

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

Deforestation

Reading: Pages 49-54 in Levine and Miller (sections on forests)

Chapter 9 in Cox

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.