Detritusni put energije

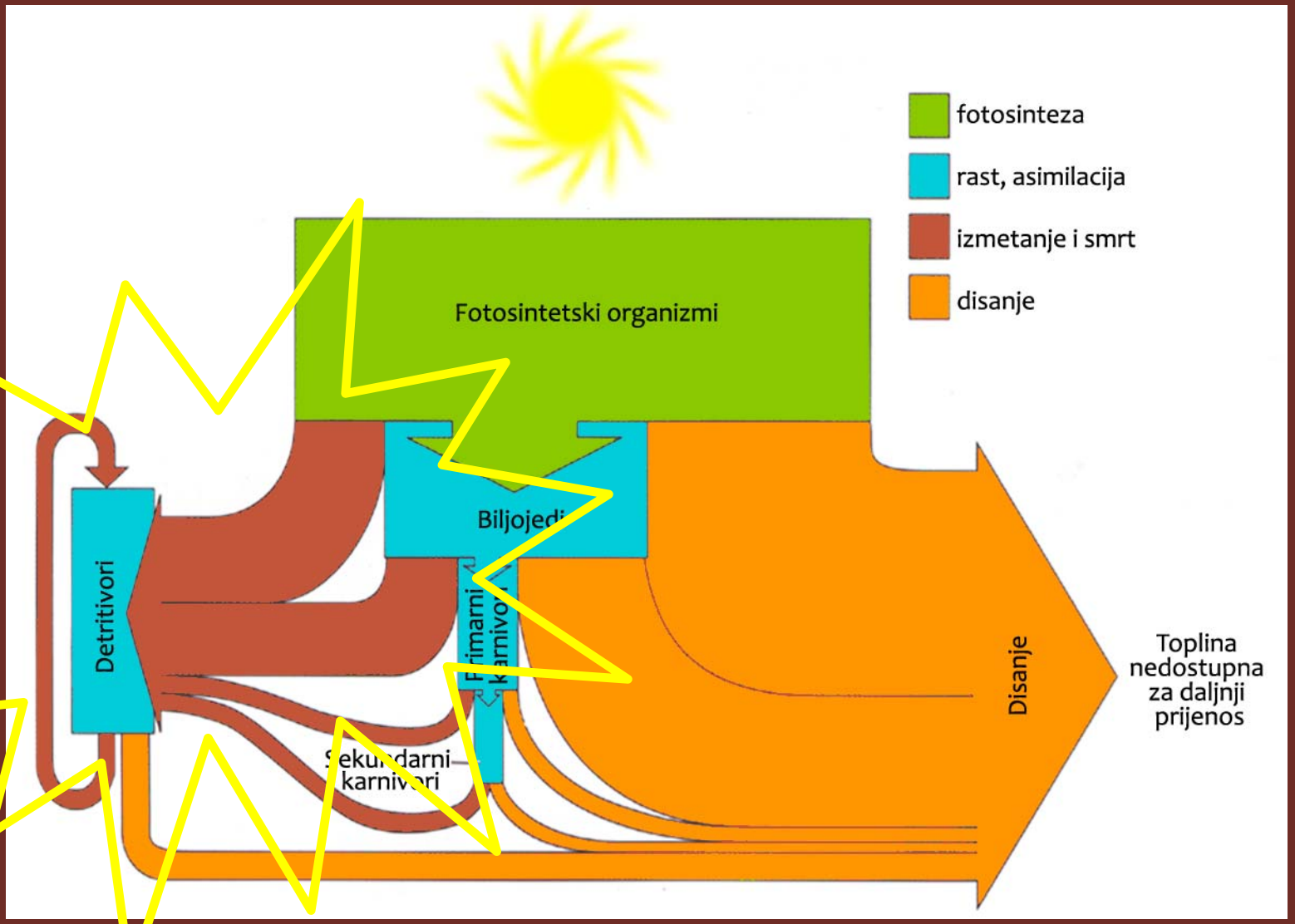
Detritus

1963. Odum & De la Cruz:
Usitnjena organska tvar uključena u procese razgradnje (mrtvih organizama)

1991. Velimirov
Detritus je nepredatorski i predatorima izazvan gubitak organske tvari iz bilo koje trofičke razine ili unesena organska tvar iz izvora koji se nalaze izvan promatranog ekosustava (bez obzira na veličinu).

Detritus je sva tvar koja se može razlikovati od žive organske i anorganske tvari.

Model protoka energije kroz ekosustav



≈ 10^{11} t / godina

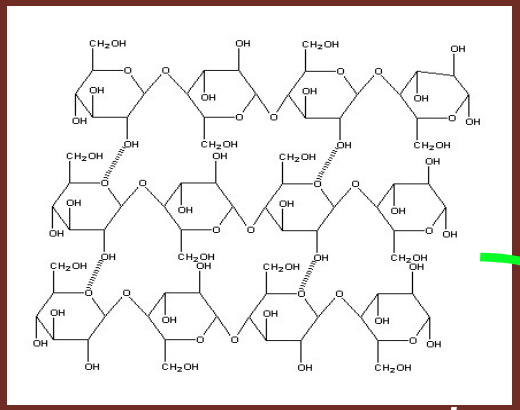
Ciklus alohtone organske tvari

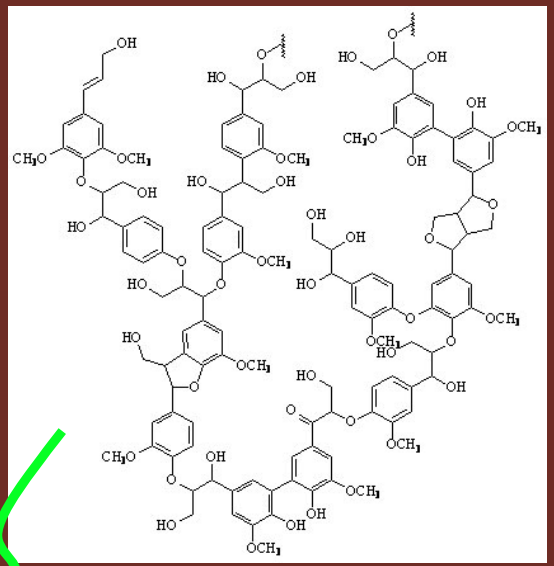
Biljke prije odbacivanja lišća resorbiraju
šećere, amino i masne ~kiseline

