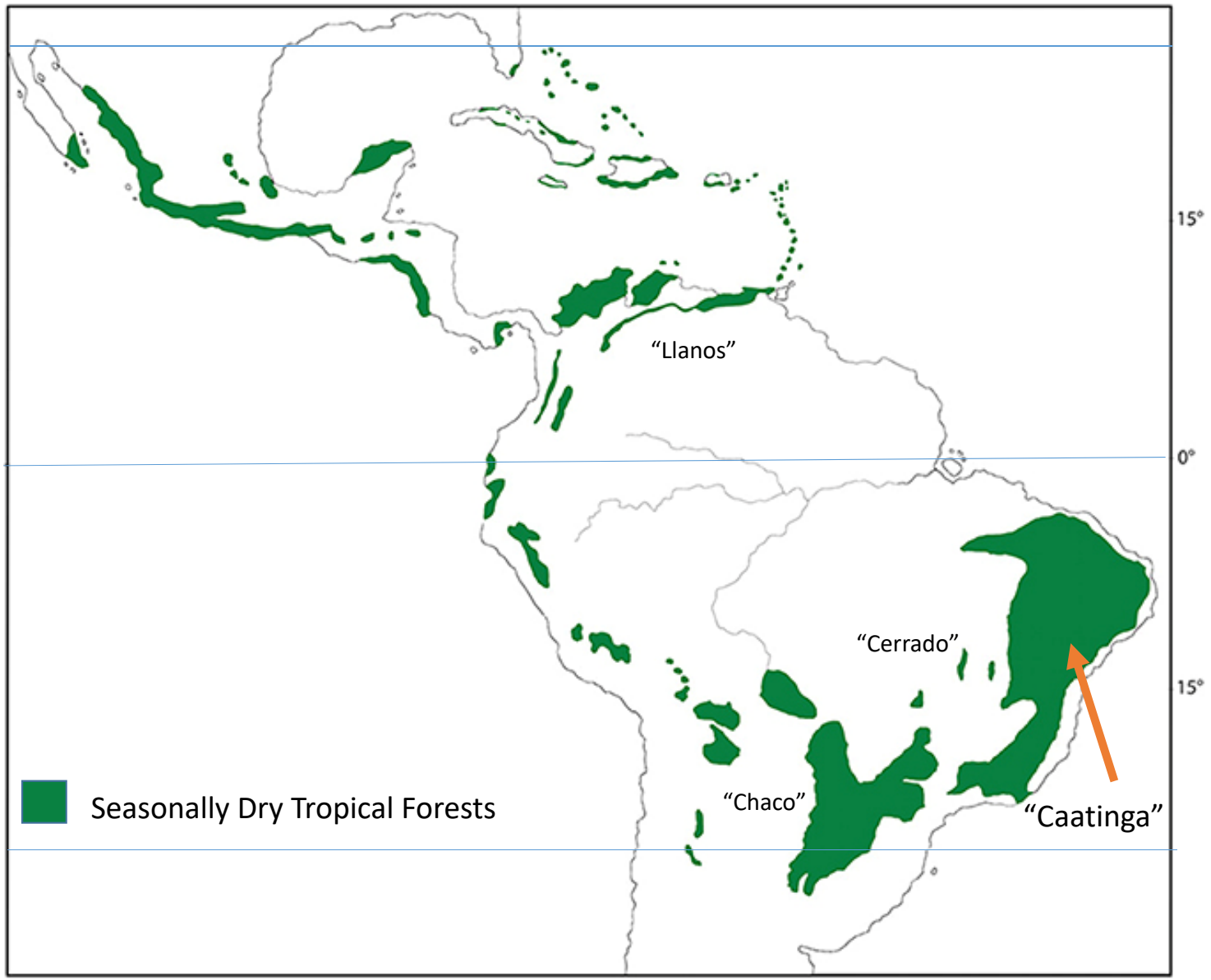
Seasonally Dry Tropical Forests



DEFINITION:

