Mangrove Ecology

I. Introduction
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V. Productivity
VI. Biotic Interactions
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VIII. Challenges

Mangroves are similar to Marshes

- occur on depositional coastlines & are structured by specific types of plants
- provide habitat for juvenile animals (nursery)
- zonation patterns
- wide range of salinities
- water logged sediments
- high hydrogen sulfide concentrations
- low oxygen sediments

What are mangroves?

- salt-tolerant woody trees and shrubs in tropics and subtropics
- mangrove forests (‘mangals’) occur in estuaries and marine shorelines
- mangroves make up 60-75% of the coastal vegetation in the tropical and subtropical regions of the world

Importance

- essential component of the tropical and subtropical coastlines
- mangrove forests link open ocean and the coast

Help to:
  - prevent erosion
  - filter nutrients
  - protect shoreline from severe weather

“Filtering” Effect

- mangroves improve marine water conditions by removing…
  - nutrients
  - sediments

(potentially important where mangals are adjacent to coral reefs, which are especially susceptible to nutrients and sediments)
II. Distribution

- found in areas with mean monthly air temperature > 20° C

III. Key Taxa

~70 species constitute “true mangroves”
— these species occur exclusively in mangrove habitats and rarely elsewhere

- red mangrove
- black mangrove

Biology of Mangroves

- morphologically adapted to their environment
  (e.g., prop roots)
- withstand & grow in saline conditions
  - most salt excluded at roots via ultrafiltration
  - salt in tissues is accumulated in leaf vacuoles
  - salt glands for excretion in some species
  - succulence in some species
- pneumatophores (aerial roots for respiration)

Biology of Mangroves (cont.)

- viviparous reproduction

... (cont.)

IV. Zonation

Causes unclear (few experimental studies)
likely include:
- interspecific competition
- tolerance of abiotic conditions
- seed predation
- dispersal of seeds

e.g., in Florida and Caribbean
V. Productivity

- mangals provide some carbon for other marine systems (but extent of subsidy is unclear)

- export of C is variable & much is retained
- 30-80% of fallen leaves, branches, flowers, & fruits are eaten by crabs
- < 50% litter decomposed by bacteria

VI. Biological Interactions

- Facilitation
- Predation
- Competition

Facilitation

- alteration of conditions
  - mangals provide structurally complex habitat
    - reduces risk of predation
    - used by many species as nursery habitat (e.g., fishes, crabs, & shrimp)

Species that use structurally complex mangrove habitat
Predation
- structural complexity reduces risk of predation
- herbivory very high - but benefits from some herbivores
  - e.g., crabs oxygenate & add nutrients to soil

Competition
- among mangroves for light
- among sessile species that attach to mangroves for space

VII. Abiotic Disturbance
- development
- pollution
- destruction of coral reefs
- changes to drainages
- deforestation ("upstream")

VIII. Challenges
- over 50% of mangrove habitat has been destroyed

Threats to Mangrove Forests
- development
- pollution
- destruction of coral reefs
- changes to drainages
- deforestation ("upstream")