↓

Listinac je nutritivno siromašan

24-48h LEACHING – ispiranje
organski, N i P spojevi, K, Na…
gubitak i preko 50% tvari

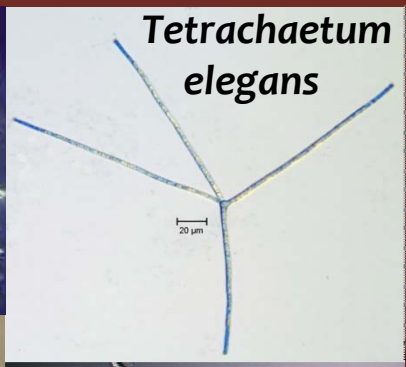


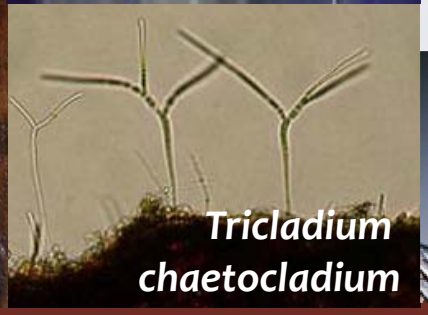


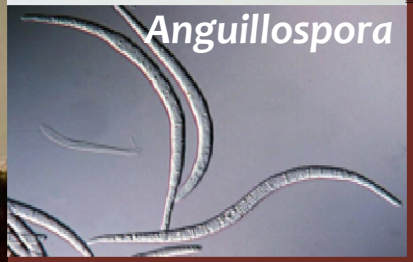
2/3 nefosilnog C

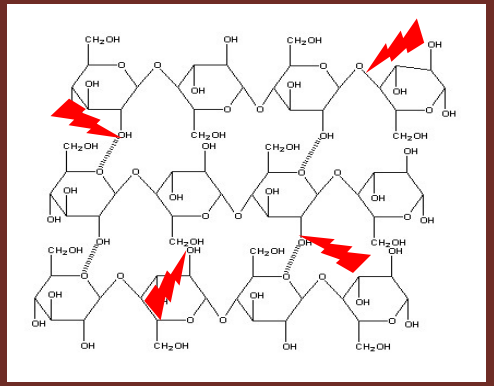
Ciklus alohtone organske tvari

Mikrobno kondicioniranje (bakterije i gljive)
(hyphomycetae: nespolni stadiji Ascomycota i Basidiomycota)



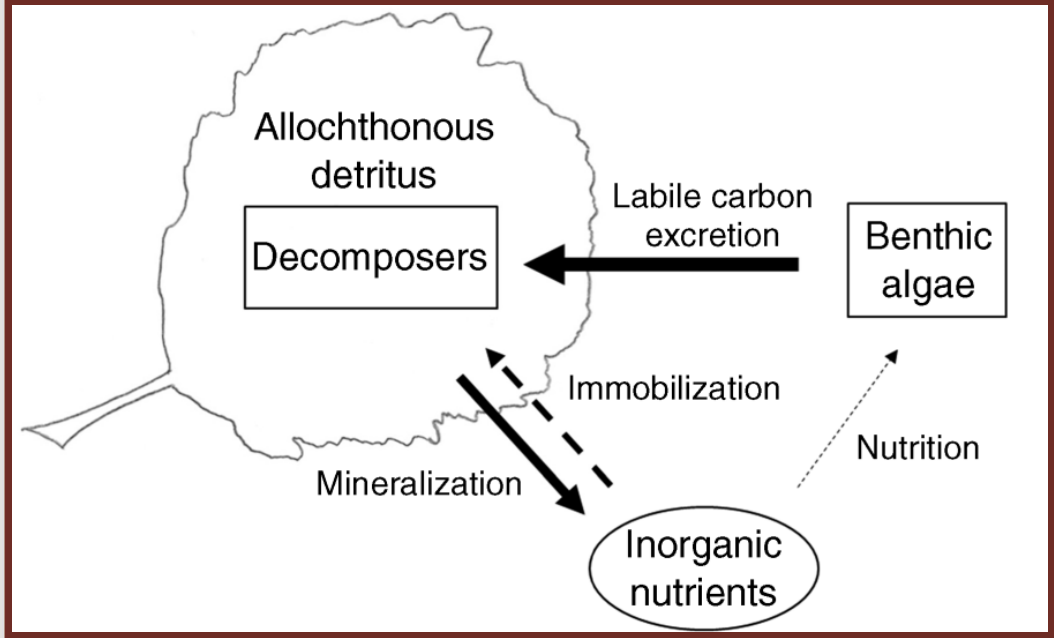


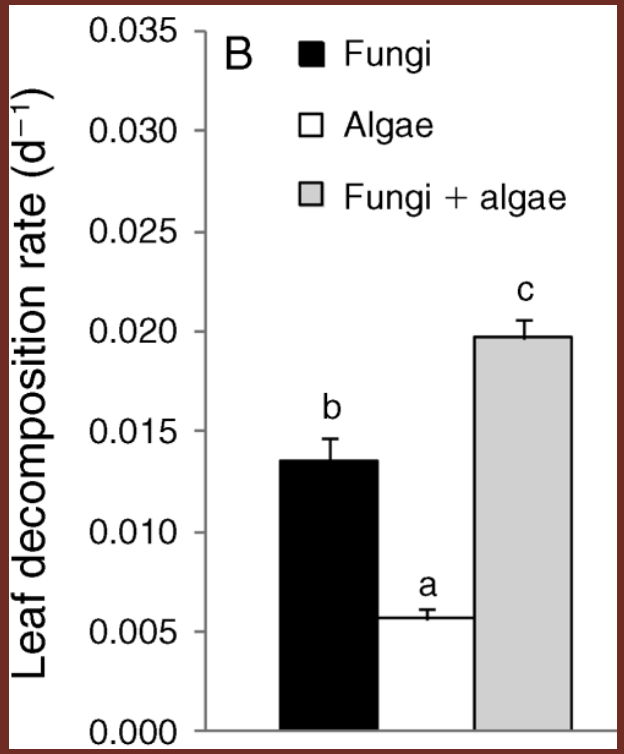




Ciklus alohtone organske tvari

Priming effect - Metabolizam alga pogoduje rastu gljiva i aktivnosti enzima → razgradnji listinca





Ciklus alohtone organske tvari

Naseljavanje makrobeskralježnjaka usitnjivača

Izmet i neingestirani fragmenti ‘ogrisci’ (*eng.* orts)

