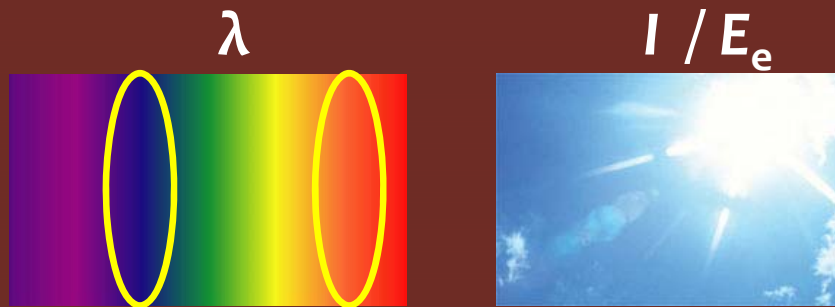


Ograničavajući čimbenici za fotosintezu

Svjetlo (fotokemijske reakcije)

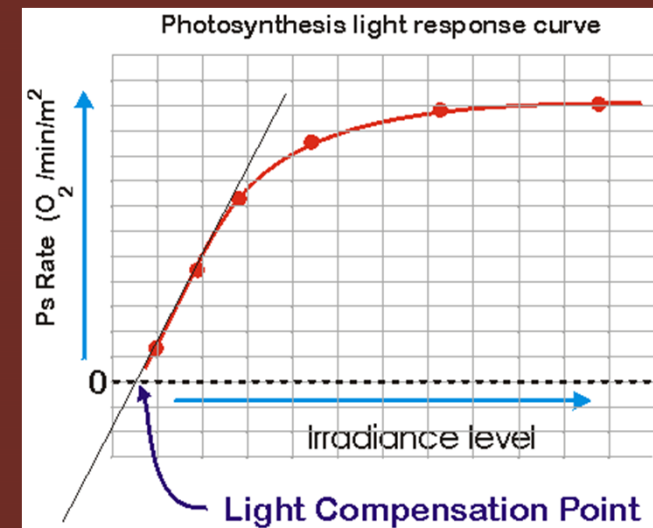


Svjetlosna kompenzacijska točka ($P = R$) pri $< 10 \text{ W m}^{-2}$

Točka zasićenja već pri $< 50 \text{ W m}^{-2}$

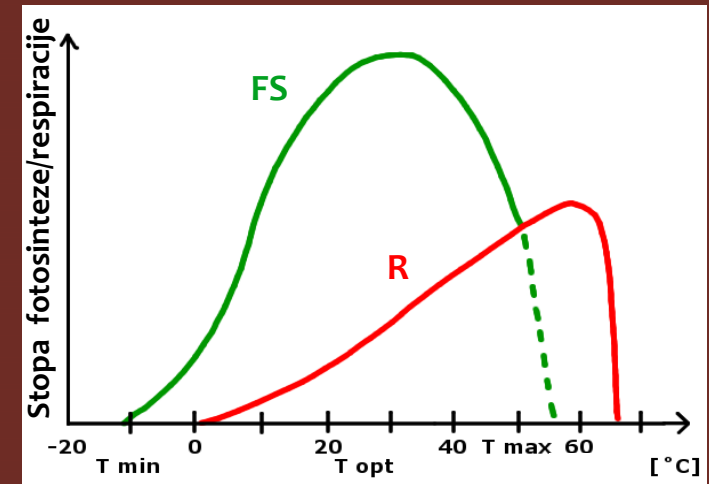
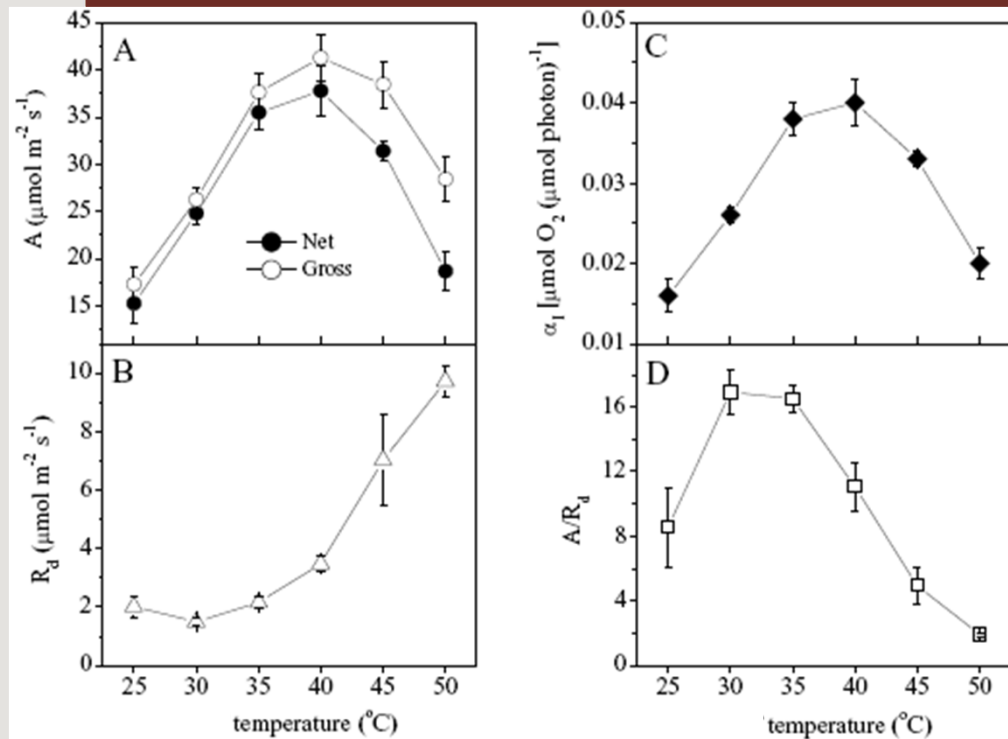
Pri točki zasićenja $PP \approx 8 \times R$

Srednja $PP \approx 6 \times R$



Ograničavajući čimbenici za fotosintezu

Temperatura (biosintetske reakcije, disanje)



