HERBACEOUS ECOSYSTEMS

1A. GRASSLANDS

grasslands - once 42% land, now 12%
- temperate zone, open wind-swept plains
- incl. N.Am. prairies, S.Am. pampas, Eur. steppes, s.Afr. veldt
- Afr. savanna includes scattered trees

seasons - bright sun, high winds
- harsh rainy winter, hot dry summer
- brief equinoxes, rainfall 250-800 mm
- evaporation exceeds precipitation

soil - soggy in spring, parched by summer

1B. PLANTS & ANIMALS

few trees-shrubs - saplings drowned

grasses - non-woody, herbaceous
- growing season during mild spring
- half+ underground to survive fires
- blade (narrow leaf maximize light, clipped by grazing animals)
- rhizome (underground stem/storage, propagate horizontally, not clipped)
- fibrous roots (shallow, no taproot)

animals - worms fertilize soil
- large termite & ant mounds in savanna
- small burrowers, large hoofed grazers

1C. GRASSLAND ECOLOGY

succession - seral, not shade-tolerant, poor roots
- maintain by fire & water (otherwise replaced by shrubs-trees)
- fire eliminates woody saplings, clears mulch, returns nutrients

agriculture - esp. grains, req. fertilization & irrig.
- leads to runoff & pollution

pastoralism - cattle replace lg grazers
- leads to overgrazing, topsoil erosion
- desertification - replaced by bare soil

2A. ARCTIC TUNDRA

arctic tundra - 'treeless plains'
- circumpolar around Arctic Circle
- frozen plains with summer bogs

seasons - winter 9 months dark, frozen
- summer - 3 months 5°C, long days
  (low angle, only 10% at midnight)
- rain low all year (cold air less humid)
- evaporation also low, some humidity
- snow provides melt water in summer

soil - shallow 20-60 cm, soggy in summer
- rocks pushed up by wet sinking soils
- low in nutrients (esp. nitrogen)

permafrost - thick subsurface layer
- perpetually frozen 1000's years
- vegetation & litter prevent thaw

2B. PLANTS & ANIMALS

no trees - below timberline

plants - low diversity, small & simple
- adapted to cold, wind, permafrost,
  short growing season
- above ground freezes in winter

herbs - grasses, perennial, grow slowly
- low on ground, most tissue beneath
- too cold for seeds to germinate
- propagate by rhizomes underground

animals - migratory
- lemming, hare, caribou, musk ox
- fox, wolf, grizzly bear, geese, owl

2C. TUNDRA ECOLOGY

productivity - low (cold, permafrost)
- rate comparable to temperate zone
- but very short growing season

decomposition - slow, increase spring
- permafrost, not enough bacteria-fungi

cycling - very tight, not much is lost
- most in dead matter (not soil or tissue)

oil wells - introduce roads, pollution,
spills, sewage, toxic chem, etc.

3. ALPINE TUNDRA

alpine tundra
- mountain tops in temperate zone
- more diverse than arctic tundra

climate - temperature fluctuates daily
- more precipitation (esp. snow)

soil - drier, moist in meadows & bogs
- permafrost rare (only very high elev.)

plants - more diverse, low to ground
- growing season < 6 months, seeds
- trees sculpted by wind (krummholz)

tropics - seasonal rains, plants erect