Ciklus alohtone organske tvari

Fizičko usitnjavanje- struja vode, abrazija česticama u suspenziji (simultano sa svim prethodnim fazama razgradnje)

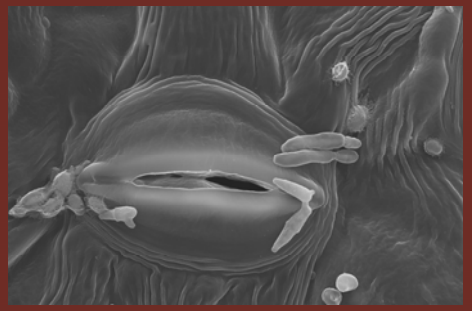
Stopa razgradnje određena je:

Sastavom i strukturom biljnih ostataka

- **količina potpornog tkiva (zeljaste : drvenaste : vodene biljke);**
- **početna koncentracija nutrijenata;**
- **kemijski inhibitori (vosak, tanini);**
- **puči**

Okolišnim čimbenicima

- **T (primarni utjecaj na mikrobne procese)**
- **nutrijenti**
- **pH**
- **hidrologija**



Aktivnošću konzumenata

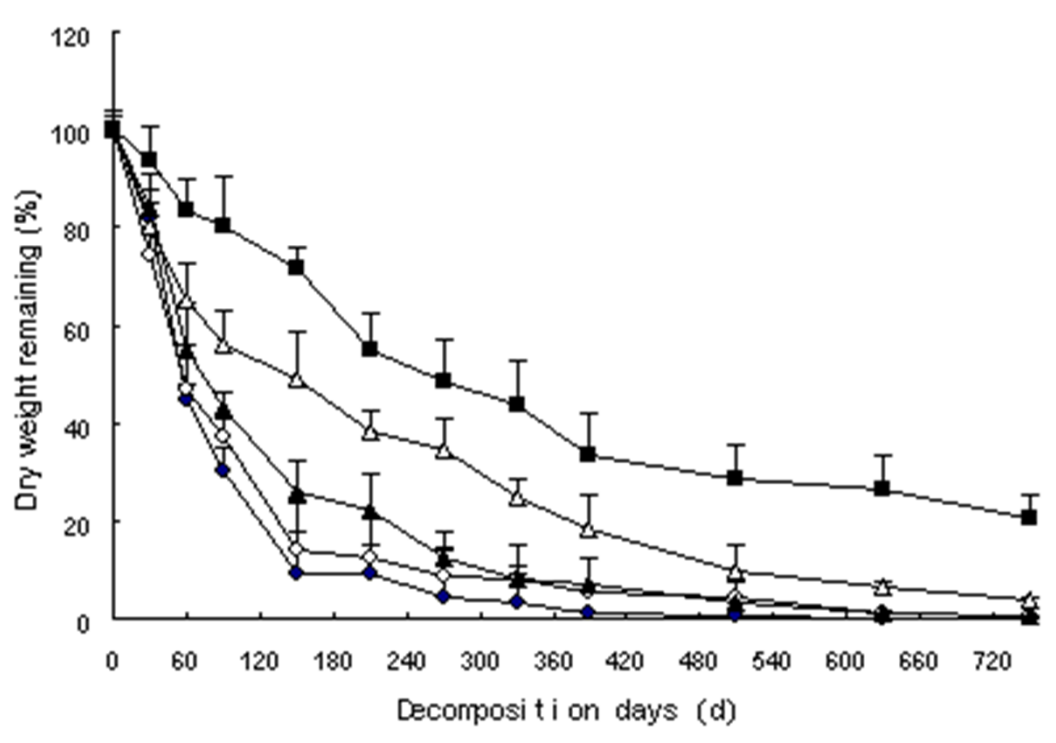
Razgradnja listinca

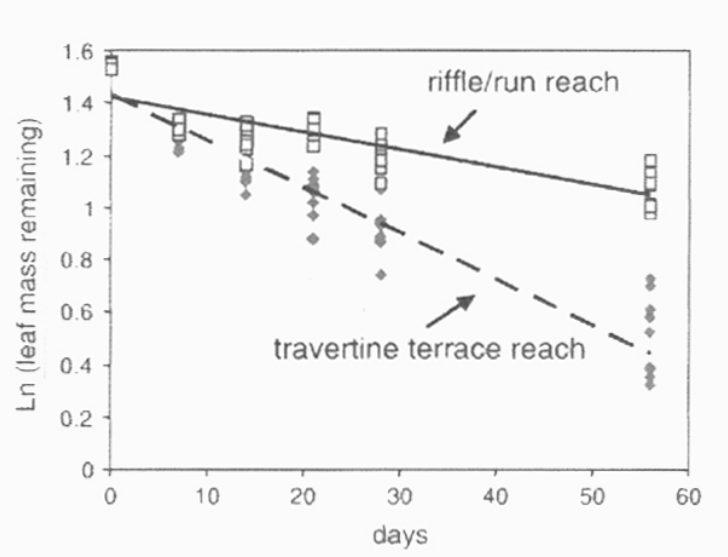
Integrativni proces na razini ekosustava

Povezuje biljne vrste, mikrobnu zajednicu
beskralježnjake i fizikalno kemijske parametre okoliša.