Ograničavajući čimbenici za fotosintezu

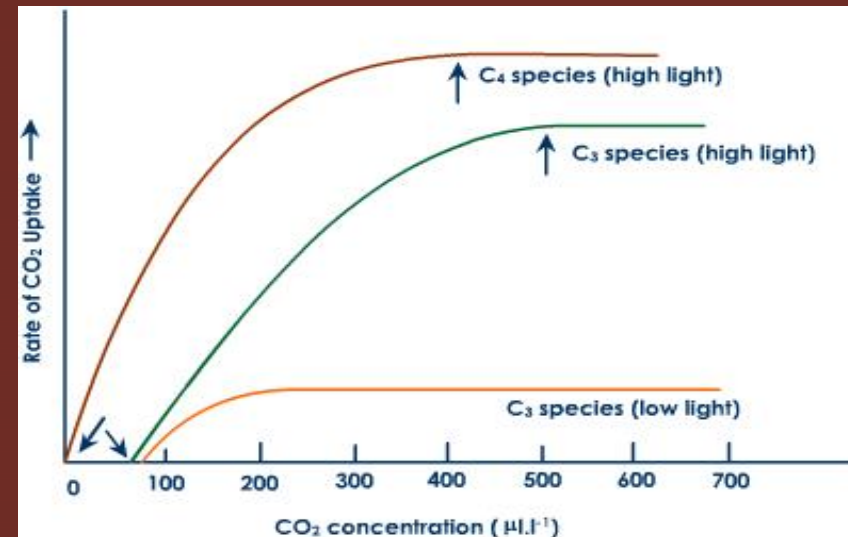
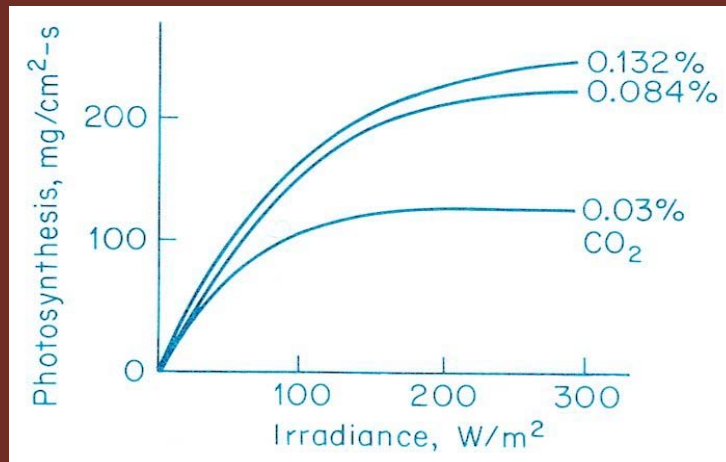
CO₂

kompenzacijske točke:

C₃: 50 ppm (0.005%);

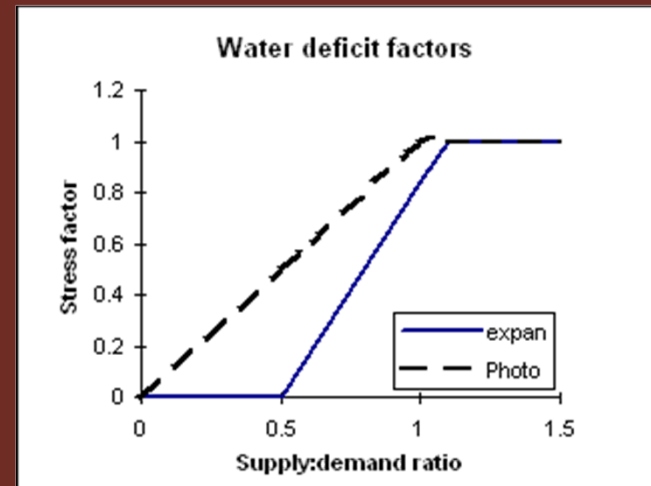
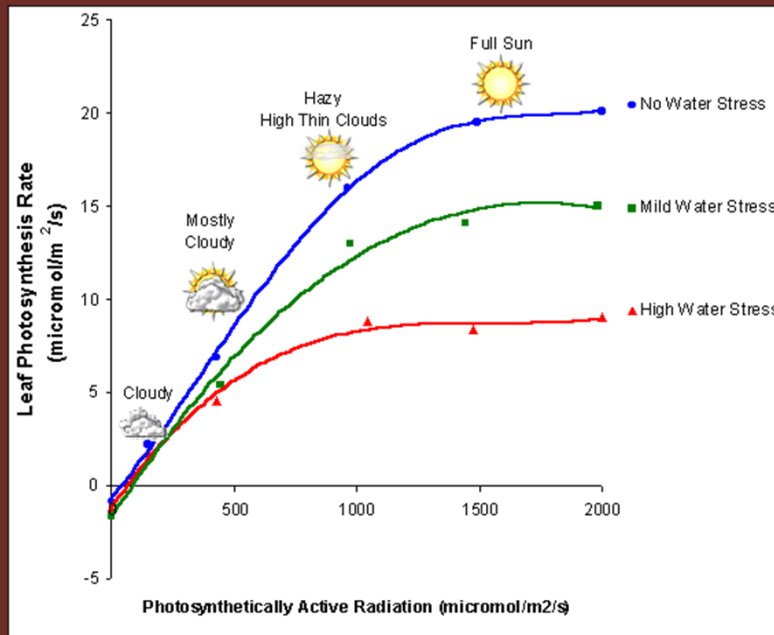
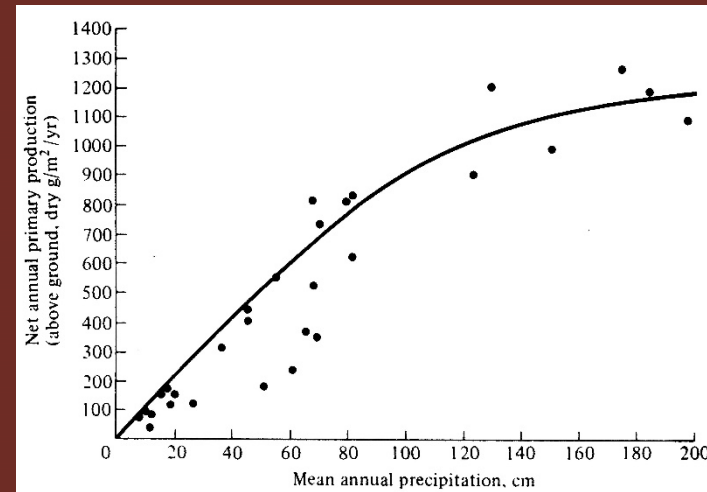
C₄: 0-5 ppm

