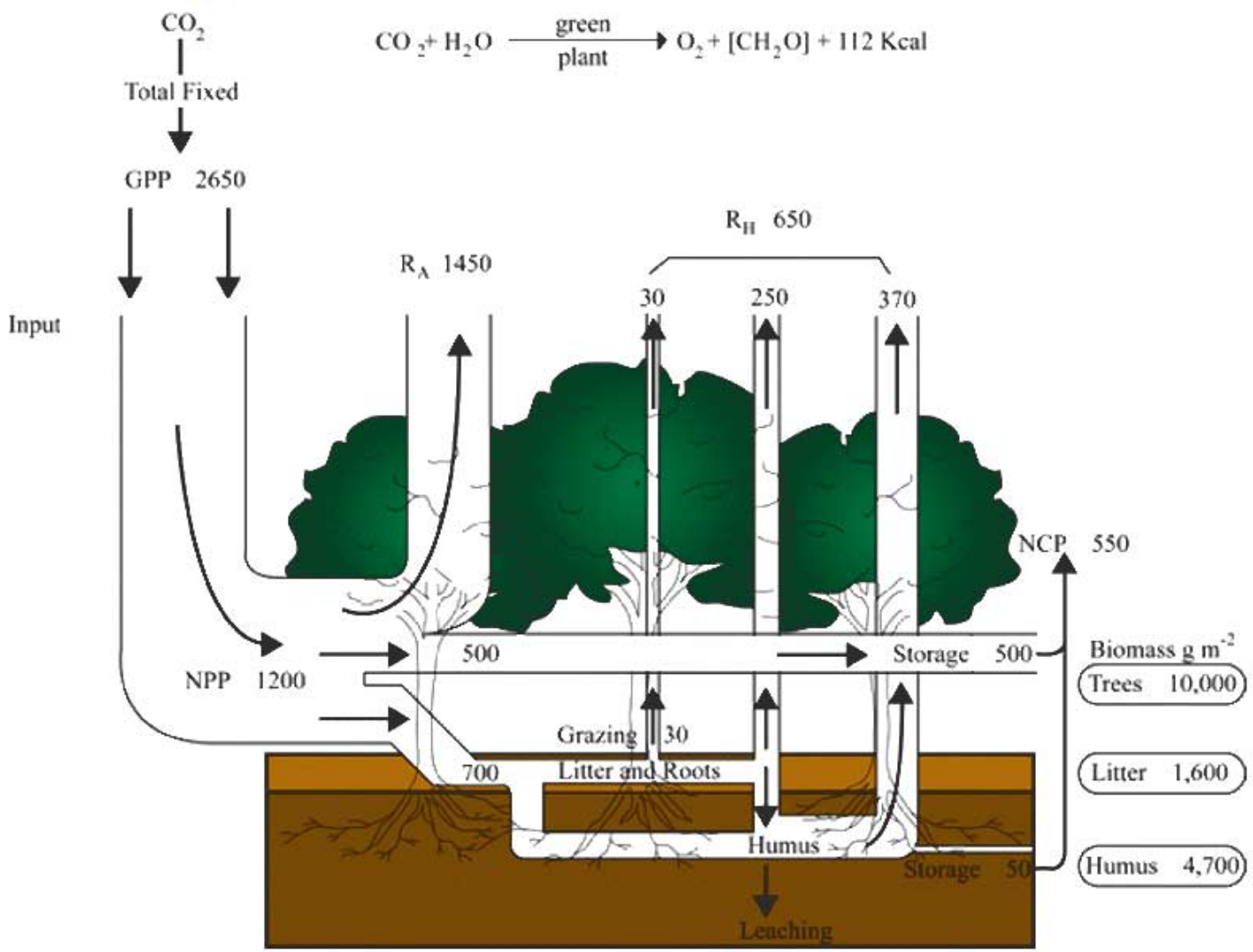
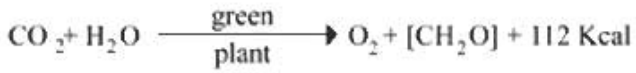