Može se koristiti za procjenu stanja

Model razgradnje listinca

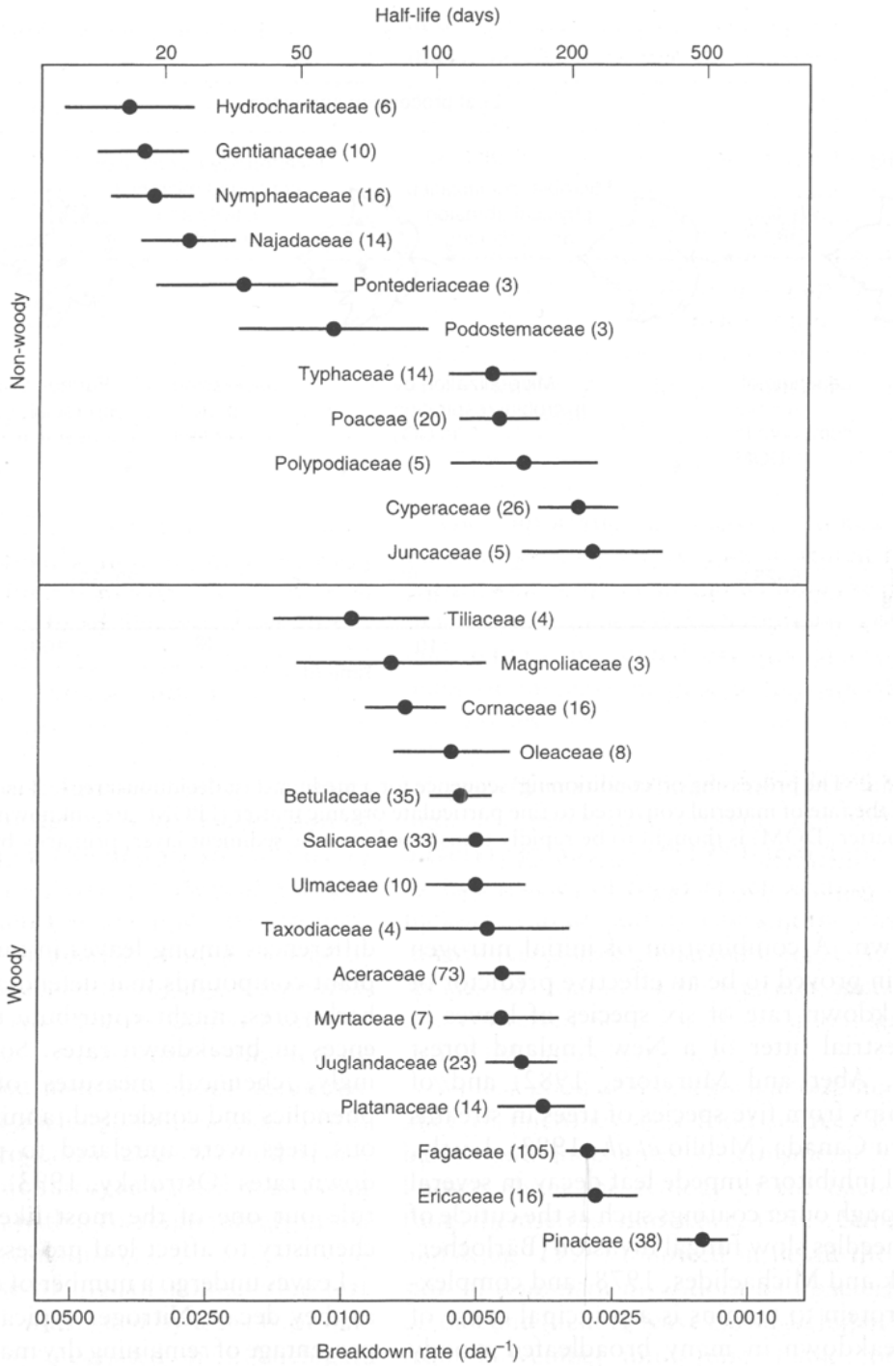




$$m_t = m_i e^{-kt}$$

m_t=masa listinca nakon t dana
m_i=početna (inicijalna) masa
t=vrijeme ekspozicije u danima
k=koeficijent razgradnje (dan $^{-1}$)

Stope razgradnje listinca *processing continuum* (k): Sporo (< 0.005), Umjereno (0.005-0.010) i Brzo (> 0.010) raspadajući



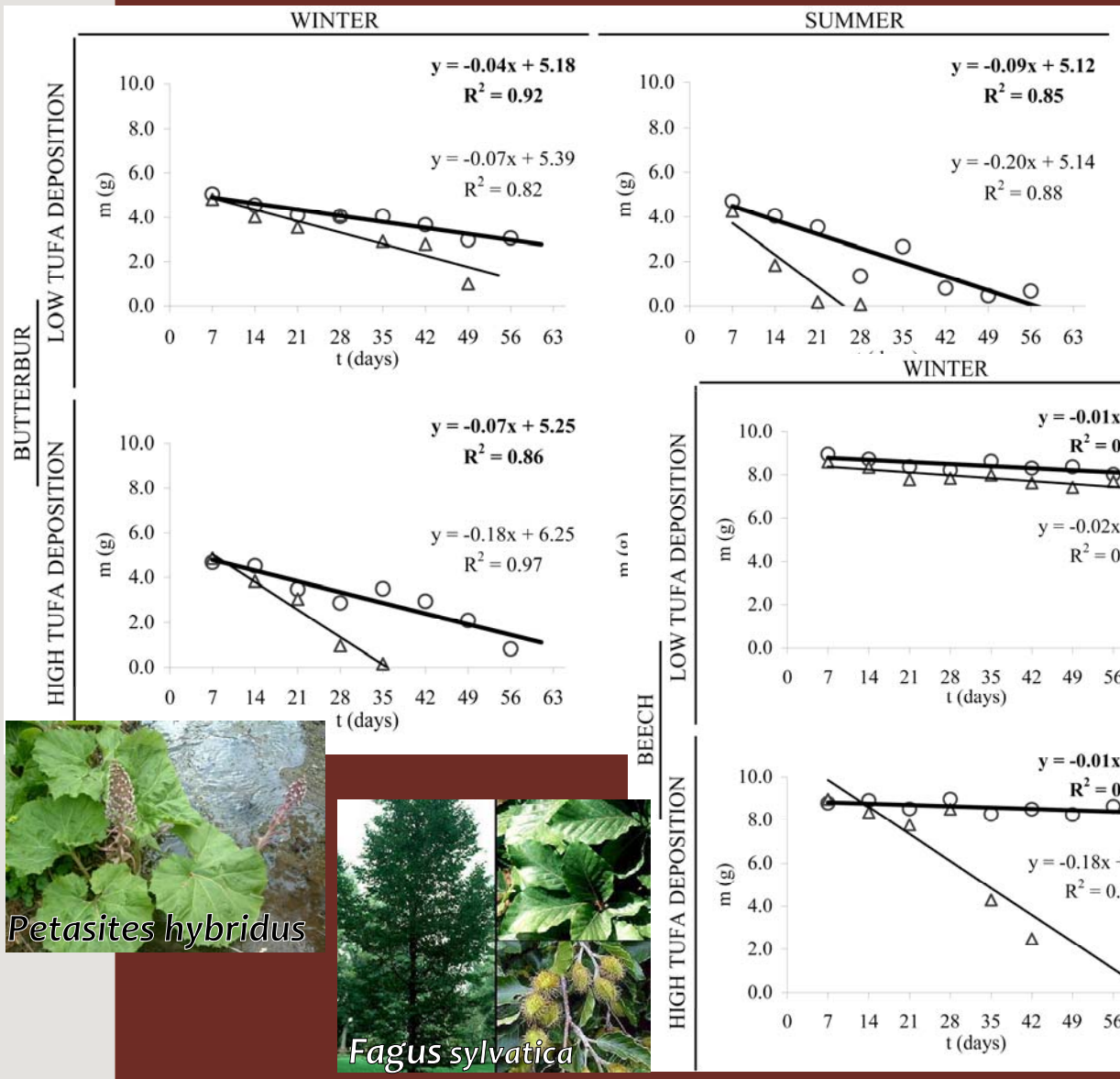
Stope razgradnje listinca

$$m_t = a \times t + b$$

a - varijabla vezane uz osobine biljke (≈ k)

