense settlements reconfigure into many smaller settlements
- population dislocation = population is “pushed” from one dense settlement to another
- state collapse = disintegration of the economic, political and ideological power structures that characterize the state
- cultural collapse...
culture = system for inheritance of behavioral (non-genetic) information

cultural variation = differences in the behaviors expressed by individuals as a result of different social learning opportunities

innovation by accident = generation of new cultural variability through random errors

innovation by design = generation of new cultural variability through intentional change (i.e., invention)
■ cultural collapse = failure of the system that ensures the transmission of behavioral information
■ failure in transmission
  ■ population crash → failure in learning environment
  ■ illiteracy → failure in institutional memory
■ failure in innovation
  ■ causes not clearly understood
  ■ narrow variability → limited innovation
  ■ the trouble with a world full of EMINEMs...
  ■ or a single bio-engineered crop...
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■ levels of organization
■ why do groups of potentially autonomous agents “decide” to organize together when they could function on their own?
  ■ cells in a multi-cellular organism; families in a foraging band; commoners, craft specialists, and elite in a state
  ■ sometimes groups derive a greater benefit from cooperating than they would by acting alone...
  ■ but in many cases sub-units can do better by acting in their own interest
  ■ is system collapse common?
  ■ YES: most common where the sub-units could do better on their own...if they can “break out” on their own.
    ■ organismal cancer: a “relic” left over from the shift to multi-cellular life
    ■ social cancer: sub-units within society act in their own best interest regardless of risk to future viability of society
      ■ short term gain, long term loss...
  ■ difficult for individual to predict which actions terminally detrimental for society
    ■ time scale of effects critical!
internal vs. external mechanisms of collapse

- internal-external relatively easy to define in the case of cancer or a gun-shot wound...
  - the boundary between the cells that make up the organism and the external environment is very sharp

- internal-external sometimes difficult to define for civilizations
  - city-states (relatively easy) - diffuse polities (very difficult)
  - what is internal in a diffuse polity?

social vs. ecological mechanisms of collapse

- social mechanisms = pathologies (maladaptive behaviors) that originate within, or are the result of social organization

Victims of warfare or sacrifice?

Tomb 1001 at Anyang, last capital city of Shang Dynasty

Qin Dynasty, 221-206 BC

A far less costly solution to display of political power (elite), and allegiance (citizens) that ensures the perpetuation of the state
■ social vs. ecological mechanisms of collapse
  ■ ecological mechanisms = pathologies that originate in the environment, or from the interactions between people and the natural environment
    ■ Drought...
    ■ Diet based only on maize...

■ the boundary between social and ecological causes of collapse are also frequently “fuzzy” because (of course) society is part of one’s environment

■ proximate vs. ultimate causes of collapse
  ■ proximate causes = the immediate events (or chain of events) that led to collapse
    ■ usually a description of an empirical case
    ■ climate changes → crop yields fall → people starve → elite and bureaucracies have no population or resource base to maintain themselves → political authority collapses

■ ultimate causes = the general features of the system that make it susceptible to collapse
  ■ usually (law-like) generalizations based on both theory and comparative studies of many empirical cases
  ■ compact city-states are vulnerable to total annihilation, whereas distributed polities are more resistant to attack

 Common Explanations for the Collapse of Civilizations

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<tr>
<th>SOCIAL</th>
<th>ECOLOGICAL</th>
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<tr>
<td>INTERNAL</td>
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<td>Political Struggle</td>
<td>Farming Practices</td>
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<td>EXTERNAL</td>
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<td>Warfare</td>
<td>Drought Disease</td>
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Natural Timescale and Mechanisms
Calibrate to human (institutional) lifespan

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- Moche IV-V Transition AD 600
  - geological evidence
    - ice cores from Andes indicate 30-60 years of severe drought just preceding Moche IV-V
    - sand dunes at Cerro Blanco choking irrigation canals

  - archaeological evidence
    - Cerro Blanco abandoned and dense settlement begins at Pampa Grande

- Maya Collapse AD 750-909
  - Copán geological evidence
    - houses filled with erosion debris beginning AD 750

  - Copán skeletal evidence
    - skeletal remains indicate severe malnutrition; especially anemia

  - Copán architectural evidence
    - last known hieroglyphic inscription at Copán AD 822
    - latest inscription known regionally is AD 909

  - Copán botanical evidence
    - fully re-forested by AD 1250 as seen in Mahogany pollen

  - Ethnoarchaeological evidence
    - current Maya farming practices are leading to rapid soil degradation

- Maya Collapse AD 750-909 events...
  - drop in agricultural yield: soil degradation from over farming and increased aridity AD 800-1000
  - population crash: 80% of populous in Maya Lowlands died (?)
  - urban abandonment: insufficient population to support urban centers
  - dispersal: population dispersed into smaller settlements
  - state collapse: insufficient resources (labor, food) to support elites

- time scale: multiple generations
Moche IV-V Transition AD 600

- events...
  - crash in agricultural production: rapid onset of drought ca. AD 540-570 makes irrigation impossible
  - urban abandonment: insufficient population to support urban center
  - population dislocation: population moves to larger settlement in an inland valley farther North (where irrigation is still possible)
  - state collapse: insufficient resources (labor, food) to support political control along Peruvian coast

- time scale: single generation

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