pri 0.1% → 2×fotosinteza

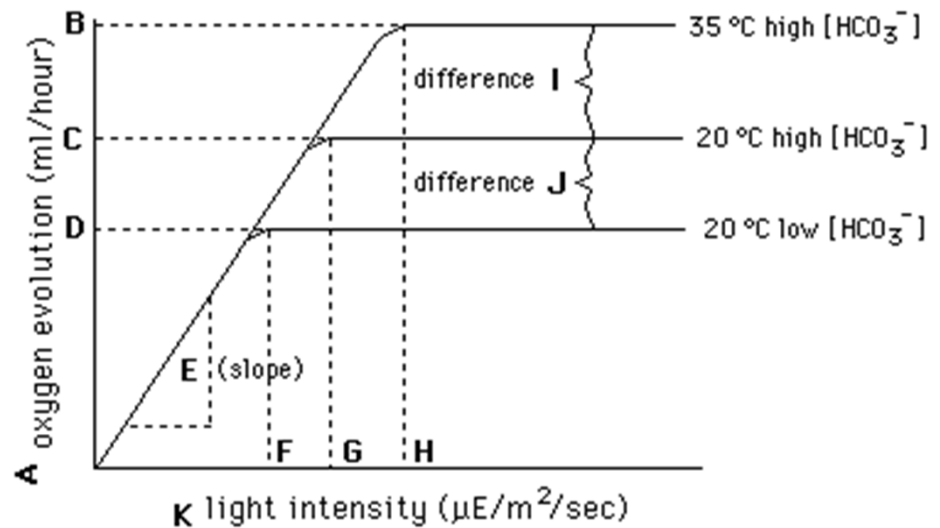
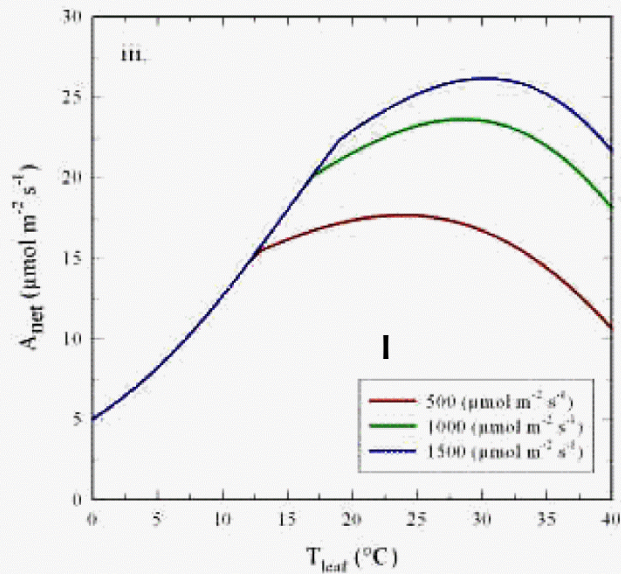
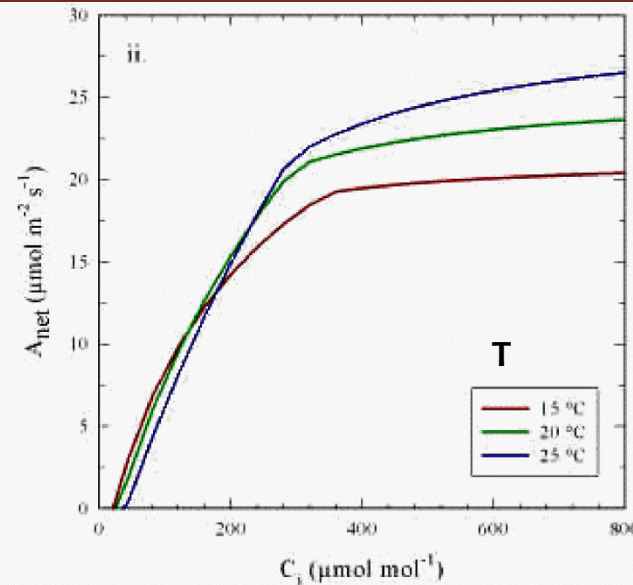
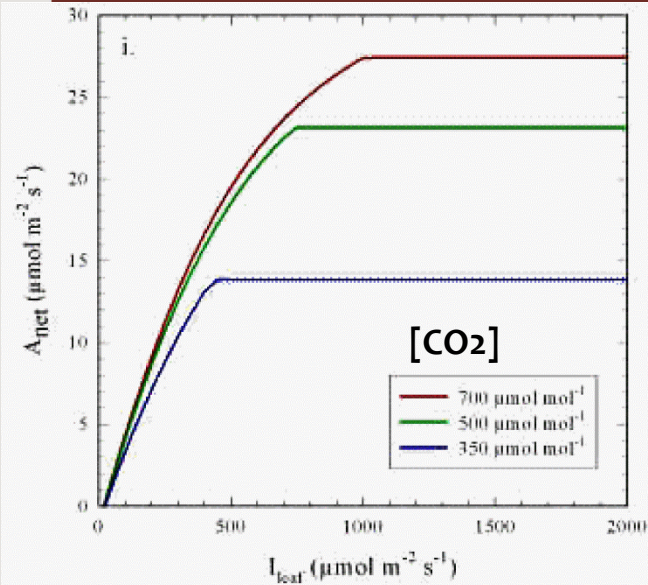