Continuous canopy or nearly so

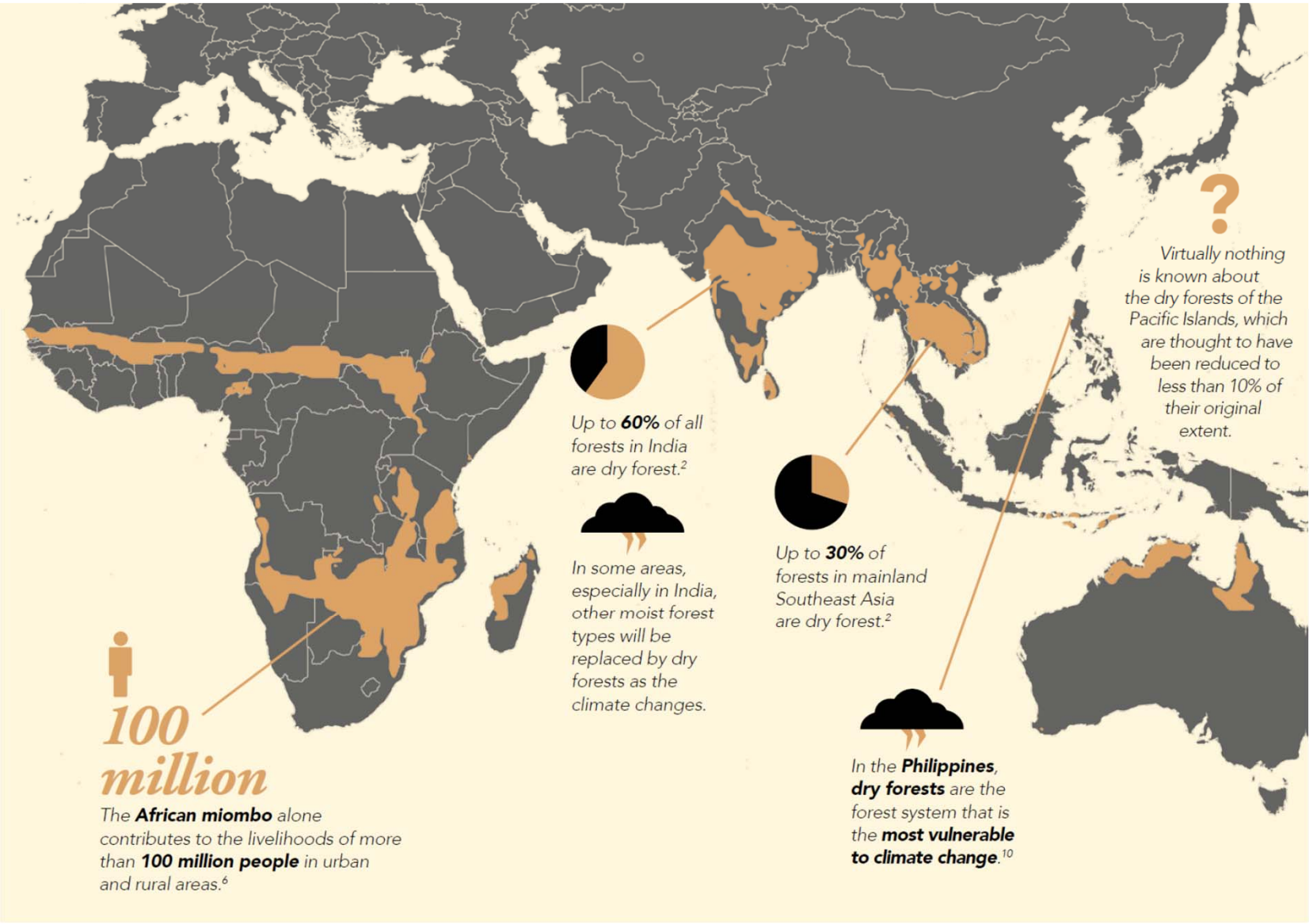
Mean annual temp ~17 °C

Mean annual precip = 200 – 2000mm

