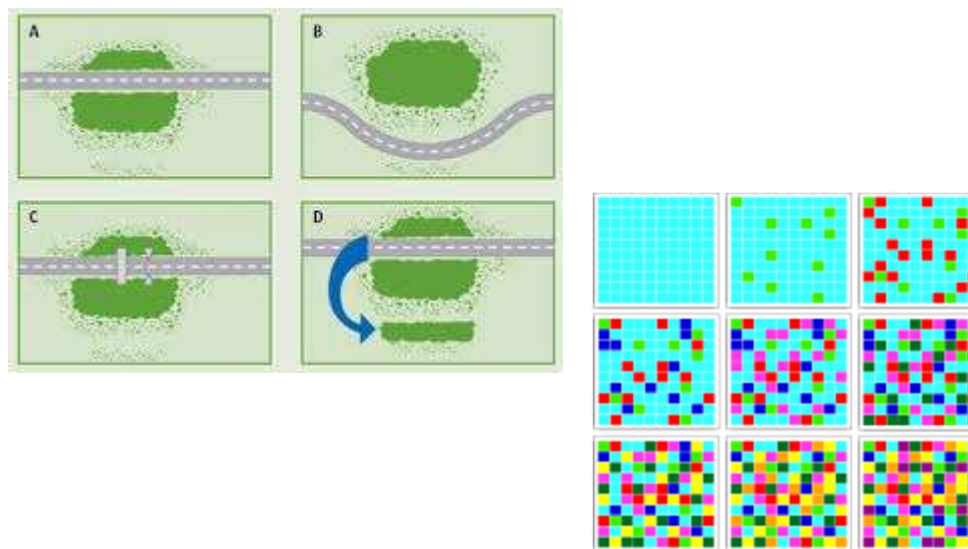


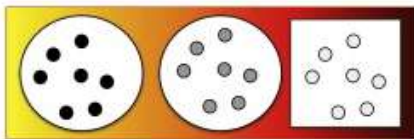
Prostorna i vremenska dinamika ugrožavanja krajobraza



Kada se žele primijeniti kvantitativni modeli u krajobraznoj ekologiji, nekoliko je ključnih pitanja koja treba postaviti:

- Koji procesi utječu na zakonitost krajobraza?
- Koja su kvantitativna obilježja tih ekoloških procesa?
- Kakva je dinamika vegetacije tijekom vremena?
- Koje vrste indikatora je potrebno kvantificirati duž prostorne i vremenske skale?
- Koji je najbolji pristup predstavljanja i kvantificiranja krajobrazne strukture?
- Koje su posljedice tih izbora za generaliziranja i ekstrapolaciju rezultata analiza?

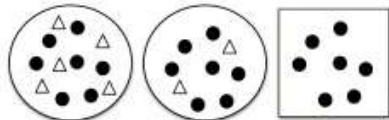
KOJE SU RAZINE PROMATRANJA?



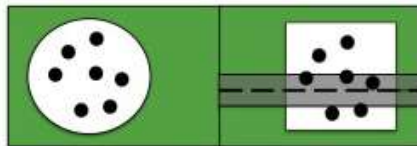
JEDINKA: npr. funkcionalne promjene ponašanja uslijed povišenja temperature i utjecaja na fiziološke procese



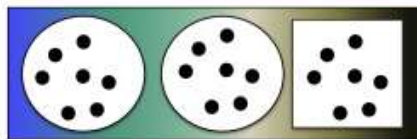
POPULACIJA: npr. funkcionalne promjene ponašanja koje vode k smanjenju gustoće populacije koja ima ponašanje u ovisnosti o gustoći



ZAJEDNICA: npr. funkcionalne promjene ponašanja uslijed nestanka vrste koja je u interakciji s tom zajednicom