Ograničavajući čimbenici za fotosintezu

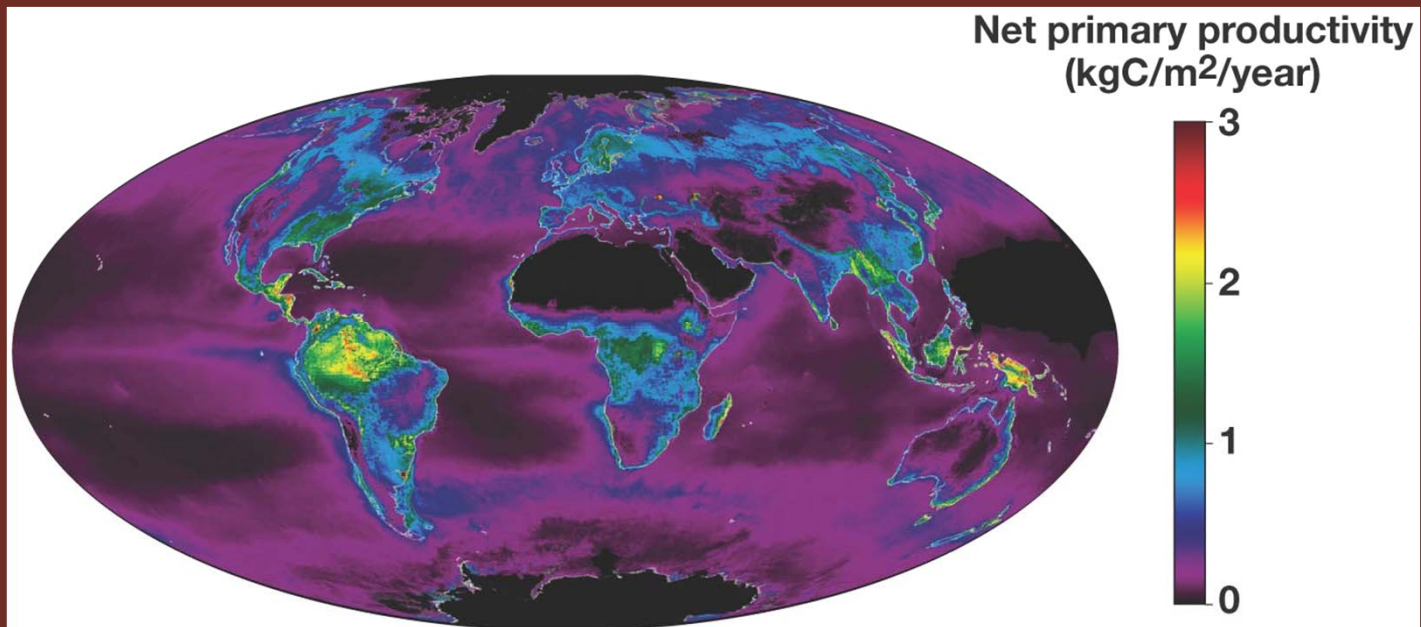
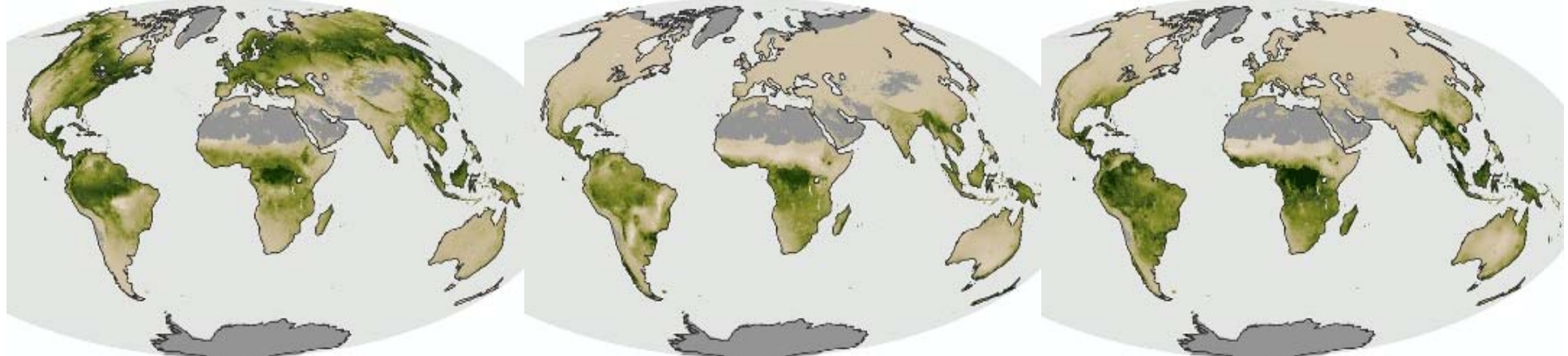
Voda fotofosforilacija



Sprega utjecaja EMZ, T i [CO₂] na stopu fotosinteze



Produktivnost ekosustava na Zemlji



Ukupna proizvodnja Zemlje

104.9 Gt C godišnje

56.4 Gt (53.8%) kopno

48.5 Gt (46.2%) oceani

Kopno - 426 g C / m² godišnje

Oceani - 140 g C / m² godišnje



Ukupna biomasa Zemlje

Biomasa (*eng. standing crop, standing stock*)

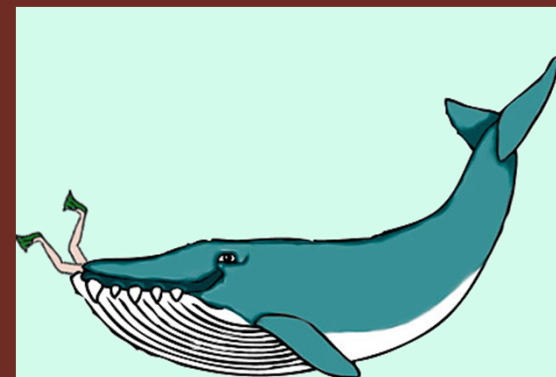
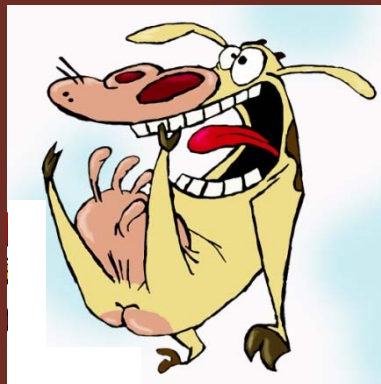
560 Gt C