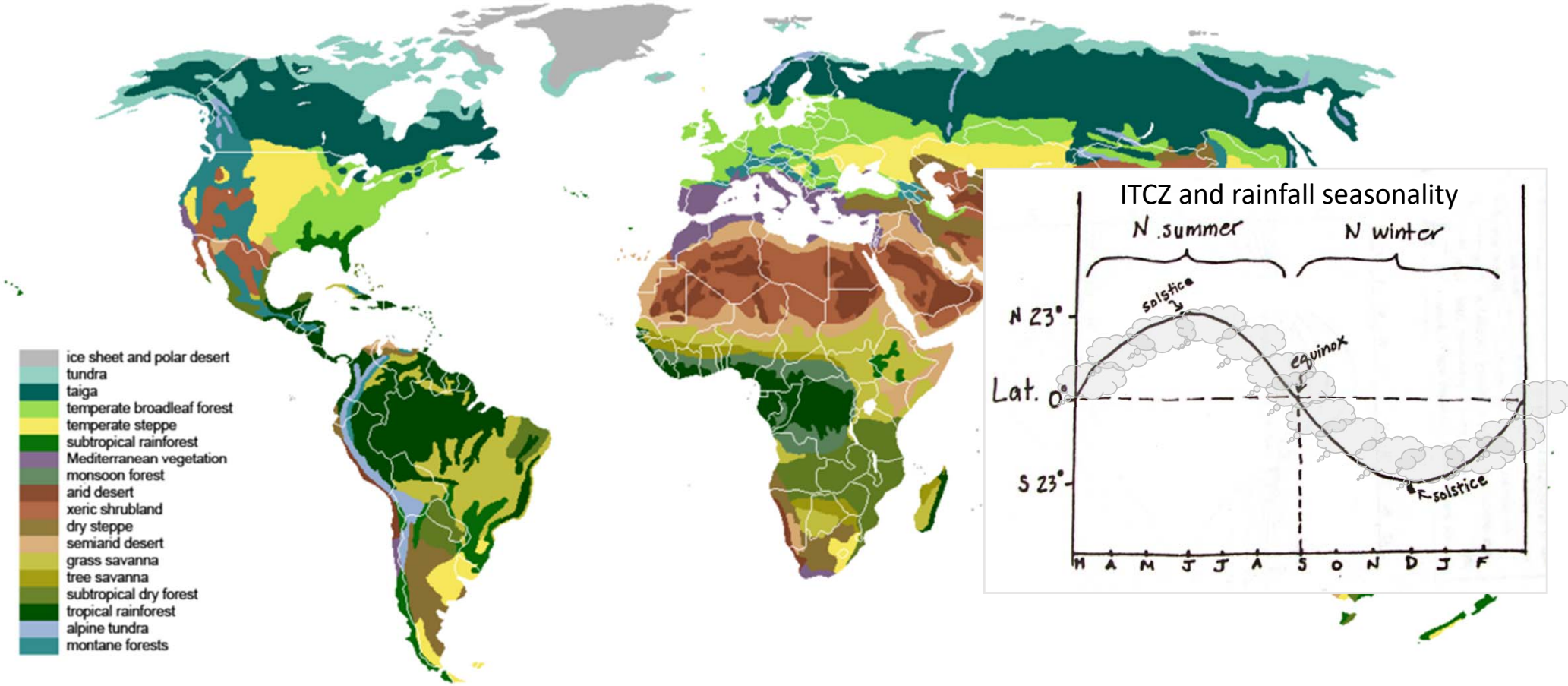
Annual PET:Pc > 1

Pronounced dry season

Lots of names!
a.k.a.
Tropical Deciduous Forest
"Monsoon Forest"



