Rainforest Ecosystems
Ecosystems: A Brief Review

- Collection of interdependent parts
- Environment provides inputs
- Ecosystem produces outputs
Inputs

- **Abiotic Inputs**
  - Energy
  - Inorganic matter

- **Biotic Inputs**
  - Organisms
  - Other ecosystems
Abiotic Inputs

- Sunlight
- Water
- Mineral Nutrients
- Gasses
Biotic Inputs

- Inactive or dead organic matter
- Dissolved organic matter
- Organically derived nutrients
Trophic Web

- **Consumers**
  - Heterotrophs (mostly animals)
  - Three levels

- **Producers**
  - Autotrophs (mostly plants)
  - Photosynthesis

- ** Decomposers (mostly bacteria and fungi)
Terrigenous Decomposers

- Fungi
- Bacteria
Where are the rainforests?
What is a rainforest?

- Closed floral canopy
- High, constant temperature
- High, stable rainfall amounts
Physical Controls

- Temperature
- Altitude
- Rainfall
- Soil
Temperature and Altitude

- Average for tropical rainforest = 25° C (77° F)
  - Minimum = 18° C (64° F)
- Average difference throughout the year is usually less than 4° C
- True rainforests are usually found below 1000 m (3,280 ft.)
Rainfall

- Between 1.8 m (6 ft.) and 9.0 m (30 ft.) per year
- More than 100 mm (4 in) per month
- Dry periods are short and unpredictable
- Half of the precipitation comes from local evaporation
- Latin American rainforests receive about 4 m (13.3 ft.) per year
Soil

- Thin layer of humus
- Poor in nutrients
- Minerals leach out as result of rainfall
Biotic Characteristics

- Forest Structure
- High biotic diversity and specialization
Multilayered Forest Structure

- Emergent layer
  - 35 to 80 m (115 to 234 ft.)

- Overstory layer
  - 20 to 50 m (65 to 165 ft).

- Midstory layer 1
  - 5 to 30 m (16 to 99 ft.)

- Midstory layer 2
  - 5 m or less (under 16 ft.)

- Understory layer
  - ground level and just above
Plant Examples

- Kapok tree
- Bromeliad
- Orchid
- Banana-type tree
- Palm tree
- Insectivorous plant
- Corpse lily
Various Plant Adaptations

- Dependent on trees for support
- Pioneer species are light dependent
- Microclimate influenced by foliage layering
- Light levels decrease as canopy density increases
- Pollination by fauna rather than wind
- Shallow roots - feeder roots are in the top 2 to 15 cm (1 to 7 in.) of humus
More Plant Adaptations

- Mineral nutrients are concentrated in plant tissues rather than in the soil
- Nutrient cycling is mainly through litterfall
- Turnover time for nutrients recycling is between 20 and 100 years.
- Symbiotic fungi in plant roots cycle nutrients from dead organic matter directly into the plant
Animal Examples

- 150 species of beetles
- Leaf-cutter ants, termites
- Anacondas
- Birds
- Bats
- Agoutis
- Tapirs
- Monkeys
- Three-toed sloth
- Jaguar
Animal Adaptations

- Most are nocturnal or crepuscular
- The sloth has algae in its fur
- Ecological niches
  - Above the canopy
  - Top of the canopy
  - Middle of the canopy
  - Below the canopy
- Large ground animals
- Small ground animals
Economic Value of Rainforests

- Hardwoods
- Minerals
- Petroleum
- Agricultural products
- Exotic animals
- Medicines
Environmental Value

- Absorb carbon dioxide
- Exude oxygen
- Cycle nitrogen and phosphorous
- Regulate temperature and precipitation
- Protect watersheds from erosion
- Harbor pollinators
Value to Indigenous People

- Home to 1,000 different South American cultures
- Protected and isolated them from the colonists
Deforestation

- Logging
- Colonization
- Cattle ranching
- Agriculture

Cynthia E. Ledbetter, Ph.D. 2003
Each second, more than an acre disappears...

From http://www.therainforestsite.com/cgi-bin/WebObjects/CTDSites

Cynthia E. Ledbetter, Ph.D. 2003
Rainforest is being lost at a decreasing rate, due to increased public awareness

- 1980s = 40 million acres/year
- 1990s = 35 million acres/year
Conservation

- National Parks
- Sustainable logging
- Sustainable forest products
- Ecotourism
References


References (continued)


Cynthia E. Ledbetter, Ph.D. 2003