Ljudi: 100 Mt ST = 350 Mt SB (svježa biomasa) = 66.7 Mt C

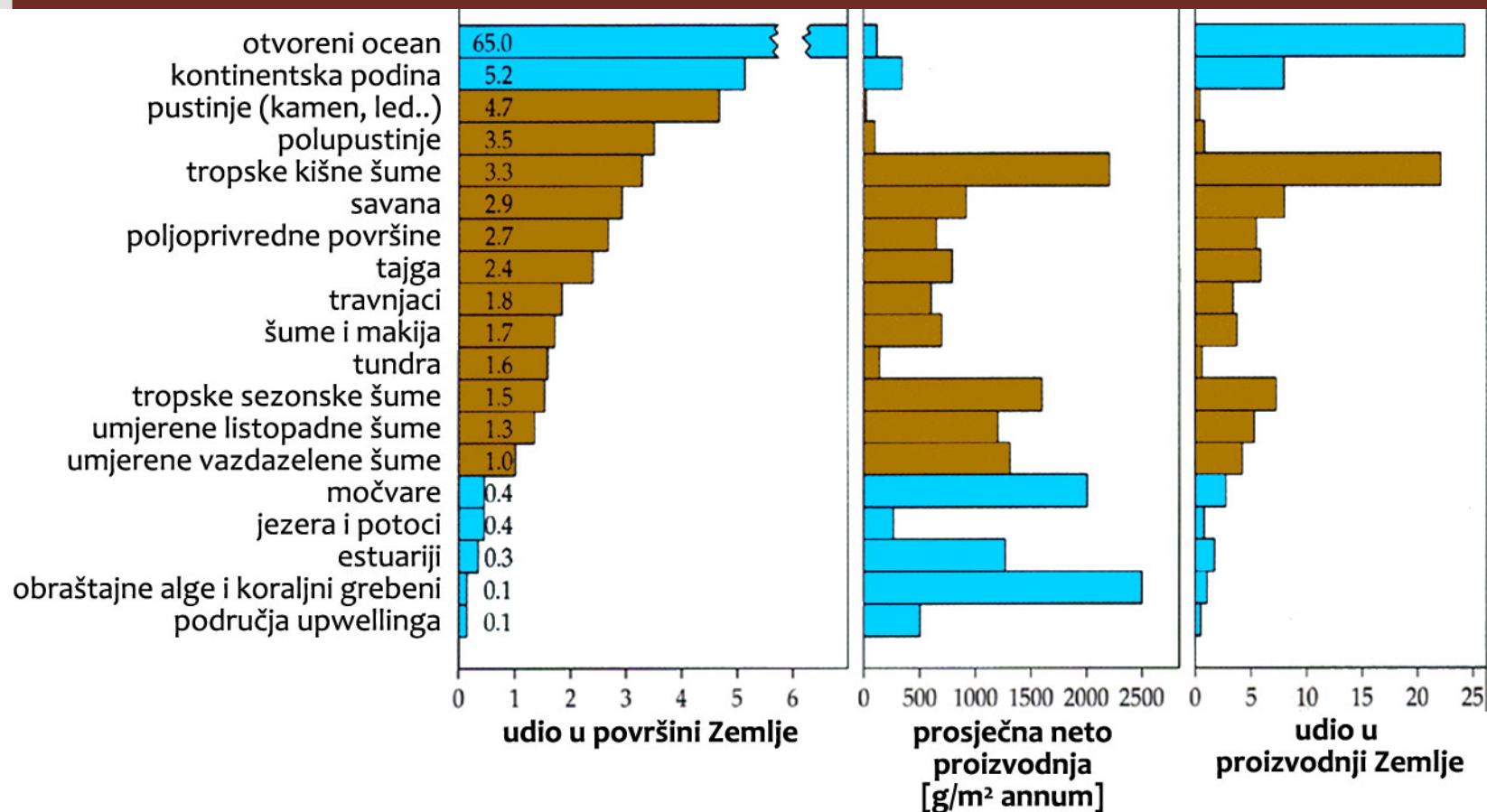
Goveda: 200 Mt ST = 650 Mt SB

Kril: 100 Mt ST = 380 Mt SB

Plavi kit: 0.5 Mt SB



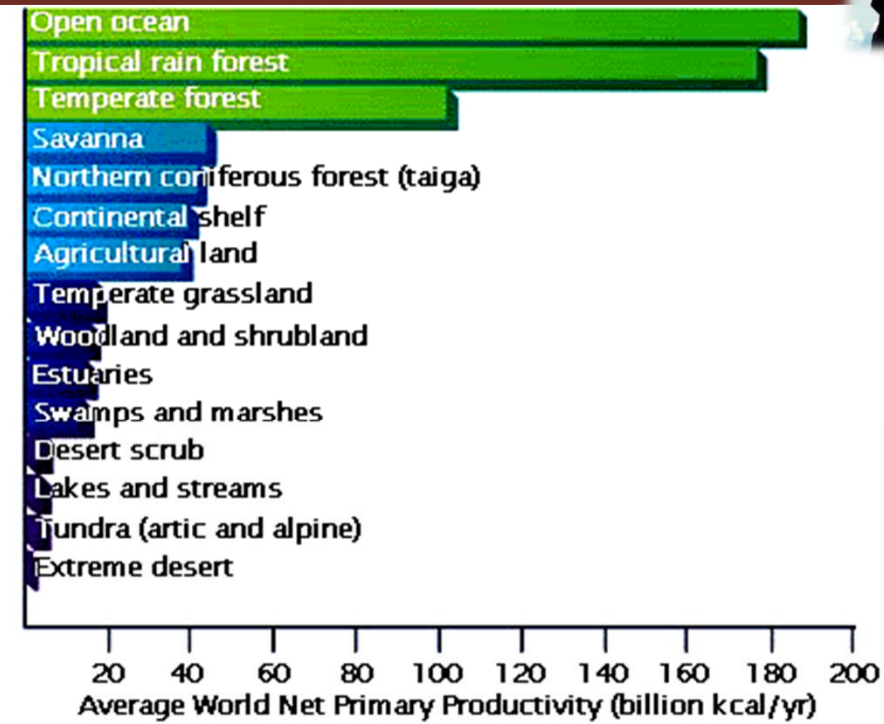
Proizvodnja bioma na Zemlji Prema (bio)masi