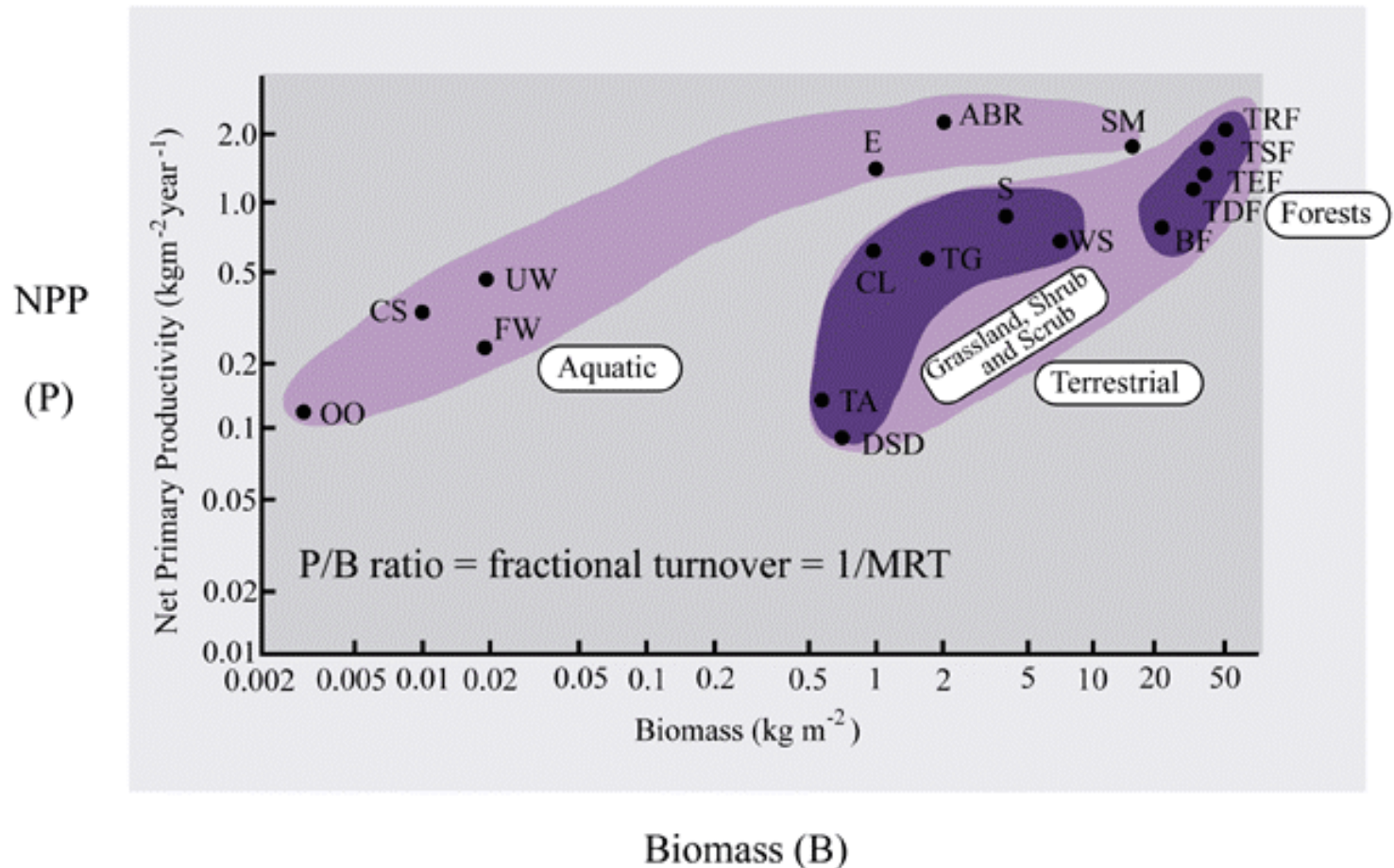
Productivity in a Forest Ecosystem

Units = g dry matter m⁻²yr⁻¹



Relationship Between NPP and Average Crop Standing Biomass

ABR	Algal Beds and Reefs	FW	Freshwater Lakes and Streams	TEF	Temperate Evergreen Forest
BF	Boreal Forest	OO	Open Ocean	TG	Temperate Grassland
CL	Cultivated Land	S	Savannah	TRF	Tropical Rainforest
CS	Continental Shelf	SM	Swamp and Marsh	TSF	Tropical Seasonal Forest
DSD	Desert and Semi-Desert	TA	Tundra and Alpine	UW	Upwelling Zone
E	Estuaries	TDF	Temperate Deciduous Forest	WS	Woodland and Scrubland



