# Ecology of Health and Disease

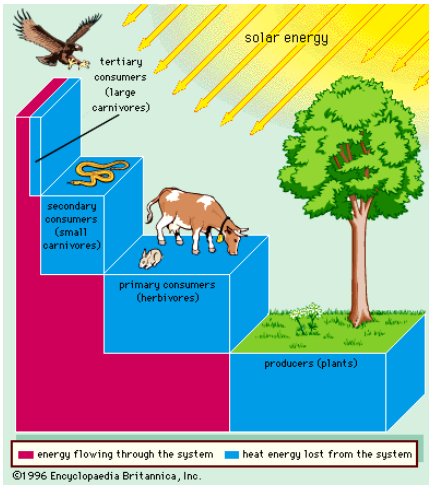
ANTH 306/Medical Anthropology
Spring 2014

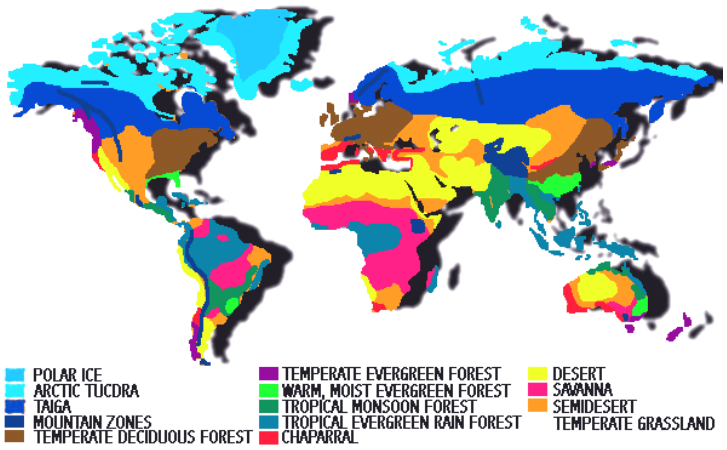
## Ecology

- Study of relationship between a species & its *environment*.
- ***Environment***
  - all the objects & forces external to organism with which it interacts or by which it is affected.
  - Distinction biotic/abiotic; organic/inorganic.
- ***Populations***
  - groups of individuals of same species who occupy same area & interbreed with one another.
- ***Habitat***
  - Specific area where a population lives.
- ***Niche***
  - The place of a species in an environment; how it makes a living,
  - Its "profession" as a species.
  - includes how the population interacts with both natural resources & other populations.
- ***Habitat*** is a more concrete idea.
- ***Niche*** is more abstract concept.

# Ecology

- ***Adaptation***
  - process by which organisms or populations make biological or behavioral adjustments that facilitate their survival & reproductive success in their environment.
- ***Ecosystem***
  - cycle of matter, information & energy that includes all organic things & links them to the inorganic.
- Exchanges of energy, matter, & information.
  - go on through ***trophic levels***, or levels of feeding relationships, i.e., producers, herbivores, & consumers.
- Exchange sequence sometimes referred to as ***food chain***.



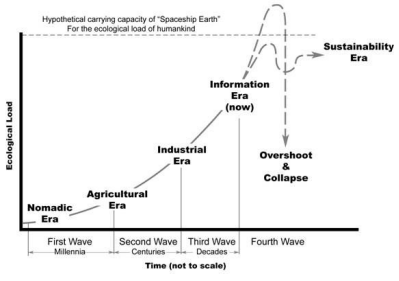



# Ecology

- Every environment is *limited* in ability to support life.
- ***Limiting factors*** can include:
  - Food
  - Water
  - Temperature
  - Rainfall
  - presence of disease causing organisms, etc.
- Limiting factors help determine ***carrying capacity*** of an environment
  - point at which or below which a population tends to stabilize.
  - alternatively, limit to which a population can grow & still be supported by same environment.
  - maximum number of individuals of a population that a given ecosystem can support.

# Ecology

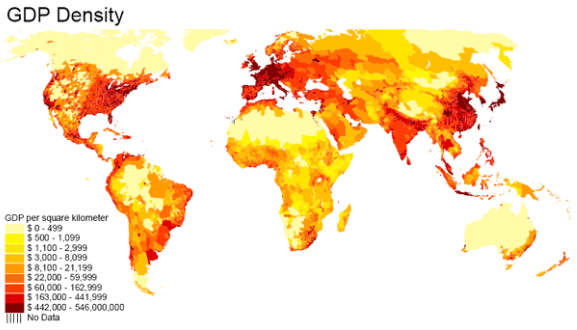
- Carrying capacity is determined *not just by total amount* of food available (calories) but also by *quality of food* in form of proteins, vitamins, minerals.
- For human populations, the carrying capacity of an environment can vary with technology.
- ***BUT it's very important to recognize that human populations may be able to dramatically increase carrying capacity the carrying capacity of an environment but can it be sustained?***




http://steadystaterevolution.org/carrying-capacity-reached-the-need-for-population-stability/