b - varijabla vezana uz uvjete okoliša

t - vrijeme



Veličinski razredi usitnjene organske tvari:

krupne ~
(**> 1 mm;** *eng.* **CPOM,**
coarse particulate organic matter)

sitne ~
(**50 µm - 1 mm;** *eng.* **FPOM,**
fine particulate organic matter)

vrlo sitne ~
(**0.5 do 50 µm;** *eng.* **UPOM,**
ultrafine particulate organic matter)

~ čestice organske tvari

Kakvoća (energetska vrijednost):

Listinac [≈ 18.5 kJg^{-1} (17-20 kJg^{-1})]

CPOM [≈ 16.5 kJg^{-1} (13-18 kJg^{-1})]

FPOM [≈ 7.2 kJg^{-1} (4.5-10 kJg^{-1})]

UPOM [< 4 kJg^{-1}]

Transport i zadržavanje POM

Struja vode

Δv

Prepreke

Struktura i morfologija dna

Transport i zadržavanje POM

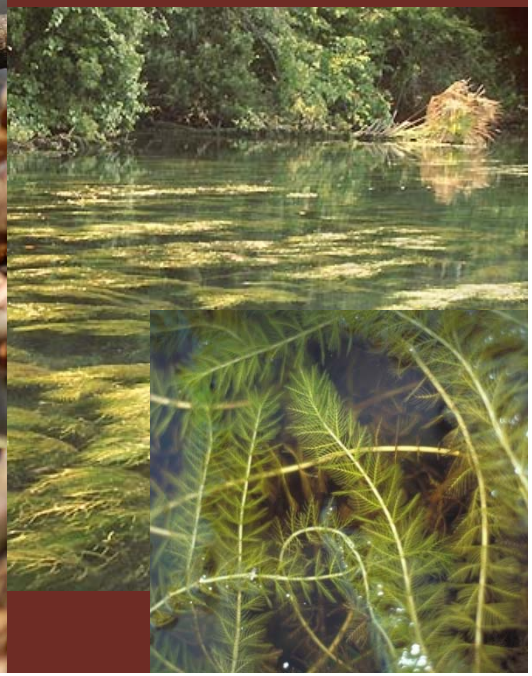
Struja vode

Δv

Prepreke

Struktura i morfologija dna

Vegetacija



Transport i zadržavanje POM

Struja vode

Δv

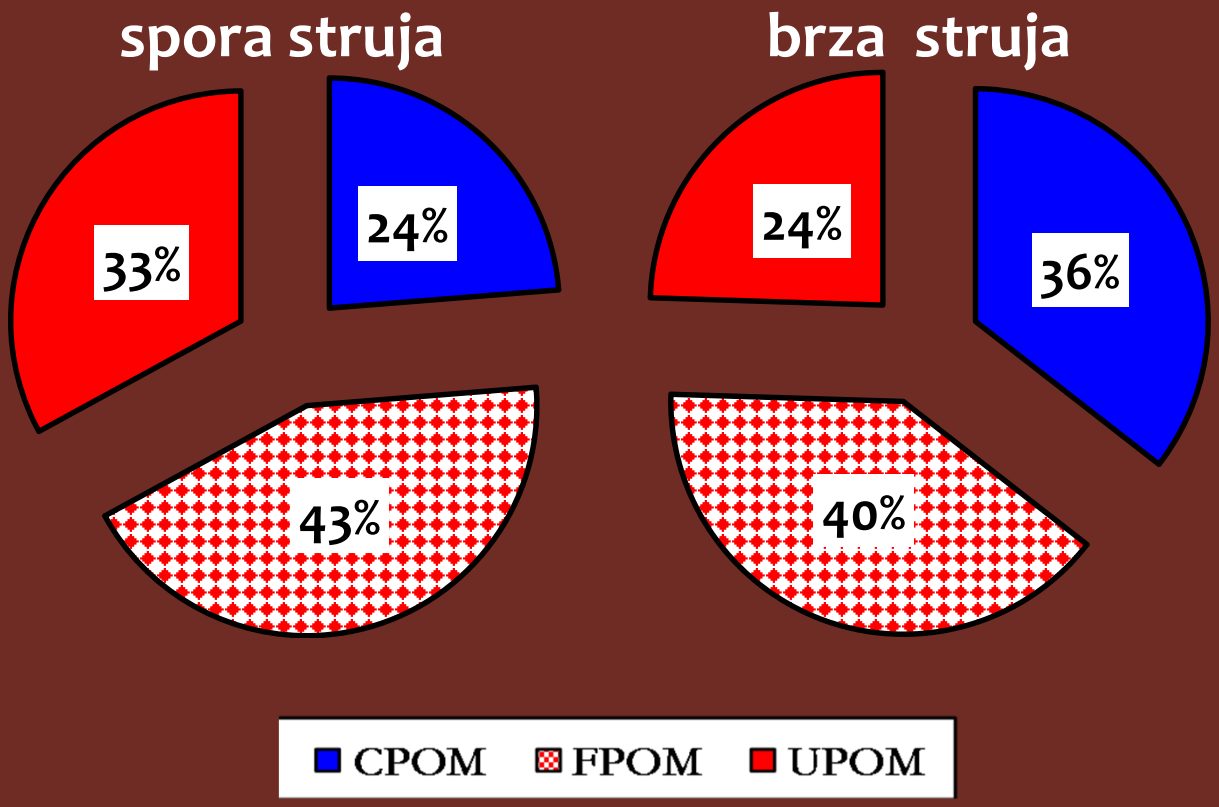
Prepreke

Struktura i morfologija dna

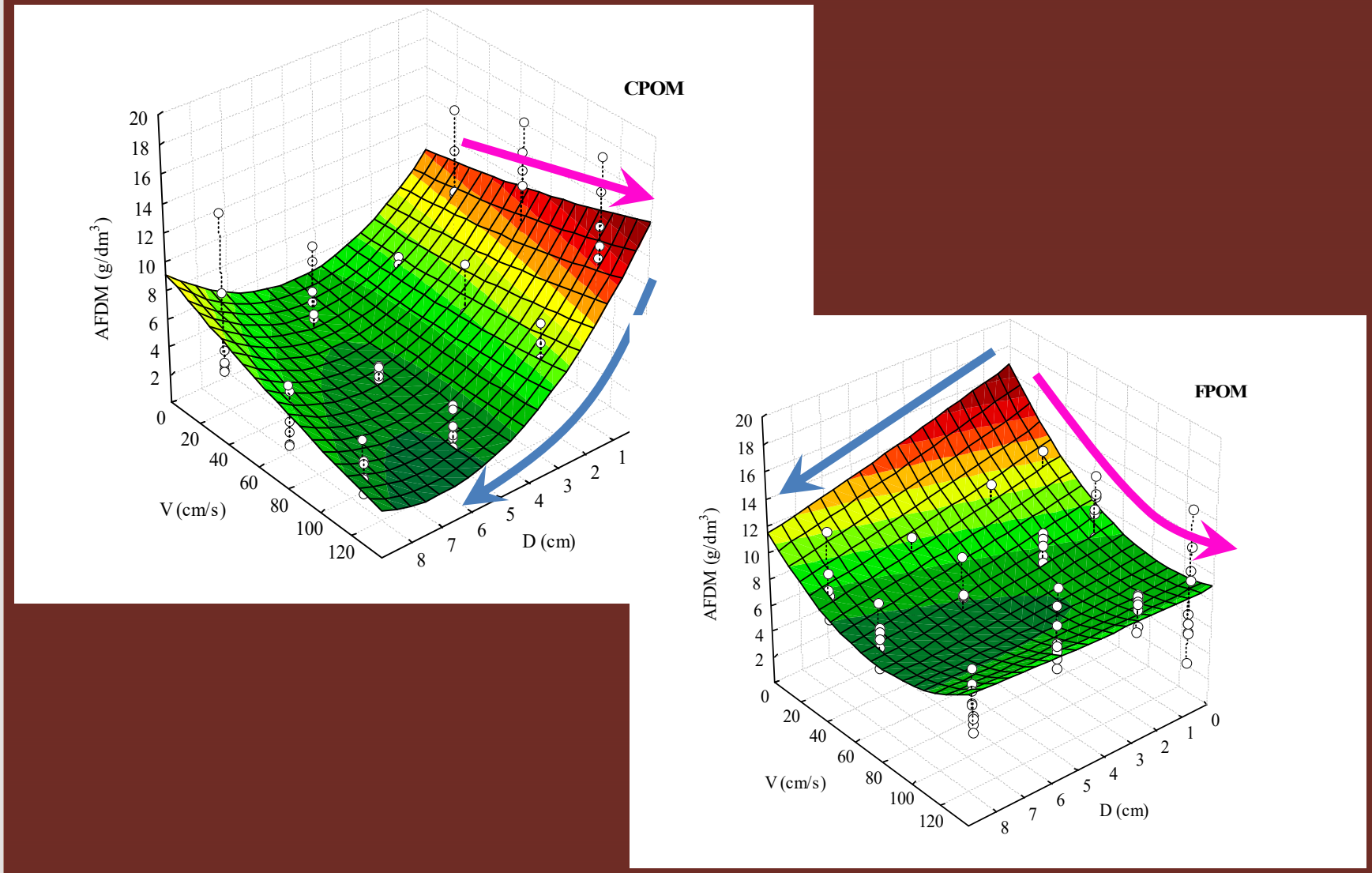
Vegetacija

Fauna - *ecosystem engineers*

Raspodjela detritusa s obzirom na na brzinu strujanja



Raspodjela detritusa s obzirom na na brzinu strujanja



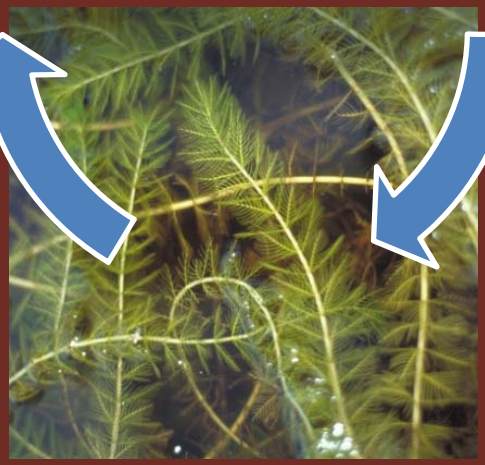
Detritusni ciklus

Ispiranje (leaching)