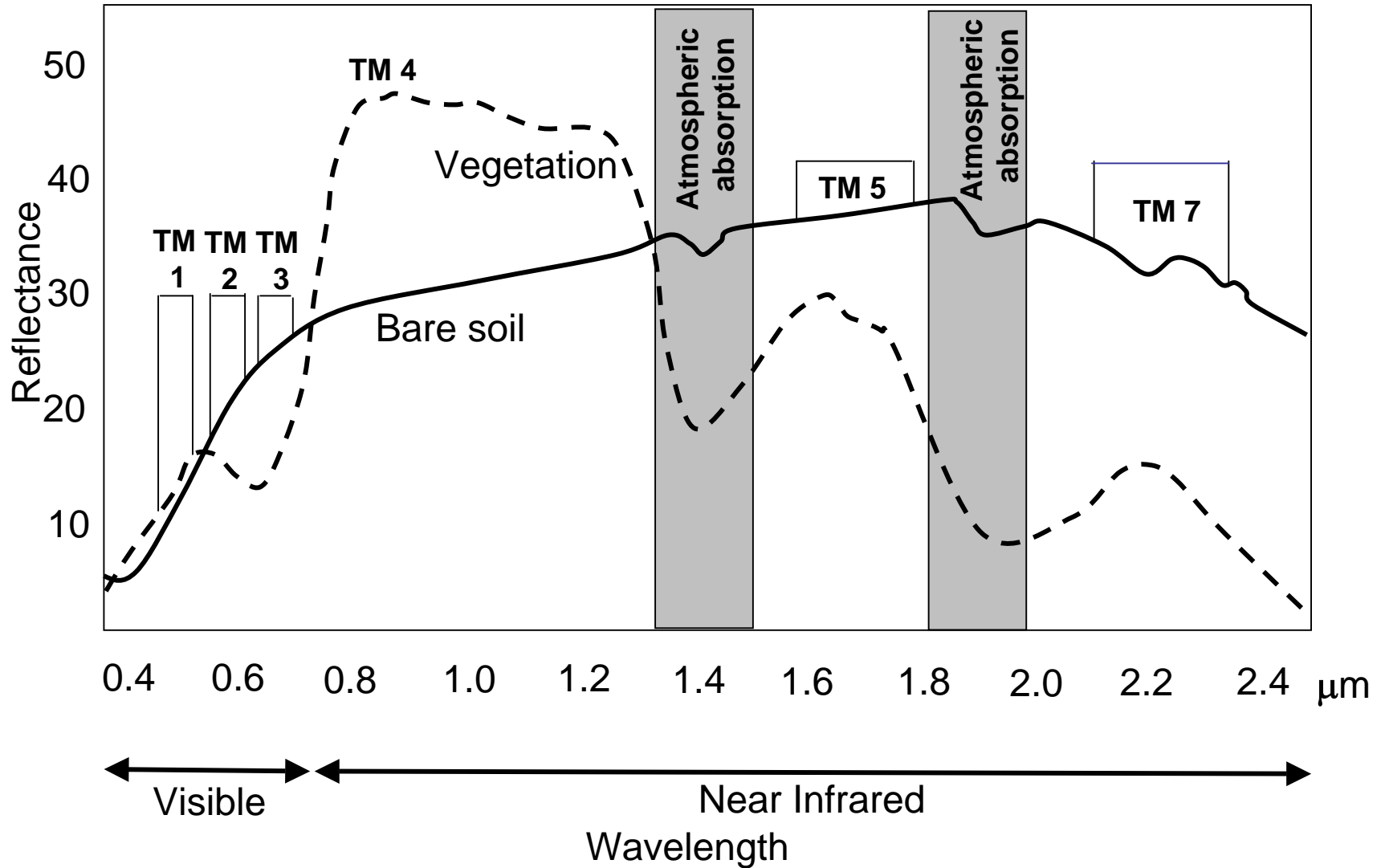
Comparison of Young and Mature Forests

	<u>Young</u>	<u>Mature</u>
Biomass (kg m^{-1})	9.7	58
NPP ($\text{g m}^{-2} \text{y}^{-1}$)	1060	1300
<u>% mass in</u>		
Wood	60	80
Leaves	10	1
Roots	30	19
Turnover time (y)	8.5	43.5
Tree age (y)	40–45	150–400
Respiration/GPP	0.80	1.00