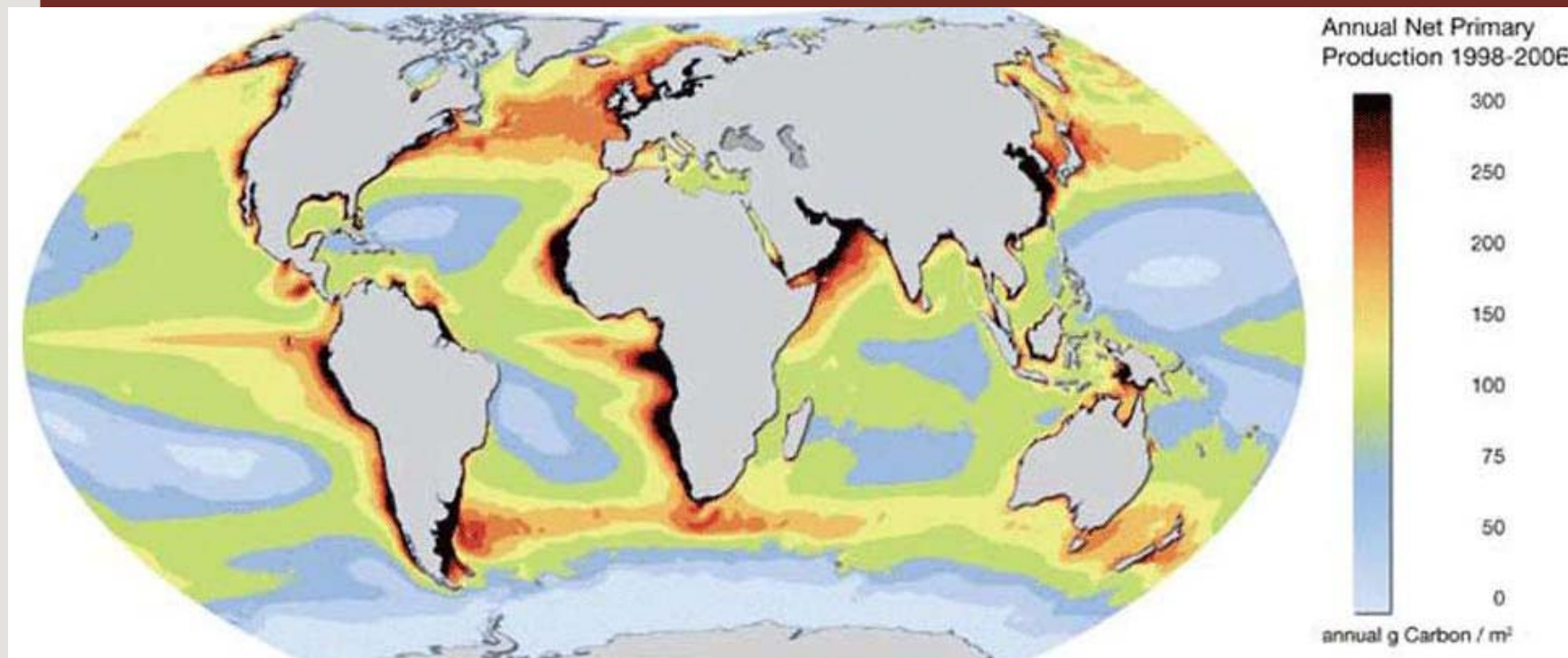
Proizvodnja bioma na Zemlji Prema energiji



Koja oceanska područja su produktivnija od drugih?



Proizvodnja oceanskih bioma na Zemlji



Koja oceanska područja su produktivnija od drugih?

3.89 Pg C / mj (siječanj 2003)

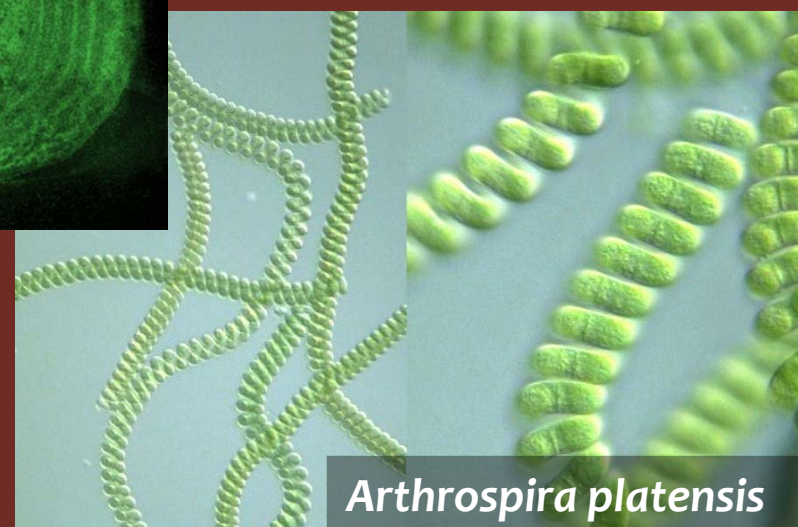
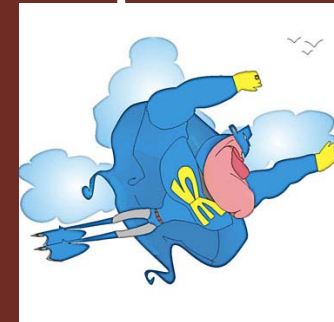
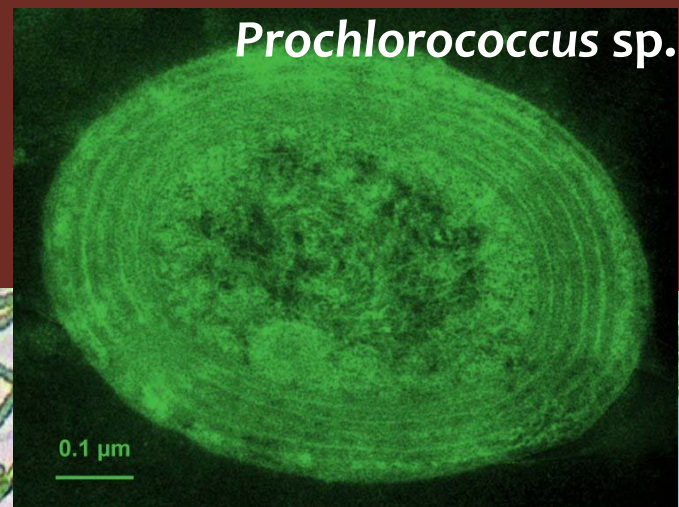
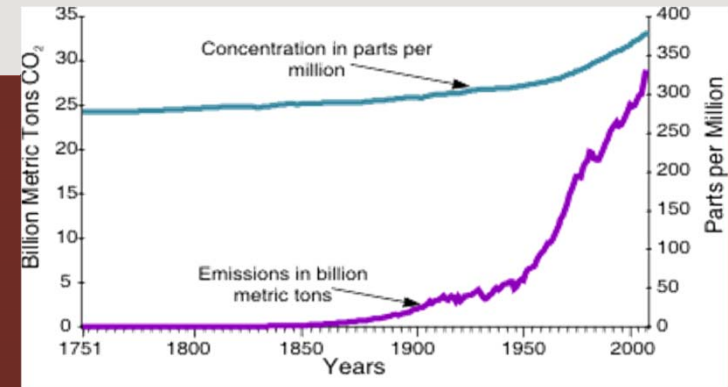
3.79 Pg C / mj (lipanj 2006)