# What about consumption?

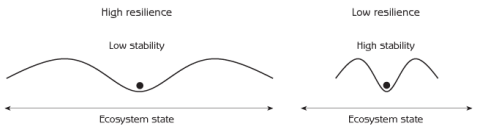
- **IPAT Equation:**
- **I = P x A x T**
- Shows relationship between a human population and its impact on environment.
- Maintains that impacts on ecosystems (I) are product of population size (P), affluence (A), & technology (T) of human population that is impacting it.




https://www.e-education.psu.edu/geog030/node/328

# Ecology

- ***Stability* & *resilience*** are 2 important properties of ecosystems.
- ***Resilience***
  - measure of degree of change system can undergo while still maintaining basic elements/relationships.
- ***Stability***
  - measure of speed with which system returns to equilibrium after absorbing disturbances.
- Ecosystems may be highly resilient yet have low stability, taking longer to return to equilibrium.
  - Despite long period necessary to return to stability they continue to persist as systems since parts do not change.
- Other ecosystems may be highly stable (quickly return to equilibrium) but have low resilience & likely to collapse.




http://gerrymarten.com/human-ecology/chapter11.html

# Ecology

- How/why are humans different?
- Human interaction with environment differs from all other animal species in two ways:

1. While ***niche*** of most animal species is relatively narrow humans occupy an exceptionally **broad ecological niche** & can be found in an extremely wide range of habitats.
2. Once **humans** enter an ecosystem they tend to **become the dominant species** & affect survival & adaptiveness of other species.

- Human ability to modify environment through technology means we can create artificial environments (farms & cities) that must be sustained with enormous inputs of energy, matter & information.
  - Draws not just from local ecosystem but often from very far away.
- Tremendous ability to modify environment means that human dominated ecosystems are often considerably less resilient than other ecosystems.

# Traditional Inuit Adaptations to Arctic

- Energy capture is key.
- Inuit operate on a high energy budget:
  - high expenditure
  - high intake
- Tundra is a simple ecosystem compared to others, such as tropical rainforests.
- 4 primary animal species exploited: fish, seals, whales, caribou.
- Dietary selectivity suggests conditions of normal food abundance.

## Traditional Inuit Adaptations to Arctic

- Dogs
  - used for hunting
  - also a reserve food supply
- But dogs meant extra energy must also be expended to feed them. [now snowmobiles]
- ***Food sharing partnerships*** helped ensure survival, as well as political stability.
- Diet was high in protein, high in fat, low in carbohydrates.
- Low cholesterol levels, low blood pressure, low rates of heart disease – possibly related to consumption of lean meat.

## Traditional Inuit Adaptations to Arctic

- Mechanisms that acted to control population growth:
  - Accidents
  - Homicide
  - suicide (especially by elderly)
  - infanticide (especially of females).
- ***Cultural adaptations*** were crucial to Inuit survival.
- Inuit full exploited resources of ecosystem yet they remained part of system without changing it to point of threatening its equilibrium.
- Their health was a reflection of this equilibrium.

# Traditional Inuit Adaptations to Arctic

Clothing and shelter aid tremendously in adapting to cold.

**Figure 5.3** **The Chimney Effect in Inuit Fur Clothing** Vents in the clothing can be opened by release of drawstrings during exercise to prevent accumulation of sweat.

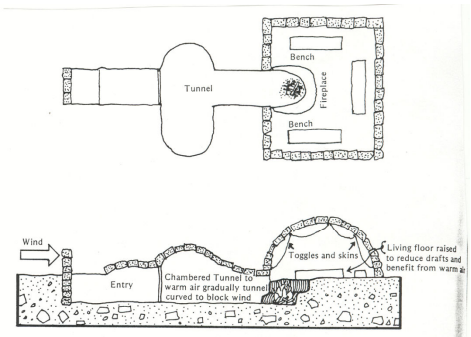



**Figure 5.4** **Features of Inuit Housing** Three architectural features are particularly significant: the presence or absence of fireplaces, the positioning of benches, and the depth of the tunnel doorway. Presence or absence of fireplaces was associated with availability of wood in winter. If the tunnel were not subterranean, floor temperatures could drop below freezing.

Source: Amos Rapoport. © 1969. *House Form and Culture*. Englewood Cliffs, N.J.: Prentice-Hall.