Arctic ecosystem as a human habitat

Major adaptive constraints:
- cold stress
- near absence of useful plants
- reliance on seasonal fish and game resources
Adaptations to arctic constraints: cold stress

Cold Stress:

**Genetic and developmental adaptations:**
- ★ high peripheral blood flow to warm extremities
- ★ rounded body form (Allen’s rule) to reduce surface area to volume ratio preventing heat loss
- ★ thermogenesis to increase BMR

**Cultural adaptations:**
- ★ snow house (igloo) design
- ★ radiant heating
- ★ clothing (e.g., down-filled parka)
Adaptive design features of the igloo

- Thin ice on walls permits reflection of radiant heat of lamps
- Raised sleeping platforms put sleepers in warmest area
- Low and long entrance permits cold air to drain and keeps outside air out
- Round shape reduces surface area to volume ratio
Dealing with cold stress while making a living
Dealing with cold stress while making a living
How the body adapts to cold and heat stress
Absence of useful plants
- animal sinew replaces vegetable bindings
- fat replaces wood as fuel source
- bone of large animals replaces wood as a construction material (e.g., sled runners)
Adaptations to arctic constraints

Reliance on seasonal fish and game resources
- Long distance seasonal movements to resource locations
- Dispersion and aggregation of band members
- Storage and preservation of food resources to survive seasonal scarcities
1. Fishing thru thin river ice
2. Sealing
3. Seal hunting
4. Fishing at stone weirs
5. Caribou hunting
6. Fishing at stone weirs

**Camp** | **Season-Purpose** | **Size**
---|---|---
1 | Mid winter sealing | 60-150
2 | Mid winter sealing | 60-150
3 | Seal hunting large breathing holes | 5-20
4 | Fishing at stone weirs | 5-20
5 | Caribou hunting | 5-20
6 | Fishing thru thin river ice | 60-80

Netsilik nomadism
Wild food resources in Amazonia

Foraging in the tropics is impossible or difficult because:

- biomass is mainly trunks and roots with only 2% (leaves and fruits) potentially edible biomass
- distribution of useful resources is patchy
- resources are high in trees and costly to acquire
- processing costs may be high because of woody coverings and high levels of toxins
- most animals are lean, therefore provide poor caloric resources which may stress the body (Speth and Spielman) with high levels of nitrogen and costly digestion (specific dynamic action)
- seasonality is sufficient to cause problems in availability of plant resources
- high species diversity leads to lack of a staple
Despite its apparent richness of plants the soils are extremely impoverished and fragile. Geologically, most of the area in an ancient Pre-Cambrian formation

★ no upwelling of useful nutrients (most contained and circulated in living biomass)
★ soils contain heavy concentrations of aluminum, iron, and silicates
★ soils are shallow and have poor mechanical properties
Aquatic resources in Amazonia

Types of Rivers:

- **Black** (e.g., Rio Negro): highly acidic, from humic acids in poorly drained areas of forest (silent forests with little game); cannot hold high levels of oxygen (starvation rivers); low level of suspended solids so little plant growth (the black color comes from the color of the humic acids), and blackness inhibits the penetration of light for plant growth.

- **White water** (e.g., Rio Branco): the most productive in terms of fish life. Originates from the Andes, rich in plant nutrient suspended matter, but whiteness inhibits penetration of light.

- **Clear water**: highly transparent, originates from impoverished crystalline soils, little suspended matter and therefore little plant growth.
Tropical forest: three different uses