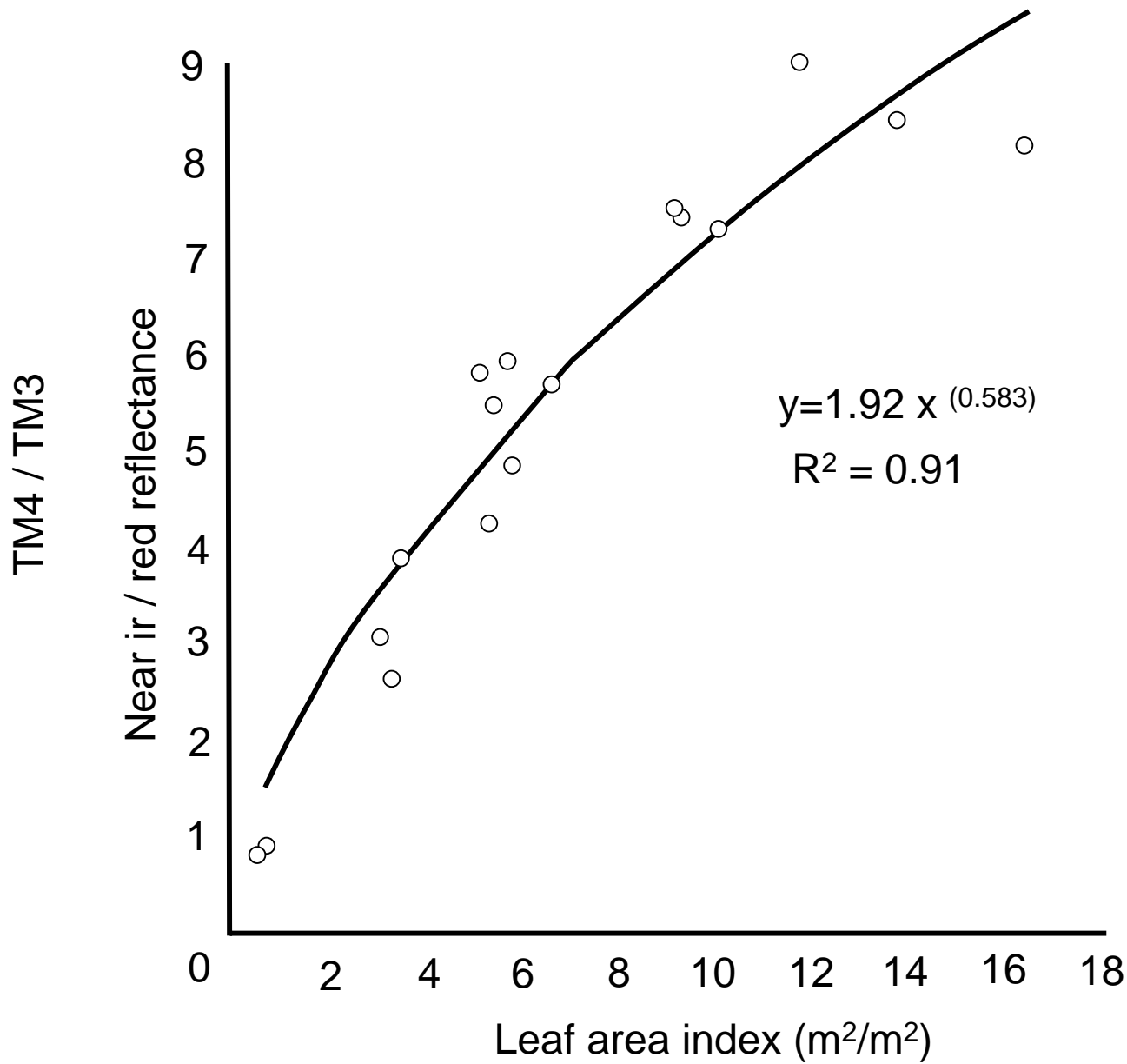
TABLE 23.1
NET PRIMARY PRODUCTION AND PLANT BIOMASS OF WORLD ECOSYSTEMS

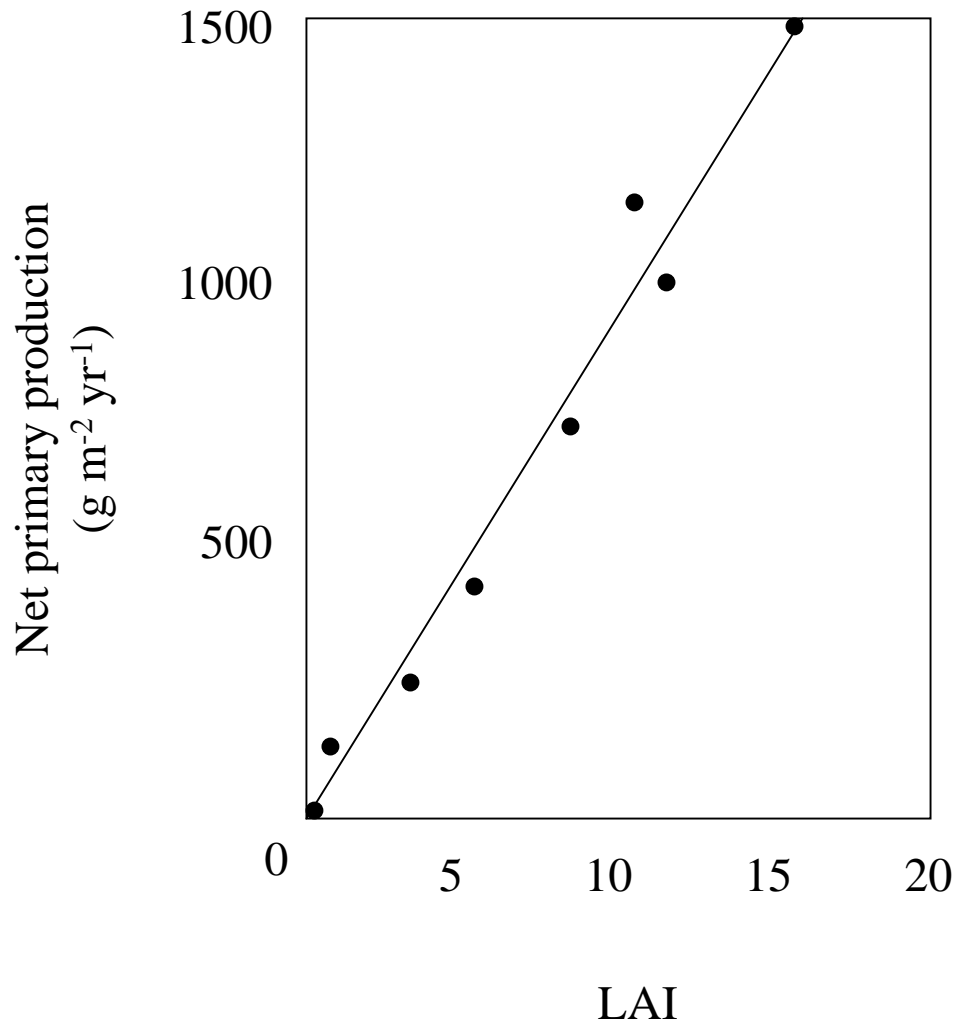
Ecosystems (in order of productivity)	Area (10 ⁶ km ²)	Mean net primary production per unit area (g/m ² /yr)	World net primary production (10 ⁹ mtn/yr)	Mean biomass per unit area (kg/m ²)
<i>Continental</i>				
Tropical rain forest	17.0	2000.0	34.00	44.00
Tropical seasonal forest	7.5	1500.0	11.30	36.00
Temperate evergreen forest	5.0	1300.0	6.40	36.00
Temperate deciduous forest	7.0	1200.0	8.40	30.00
Boreal forest	12.0	800.0	9.50	20.00
Savanna	15.0	700.0	10.40	4.00
Cultivated land	14.0	644.0	9.10	1.10
Woodland and shrubland	8.0	600.0	4.90	6.80
Temperate grassland	9.0	500.0	4.40	1.60
Tundra and alpine meadow	8.0	144.0	1.10	0.67
Desert shrub	18.0	71.0	1.30	0.67
Rock, ice, sand	24.0	3.3	0.09	0.02
Swamp and marsh	2.0	2500.0	4.90	15.00
Lake and stream	2.5	500.0	1.30	0.02
Total continental	149.0	720.0	107.09	12.30
<i>Marine</i>				
Algal beds and reefs	0.6	2000.0	1.10	2.00
Estuaries	1.4	1800.0	2.40	1.00
Upwelling zones	0.4	500.0	0.22	0.02
Continental shelf	26.6	360.0	9.60	0.01
Open ocean	332.0	127.0	42.00	0.003
Total marine	361.0	153.0	55.32	.01
World total	510.0	320.0	162.41	3.62