Mostly 10-30° N & S
(*why?*)


ice sheet and polar desert
tundra
taiga
temperate broadleaf forest
temperate steppe
subtropical rainforest
Mediterranean vegetation
monsoon forest
arid desert
xeric shrubland
dry steppe
semiarid desert
grass savanna
tree savanna
subtropical dry forest
tropical rainforest
alpine tundra
montane forests

ITCZ and rainfall seasonality
N .summer
N winter
solstice
N 23°
equinox
Lat. 0°
S 23°
F-solstice
M A M J J A S O N D J F

Seasonality and NPP

Water does not limit primary productivity in WTF

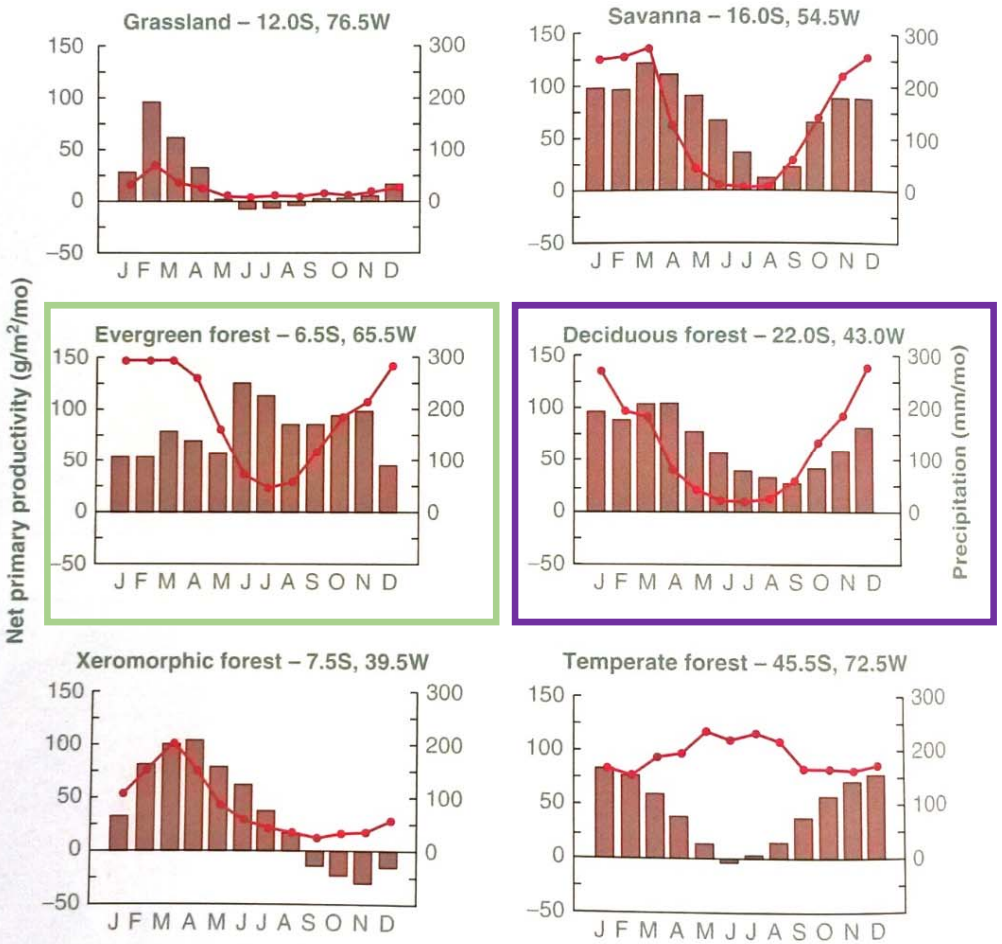


FIGURE 9-8
Estimated monthly net primary productivity for six locations in South America. Monthly rainfall (•—•) is also shown for comparison. Cartographic coordinates refer to the southwest corner of 0.5° latitude × 0.5° longitude grid cells.