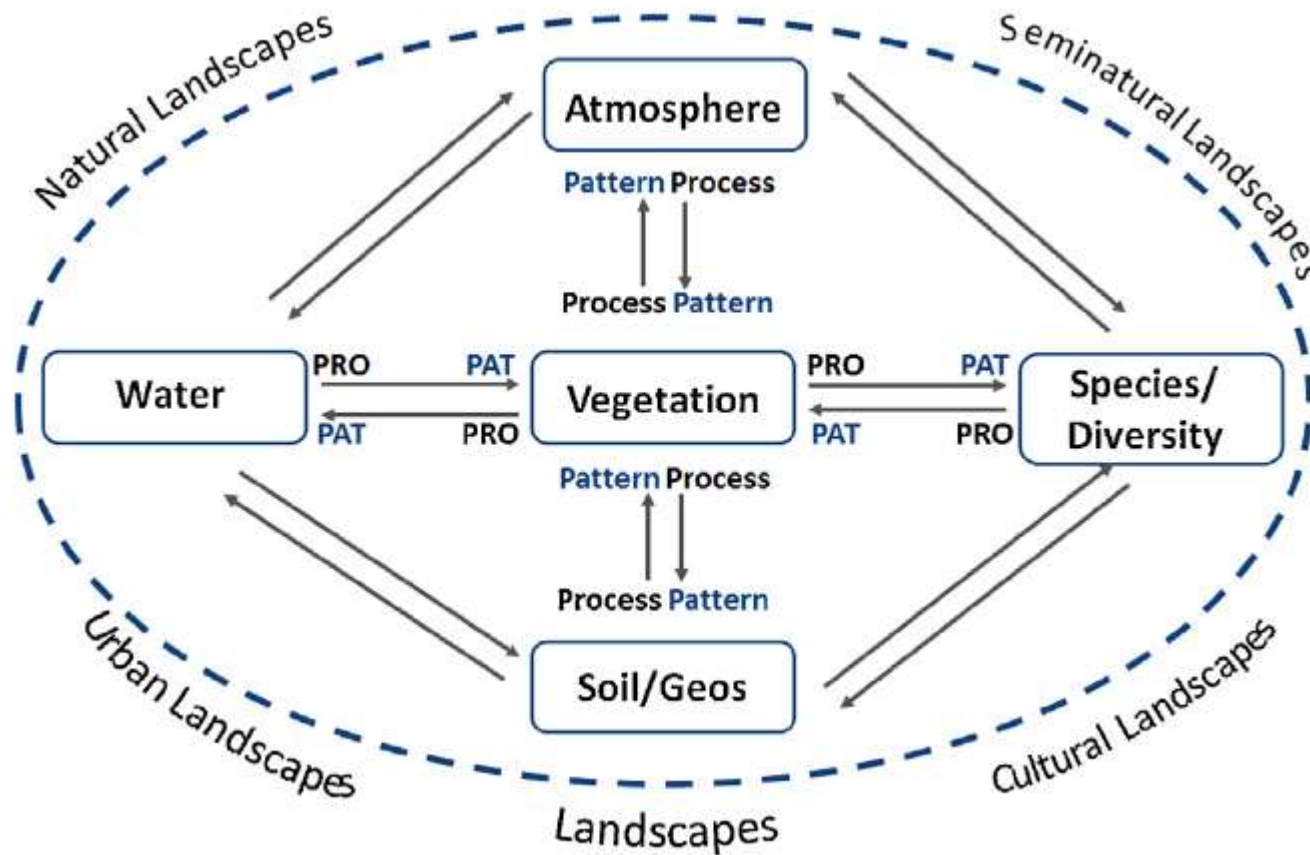


STANIŠTE: npr. funkcionalne promjene uslijed strukturnih promjena staništa (izgradnja ceste)



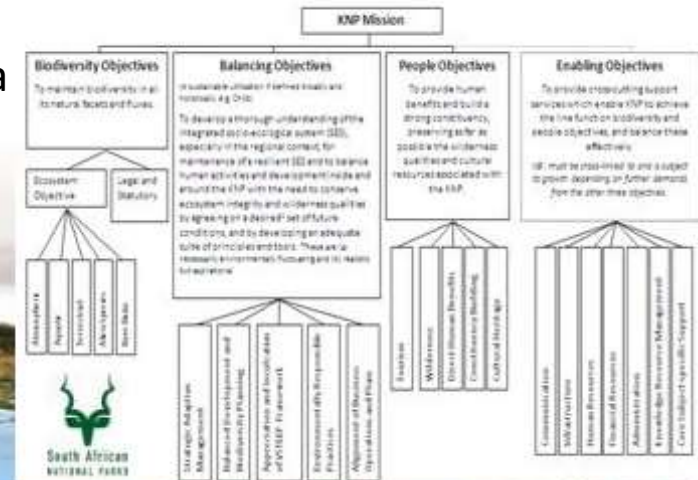
KLIMA: npr. funkcionalne promjene uslijed strukturnih promjena zbog smanjenja dostupnosti vode

KOJE SU INTERAKCIJE PROCESA I ZAKONITOSTI U OKOLIŠU?



