

Forests and Deforestation

Based on Mader, Sylvia S. 1996. *Biology* - 5th Ed. WCB
 and
 Cox, G.W. 1997. *Conservation Biology* - 2nd ed. WCB
 and
 Levine, J.S. and K.R. Miller. 1994. *Biology: Discovering Life*. D.C. Heath
 and
 Lewis, Gaffin, Hoefnagels & Parker. 2004. *Life* - 5th ed. McGraw Hill

Deforestation

Reading: Pages 881-887 in Lewis et al.

Web Readings:

[NASA - Tropical Deforestation](#)

[Causes of Deforestation](#)

[Consequences of Deforestation](#)

[Sustainable Forestry](#)

[Home Depot](#)

Stark, N.M. and C.F. Jordan. 1978. Nutrient retention by the root mat of an Amazonian rain forest. *Ecology* 59(3) pp. 434-437

I. Succession

A. general trends in succession:

- a) Early seral stages are highly productive but require large inputs of nutrients and also tend to lose nutrients
- b) Consequences of farming in rain forests
- c) Mature biomes good at utilizing nutrients

Video: 19219 (diagram), 18997, 18998 (bog), 17551, 17552 (lake)

| Pioneer Community | Climax Community |
|--------------------------------|------------------------------|
| Harsh environment | favorable environment |
| biomass increasing | biomass stable |
| energy consumption inefficient | energy consumption efficient |
| some nutrient loss | nutrient cycling |
| low species diversity | high species diversity |
| fluctuations common | fluctuations less common |
| <i>r</i> - adapted | <i>K</i> - adapted |

II. Types of Forests

A. temperate deciduous forests

- 1. form band south of taiga in northern hemisphere**
- 2. growing season between 140-300 days**
- 3. from 75-150 cm rain/year**
- 4. complex understory, some species flower in spring before canopy leaves out**
- 5. nuts an important food source**
- 6. more nutrients tied up in trees**

Video: 16622, 18126, 18658-18662, 19225 (food chain)

B. Taiga

- 1. Band of forests south of tundra in northern hemisphere**
- 2. Growing season around 130 days**
- 3. From 40-100 cm rain/year**
- 4. Simple understory of mosses and lichens**
- 5. Explosive growing season**
- 6. Nesting area for migrating birds**
- 7. Taiga – Russian for swampland**

C. Tropical Rain Forests

- 1. South America, Africa, Asia, some tropical islands**
- 2. 365 day growing season**
- 3. more than 200 cm rain/year**
- 4. extremely complex canopy**
- 5. no understory except at edges - jungle**
- 6. highly diverse**
- 7. many arboreal species and epiphytes**
- 8. all nutrients held in trees**
- 9. laterite soils - high in aluminum and iron**
- 10. may take 1,000 years for full successional recovery**

D. tropical deciduous forests

- 1. like tropical rain forest, but pronounced dry season**

2. Videodisc:

| | |
|-------------------------------------|---------------------------------------|
| 18718 - aerial view | 18753 - cockroach |
| 18719 - same | 18755 - fungus |
| 18720 - same (closer) | 18756 - morpho butterfly |
| 18720 - river | 18757 - butterfly |
| 18721 - river bank | 18758 - grape shoemaker butterfly |
| 18722 - river bank | 18759 - glasswing butterfly |
| 18723 - emergent | 18760 - glasswing butterfly |
| 18724 - forest floor | 18761 - bamboo phage butterfly |
| 18725 - flowering trees | 18762 - anartia butterfly |
| 18726 - layering | 18763 - lady slipper butterfly |
| 18727 - hillside | 18764 - katydid |
| 18728 - aerial | 18765 - katydid |
| 18729 - bromeliad | 18766 - dead-leaf mantis |
| 18730 - clearing | 18767 - dead-leaf mantis |
| 18731 - buttressed tree | 18768 - dead-leaf mantis |
| 18732 - stream | 18769 - preying mantis, hatching |
| 18735 - liana vines | 18770 - walkingstick |
| 18736 - clearing | 18771 - walkingstick |
| 18737 - base of tree | 18772 - walkingstick |
| 18738 - thorns | 18773 - leaf-footed bug |
| 18739 - tree fern | 18773 - grasshopper |
| 18740 - Cassia | 18774 - army ants |
| 18741 - Warscewiczia | 18775 - ants |
| 18742 - ? | 18776 - bubble-nest (frogs) |
| 18743 - club moss and ferns | 18777 - poison-arrow frog |
| 18744 - palm sprouts | 18778 - toad |
| 18745 - bananas | 18779 - leaf frog |
| 18745 - breadfruit | 18780 - blacksmith frog |
| 18746 - pliodendrons and heliconias | 18781 - blacksmith frog eggs |
| 18747 - ginger | 18782 - blacksmith frog eggs, embryos |
| 18748 - heliconias | 18783 - blacksmith frog eggs |
| 18749 - passionflower | 18784 - south american bullfrog |
| 18750 - seeds | 18785 - coral snake - poisonous |
| 18751 - coffee tree | 18786 - king snake - beneficial |
| 18752 - cocoa tree | 18787 - coral snake mimic |
| 18753 - cocoa nuts | 31298 - toucan |
| | 16524 - bird-of-paradise |
| | 16752 - orangutan |

Rain Forest Destruction

- 19003 - rain forest destruction
- 19004 - fire
- 19005 - after fire
- 19006 - after fire
- 19007 - denuded slope
- 19008 - road building
- 19009 - tin mine
- 19010 - deforestation
- 19011 - aerial view
- 19156 - space view
- 29975 - Brazilian Indians

III. Nutrient Cycling in Rain Forests

A. Mycorrhizae

1. in rain forest, fungal filaments may surround or actually penetrate roots
2. direct nutrient cycling - nutrients move from dead organic matter into roots without entering soil
3. Venezuela - mats 15 to 40 cm thick
 - a) absorb 100% of Calcium and phosphorous¹
4. Climax forest roots near surface, successional roots run deeper

IV. Forest Destruction:

A. Causes:

1. **Population Growth**
 - a) Sustenance farming
2. **Economic Development**
 - a) Timber – particularly Asia
 - b) Cattle

B. Impacts:

1. **Reduced species diversity**
 - a) Up to 30K species per year!
2. **Increased Global warming**
 - a) Deforestation releases CO₂
 - b) Cut forests cannot take up CO₂
3. **Changes in rainfall patterns**

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¹Stark, N.M. and C.F. Jordan. 1978. Nutrient retention by the root mat of an Amazonian rain forest. *Ecology* 59:434-437.