Wet Tropical Forest

near 0° latitude
closed canopy
rainfall >2000mm/yr
no severe drought: **PET:Pc < 1**

Dry Tropical Forest

mosty 10°-30° latitude
mostly closed canopy
rainfall 200-2000mm/yr
>3 mos dry season: **PET:Pc > 1**

Tropical Savanna

mostly 10°-30° latitude
grassland with scattered trees
rainfall similar to dry forests
maintained by fire
extreme edaphic conditions

transitions to

when rainfall strongly seasonal

dynamic

drought and/or sandy, waterlogged, or shallow soil **+ fire** transition to…

may revert to forest in absence of fire (+ grazing)


Fire is the primary disturbance

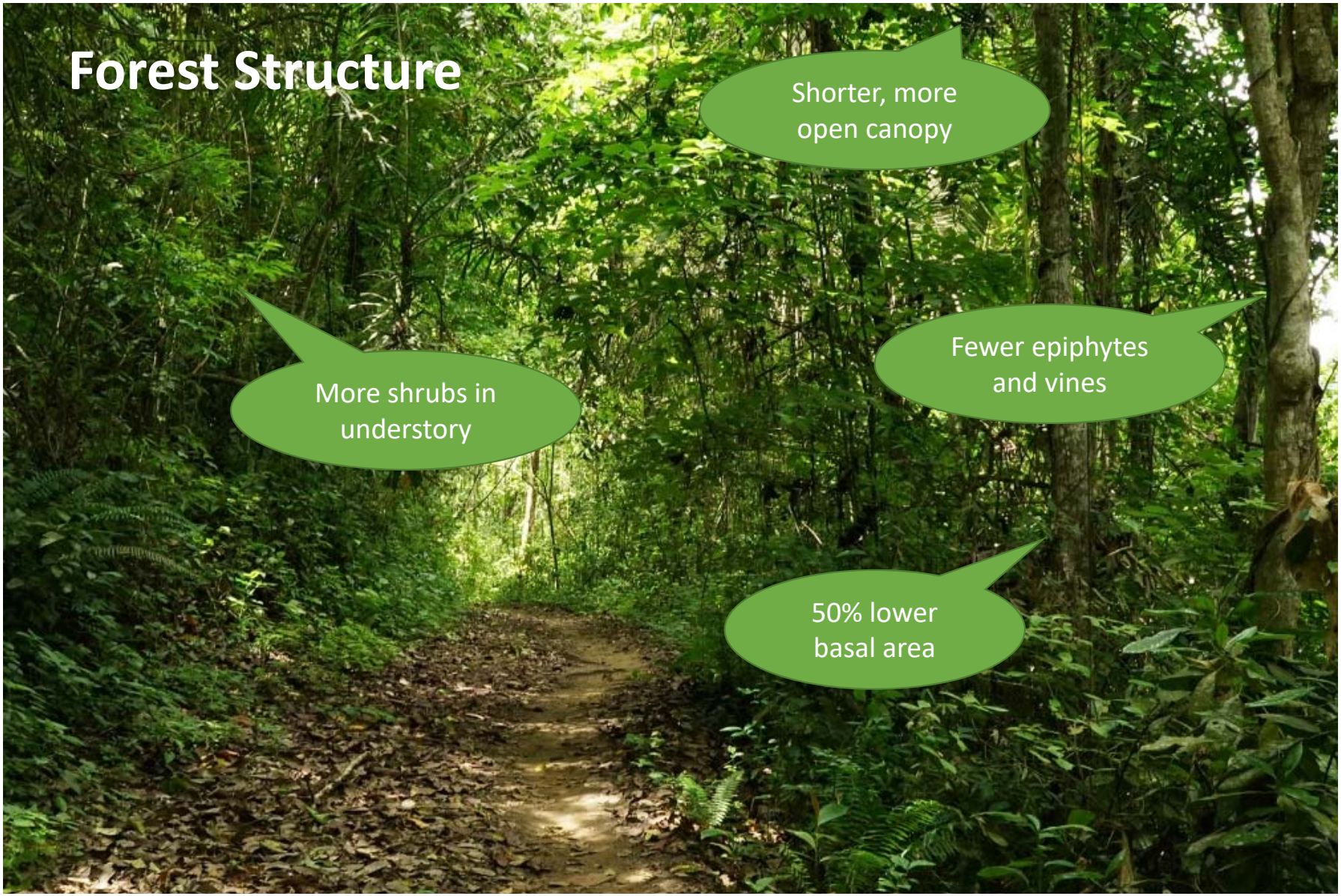
Wet season vs. dry season