	Površina (%)	PP (gC/m ² ×ann)	PP (%)
Upwelling	0.1	300	0.5
Priobalje	9.9	100	18.0
Otvoreni ocean	90.0	50	81.5

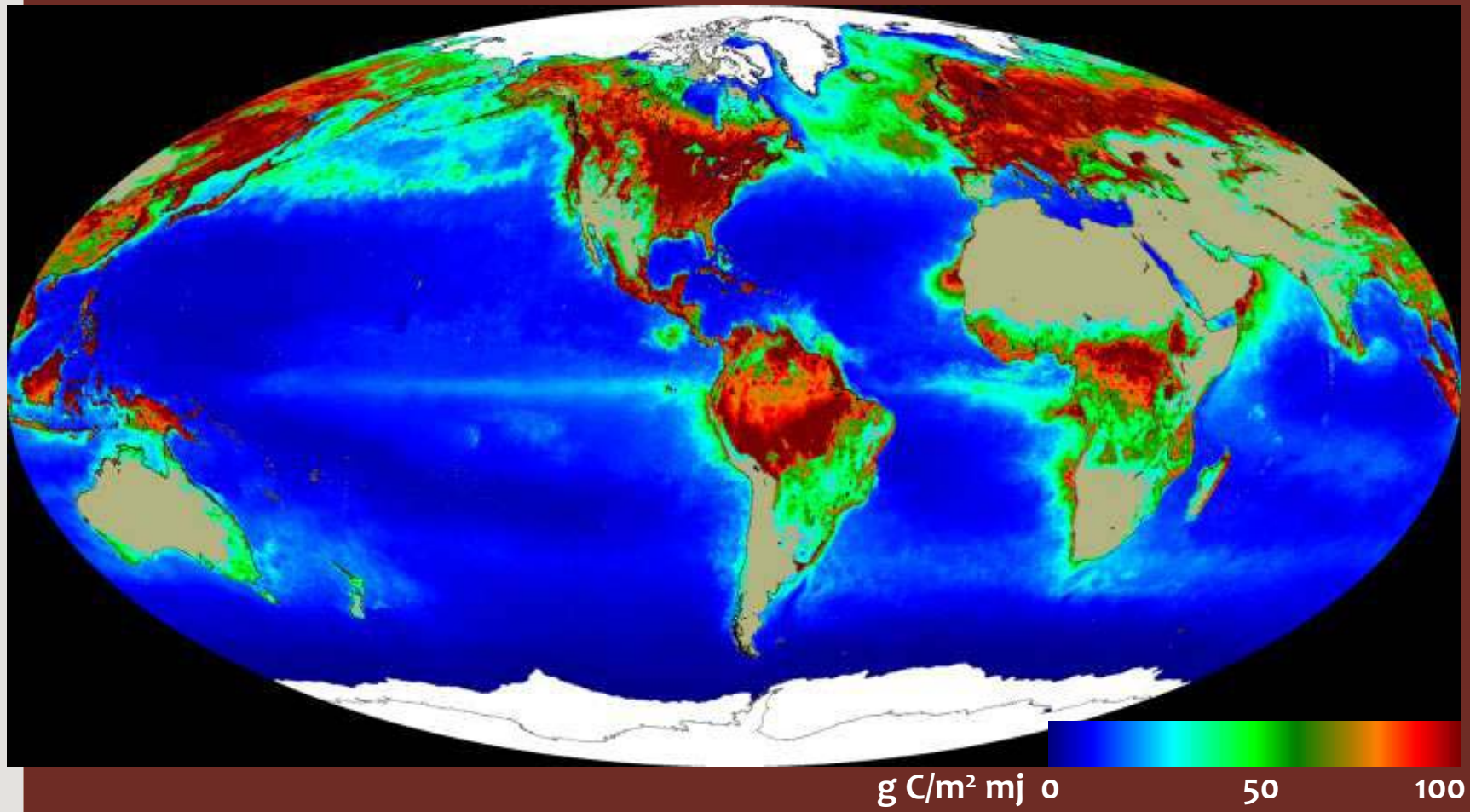
Modrozelenne alge

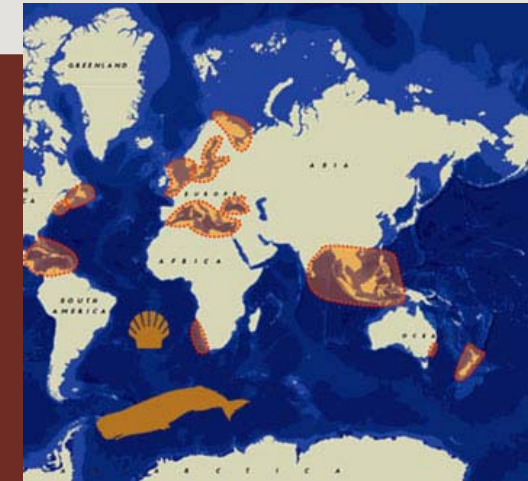
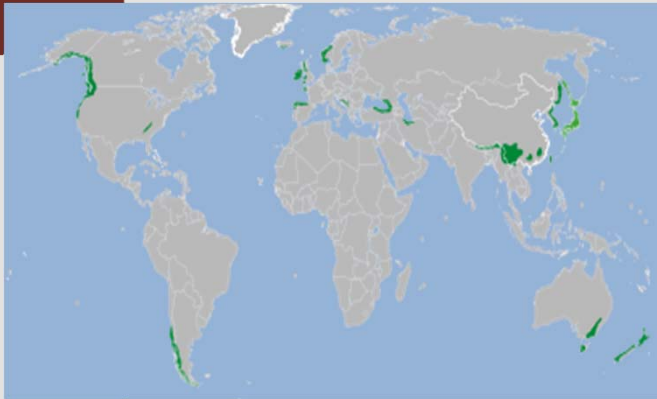
20–30% fotosintetske proizvodnja
25 Gt C godišnje