Source: Smith, 2001.



A portion of the solar spectrum showing the typical reflectance from soil (-----) and leaf (- - - -) surfaces and the portions of the spectrum that are measured by the LAND-SAT satellite.

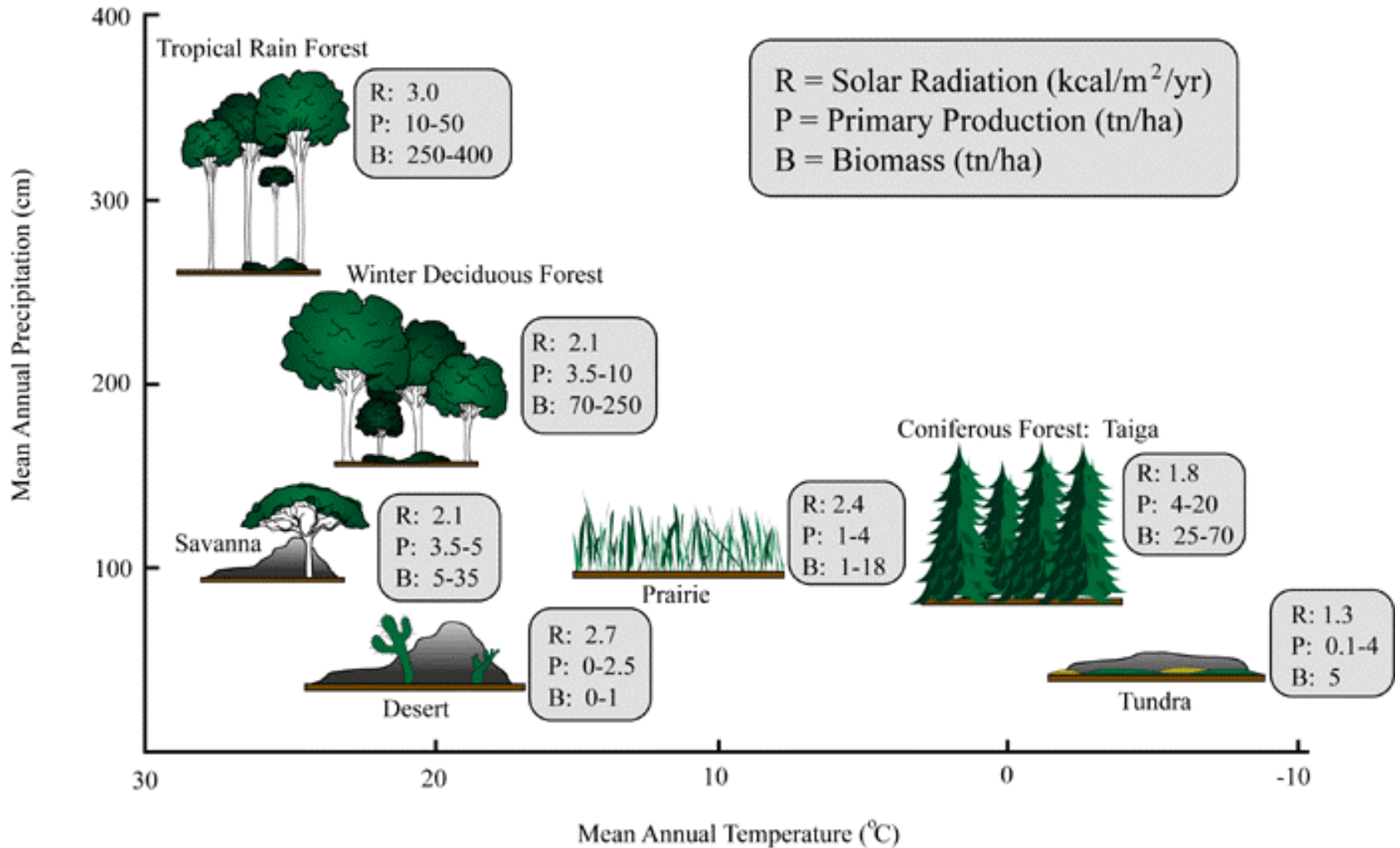


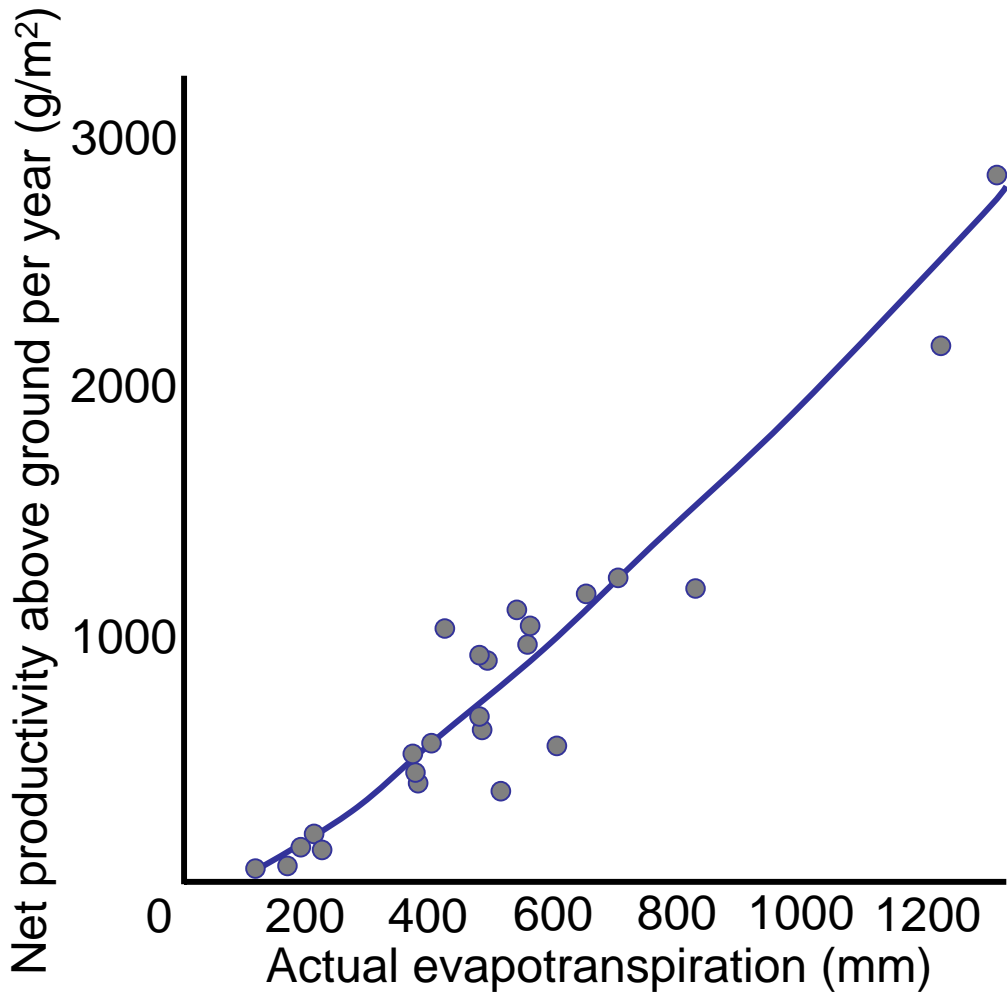


NPP is directly related to leaf-area index (LAI)
for forests in the northwestern United States