>3 mos dry season: **PET:Pc > 1**

Some or all trees are deciduous

Consequences: Lower NPP, lower diversity, higher soil fertility than rainforest

WTF = 200-500 tree spp./ha, DTF = 50-70 tree spp./ha


Forest Structure
Shorter, more open canopy
More shrubs in understory
Fewer epiphytes and vines
50% lower basal area

PLANT ADAPTATIONS to DROUGHT

Deciduousness

Sclerophylly

High root:shoot ratios

Water storage tissue

Adansonia sp.
(F. Malvaceae)
Madagascar

Succulence

Mechanical defenses

Opuntia sp.
(F. Cactaceae)

PLANT ADAPTATIONS

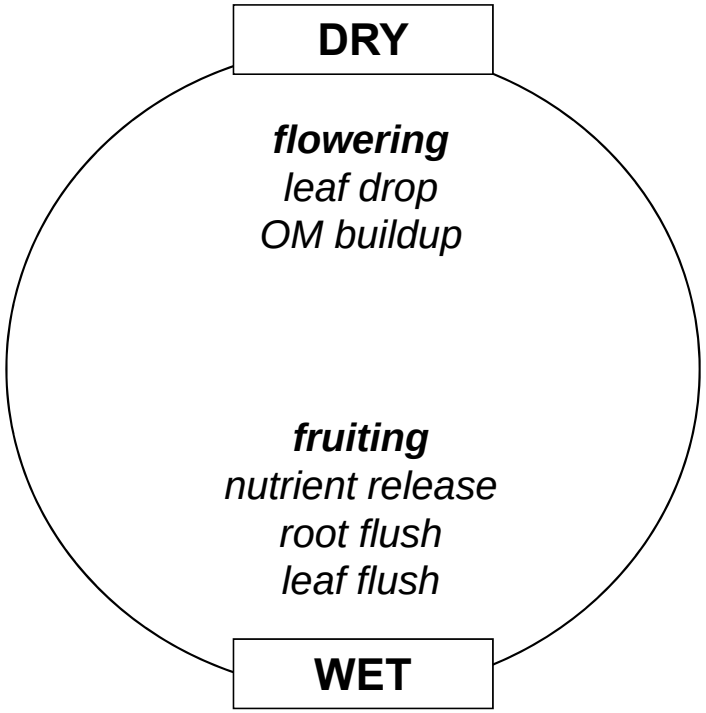
Photosynthetic bark

Ceiba trichistandra
(F. Malvaceae)
Ecuador

Alternate photosynthetic pathways:

