MARINE ECOLOGY

1. PHYSICAL FACTORS

oceans - 70% earth's surface, 7 km deep
- all interconnected by currents
- seas shallow & over continental shelf

salinity - fairly uniform, averages 3.5%
- sodium chloride, also S, Mg, K, Ca

light - only penetrates upper layer
- decreases rapidly with depth

temperature - varies less than on land
- ranges –9°C arctic to 27°C tropics
- also decreases rapidly with depth

waves - wind pushes against surface
- vertical upwelling brings up cold nutrient-rich water up contl shelf

tides - from gravitation pull of moon
- usually 2 highs & 2 lows per day
- height intensified by pull of sun
- spring tide (extra high high-tide)
- neap tide (very low high-tide)

water pressure - also increases with depth

2. ZONATION

stratification - by depth
- photic - upper, max light & temp.
- mesopelagic - middle, const. temp.
- bathypelagic - deepest, dark

littoral - shallow water by shoreline

pelagic - open ocean away from shore
- neretic - above contl shelf, diverse
- oceanic - above floor, less diverse

benthic - ocean floor & trenches
- rocky or shallow sediment
- no photosynthesis, mainly decomp.

3. ECOLOGY

diversity - phytoplankton (diatoms, bacteria)
- zooplankton (copepods, krill)
- nekton (fish, penguin, whale, seal)
- deep-sea fish (luminescent, lures)

productivity - lower than terrestrial ecosystems
- high in temperate, coastal, upwelling
- highest in certain tidal ecosystems

4. COASTS

sandy beaches & mudflats
- low diversity (burrow in shifting sand)
- low productivity, mainly decompose

rocky shores - includes tidepools
- high diversity (4 distinct zones)
- spray - usually not submerged
- high-tide - submerged once a day
- mid-tide - submerged twice a day
- low-tide - usually submerged

estuaries - semi-enclosed bays
- salinity varies with tides-river runoff
- high diversity (marine tolerate fresh)
- high productivity (trap nutrients)

salt marshes - tidal saltwater wetland
- plants store or secrete excess salt
- high diversity (nursery, wintering)
- high productivity & decomposition

mangroves - trees replace salt marshes in tropics
- shallow roots with pneumatophores
- prop roots from stem or branches
- succulent leaves with salt glands
- vivipary (no seed, floating seedlings)

5. CORAL REEFS

coral - warm shallow esp. tropics
- polyp animals secrete calcium cup
- high productivity (nutrients retained)
- clear water for photosynth. in tissues

reefs - accumulate as reef over centuries

fringing reef - up against shoreline
- initial stages around islands

barrier reef - further from shoreline
- separated from island by lagoon

coral atoll - ring around broad lagoon
after island has subsided

highest marine productivity
- only 2% of the world's ocean
- lots of niches & species diversity
- efficient & rapid recycling of nutr.

6. DEEP OCEAN

sea floor - barren sediment & bedrock
- low productivity (dark & cold,
high pressure, few nutrients)
- low diversity (no plants, feed infreq.)

deep-sea vents - over 2 km deep
- fissures over tectonic ridges, ~1 acre
- seeps out hot acidic water (40-75°F)
- high pressure prevents boiling
- mineral-rich esp. sulfur & oxygen
- chimneys build up to 30 feet high
- superhot water (750°F) from smokers

food chain - depends on thermobacteria
- free-living in water or in animal tissue
- chemosynthesis converts sulfur into nutrients
- high diversity (esp. tubeworms, clams)

7. EL NIÑO CURRENT

ENSO - winter 3-7 yrs, last up to 1-2 yrs
- El Niño ('Christ child') current
driven by Southern Oscillation wind
- tropical Pacific current flows to east
(trade winds normally flows west)

current - 2-8°C warmer east to S.Am
- disrupts upwelling nutrients esp. Peru
- elevates sea level

climate - effected globally
- evaporation intensifies weather
- either more storms-floods-mudslides
or drought-fire-famine
- also fewer hurricanes in U.S.

Calif - invaded by tropical marine spp.
- native organisms relocate deeper