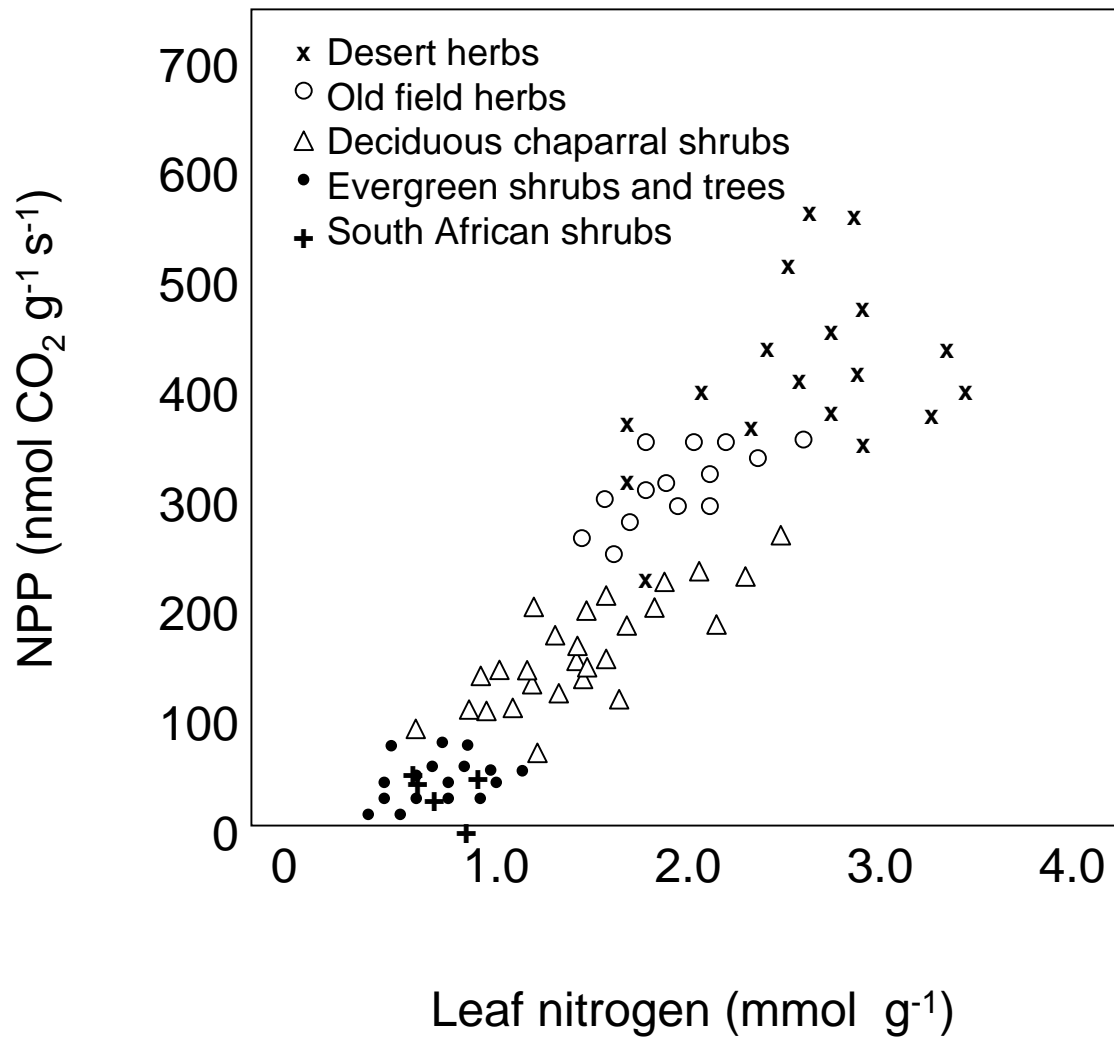
Distribution of Primary Production, Standing Biomass, and Radiation Input Relative to Rainfall and Temperature

How will global climate change influence these boundaries?





Adapted from Krebs



Terrestrial NPP Co-opted by Humans

<u>Source</u>	<u>NPP Co-opted (Pg)</u>
<u>Cultivated Land</u>	15.0
<u>Grazing Land</u>	
Converted Pastures	9.8
Consumed on natural grazing lands	0.8
Burned on Natural Grazing Lands	1.0
Subtotal	11.6
<u>Forest Land</u>	
Killed during harvest	1.3
Shifting Cultivation	6.1
Land Clearing	2.4
Forest plantation productivity	1.6
Forest harvests	2.2
Subtotal	13.6
<u>Human Occupied Areas</u>	0.4
Total Terrestrial NPP Co-opted	40.6
Total Terrestrial NPP	132.1
Percent Co-opted	30.7%