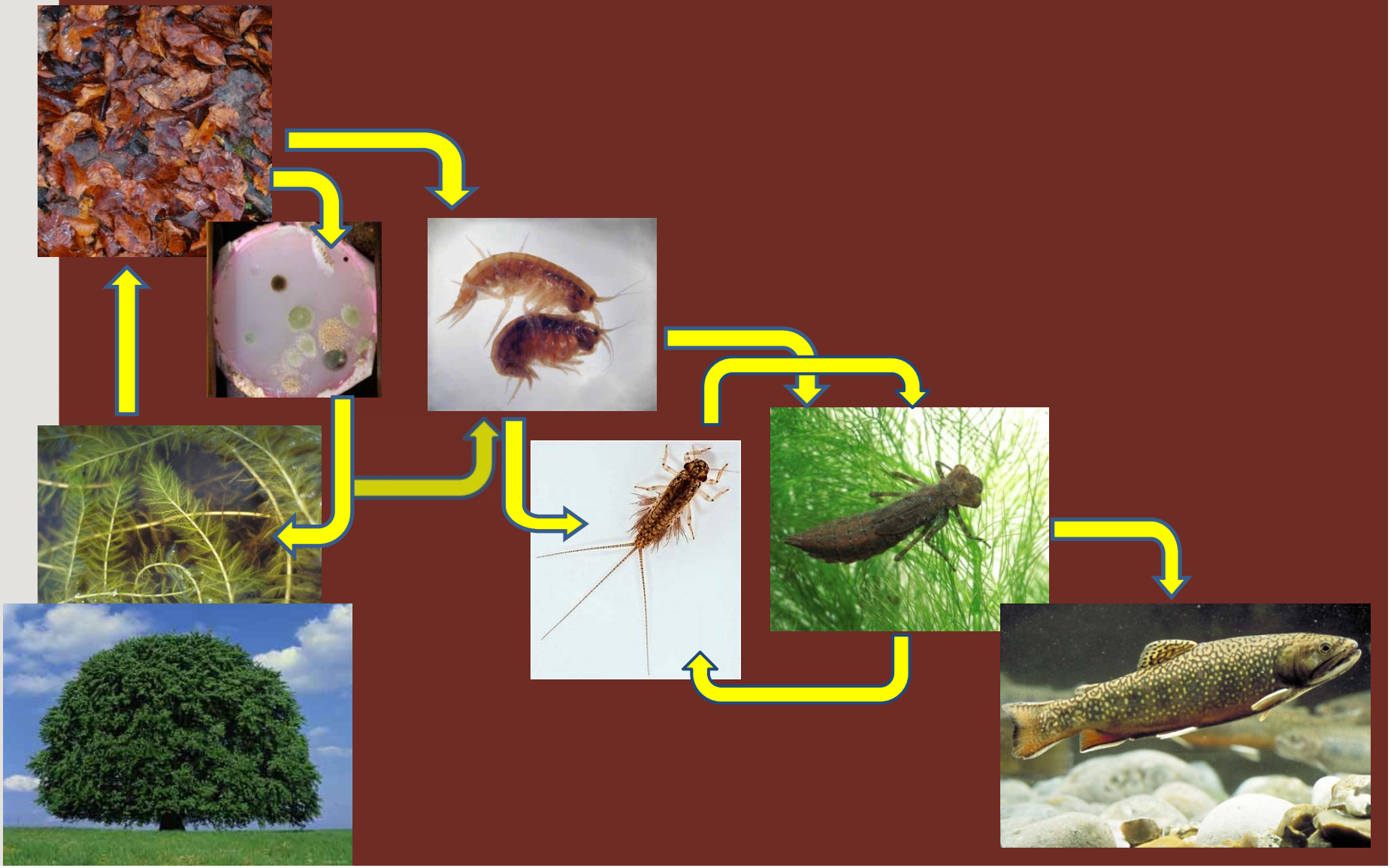
Naseljavanje zajednice mikroorganizama (obraštaj, biofilm)

Razgradnja (remineralizacija)