Biomasa vodenih proizvođača = 0.2% ukupne mase proizvođača

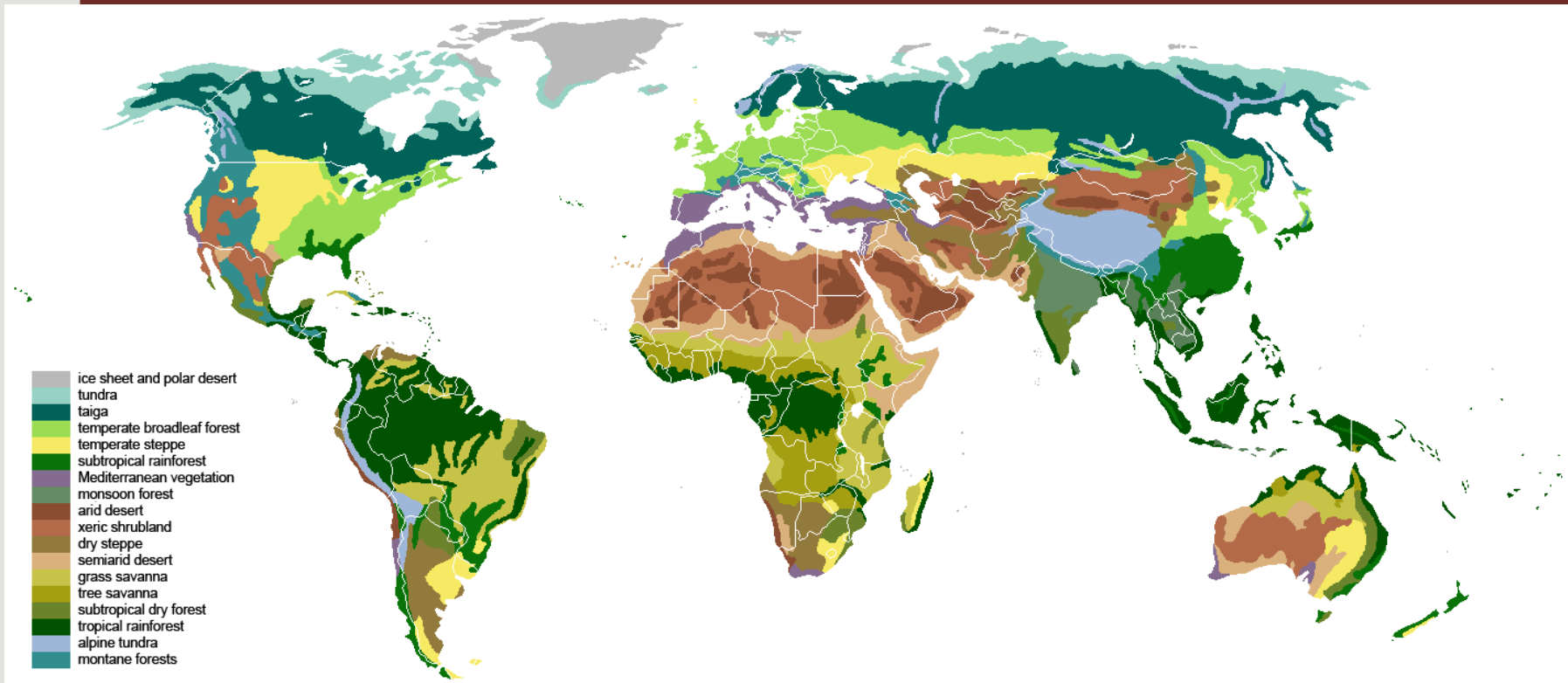


proizvodnja bioma na Zemlji





Raspored produktivnijih bioma



Ukupna proizvodnja Zemlje

Ukupna prosječna bruto proizvodnja 24.4 MJ/m²annum

Ukupna prosječna neto proizvodnja 20.7 MJ/m²annum

Najmanje produktivni biomi: 2 MJ/m²annum

Nisko produktivni biomi: 2-12 MJ/m²annum

Produktivni biomi: 12-42 MJ/m²annum

Najproduktivniji biomi: 42-100 MJ/m²annum

Obogaćena (poljoprivredna) područja: >100 MJ/m²annum

proizvodnja na Zemlji 1500-2250 TW

47300-71000 EJ godišnje

Unos 174 PW (174000 TW)

Ukupna učinkovitost produkcije Zemlje – 0.9-1.3%

Prosječna proizvodnja energije

	MJ/m ² ×annum
Šećerna trska, Hawaii	104.6
Tropska kišna šuma	62.8
Polje lucerne	62.8
Obalna močvara	50.2
Travnjak, Wisteria In.	28.5
Rižina polja, Japan	23.0
Bjelogorična šuma umjerenog pojasa	20.9
Kukuruz, SAD	18.8
Ocean (priobalje)	10.5
Visokoeutrofizirano jezero	10.0
Visoke trave (prerija)	8.4
Otvoreni ocean	3.3
Oligotrofno jezero	3.3
Pustinja	2.1

Posebne odrednice produktivnosti sustava

Rezidentno vrijeme = Biomasa / NPP

(eng. Resident time)

(vrijeme prolaza, vrijeme nakupljanja)

jedinica vremena

Obrtna stopa biomase = NPP / Biomasa

(eng. Turnover rate)

jedinica vremena⁻¹

Prosječna proizvodnja, biomasa, koncentracija klorofila i vrijeme nakupljanja

	NP (g/m ² ×ann)	B (kg/m ²)	Chl a (g/m ²)	RV (ann)
Močvare	2500	15	3	6
Algalni obraštaj i koraljni grebeni	2000	2	2	1
Tropska šuma	1800	42	2.8	23.3
Estuariji	1800	1	1	0.56
Šume umjerenog pojasa	1250	32	2.6	25.6
Sjeverne (borealne) šume	800	20	3	25
Savana	700	4	1.5	5.71
Poljoprivredne površine	650	1	1.5	1.54
Travnjaci (umjereni pojas)	500	1.5	1.3	3
Upwelling	500	0.02	0.3	0.04
Jezera i potoci/rijeke	500	0.02	0.2	0.04
Kontinentska podina	360	0.01	0.2	0.03
Tundra	140	0.6	0.5	4.29
Otvoreni ocean	125	0	0.03	0.02
Pustinjska vegetacija	70	0.7	0.5	10

Standardi pretvorbe

1	g C	=	41.84	KJ
1	g ST	=	18.828	KJ
1	g O ₂	=	15.69	KJ
1	g O ₂	=	0.375	g C