CAM & C4 more efficient in hot, dry conditions

Seasonality Imposes Synchrony

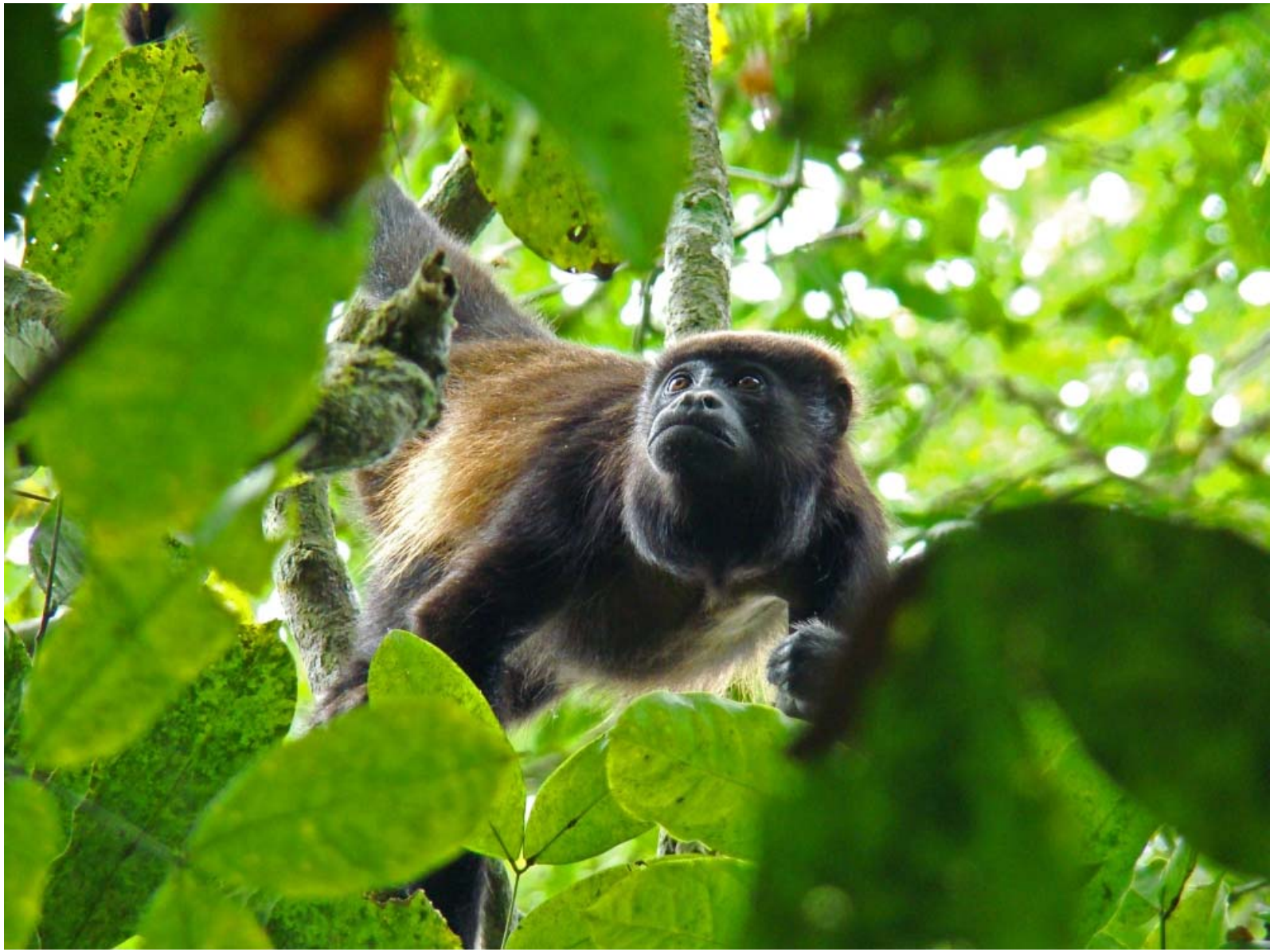


Showy flowers: DTF = 50-75%, WTF = 25%
Wind dispersal: DTF = >30%, WTF = <20%

Faunal Adaptations

Seek moist refugia

Altitudinal migration



Alouatta palliata

Mantled Howler Monkey

Diet shifts

Insectivores → Frugivores

Nectarivores → Insectivores

More reptiles than amphibians

Epipedobates machalilla

aestivation = “summer hibernation”

The most threatened tropical terrestrial ecosystem!

<2% Ecuador
<2% C. Am.
<8% S. Am.

why?