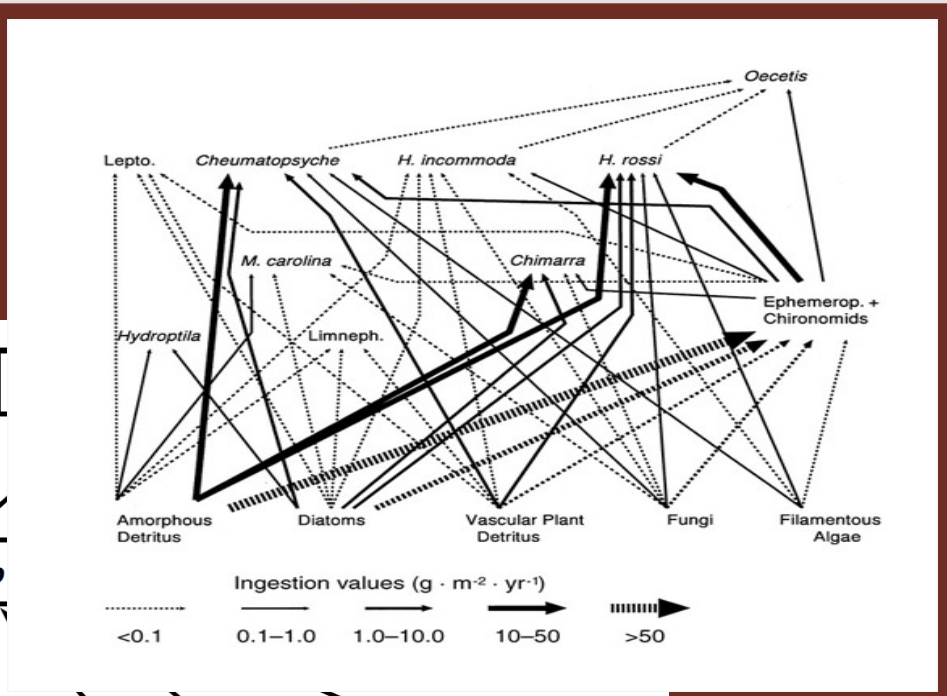
Primarna produkcija

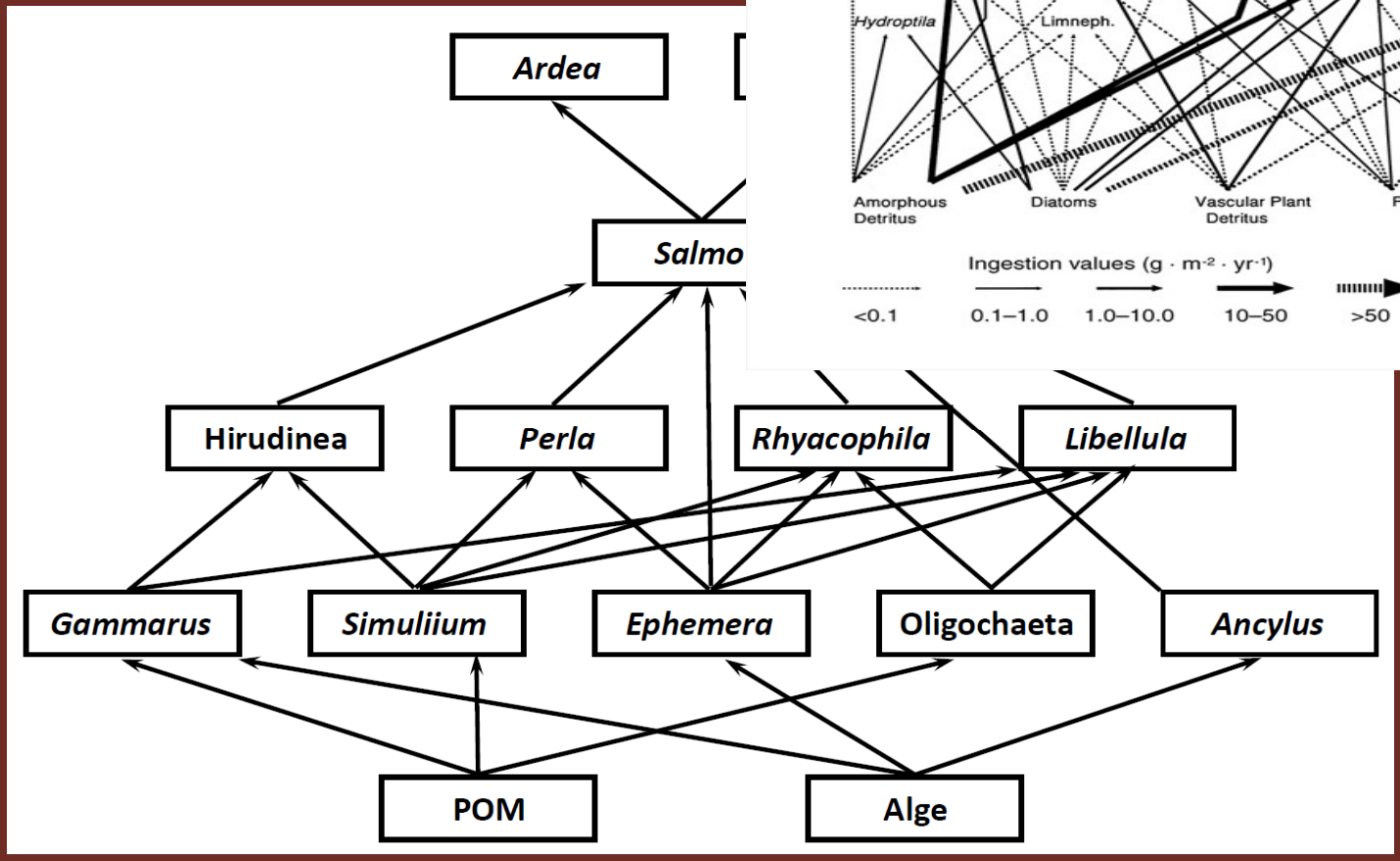


Tok energije (tvari)

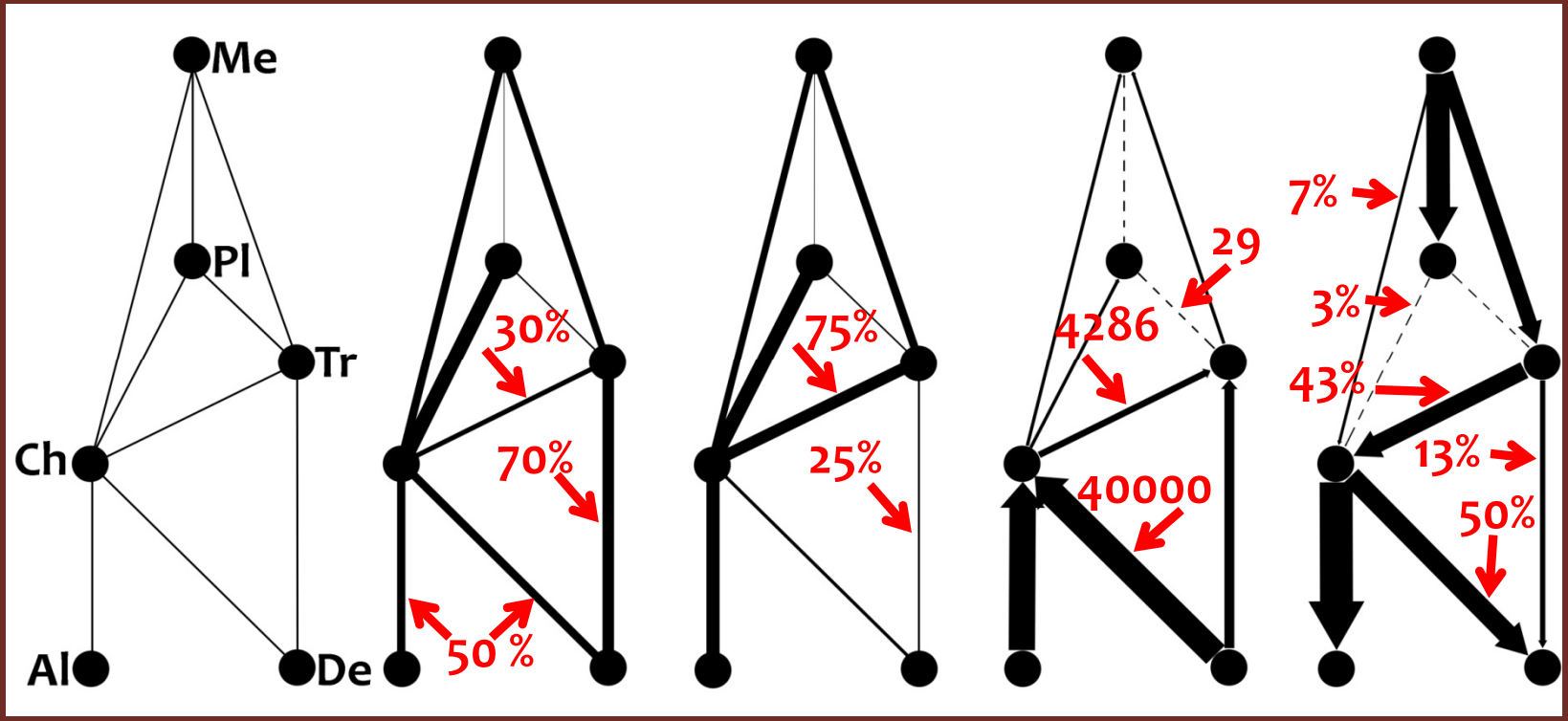


Hranidbene mreže





Hranidbene mreže



Mreža veza

Mreža udjela u prehrani
(proporcijska mreža)

Mreža asimilacije

Mreža toka
(tvari ili energije)
Npr. kJ/m²×a

I/P mreža

Al = alge, De = detritus, Ch = trzalci, Tr = tulari, Pl = obalčari, Me = muljari


all energy is only borrowed,
and one day
you have to give it back