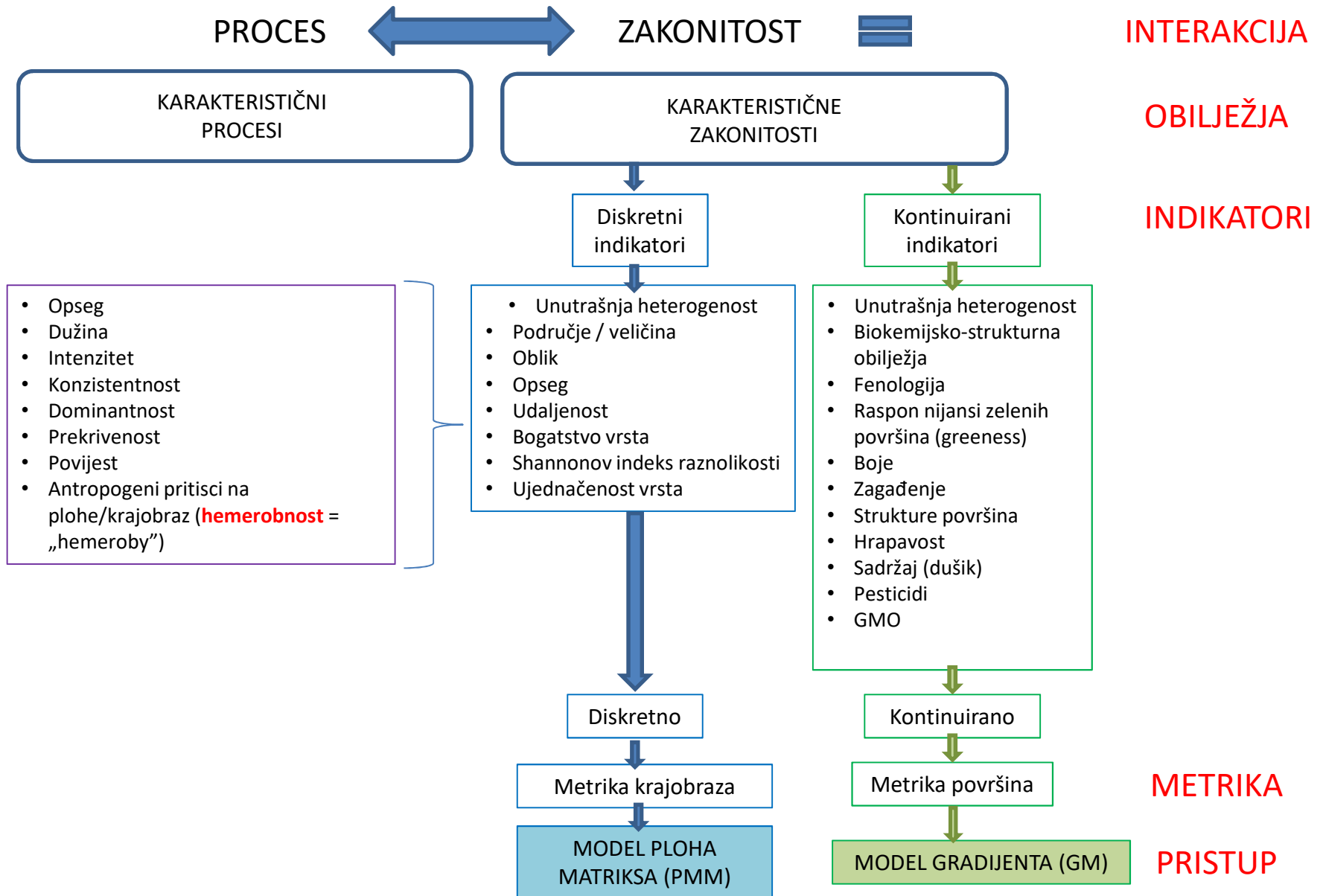
3. cilj: utvrditi vremensku dinamiku procesa i zakonitosti

4. cilj: praćenje predloženih mjera



Obilježja procesa koji utječu na zakonitosti krajobraza

prikaz **diskretnih** i **kontinuiranih** indikatora zakonitosti krajobraza

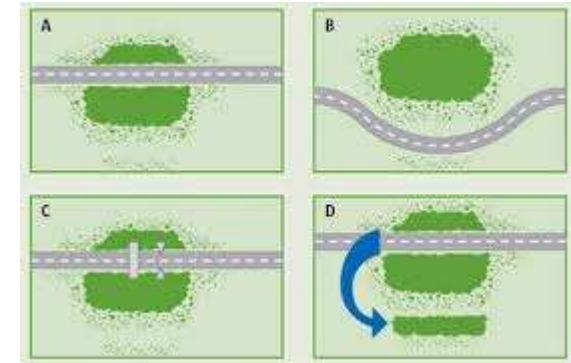


Raspon nijansi zelenih površina „greenness”

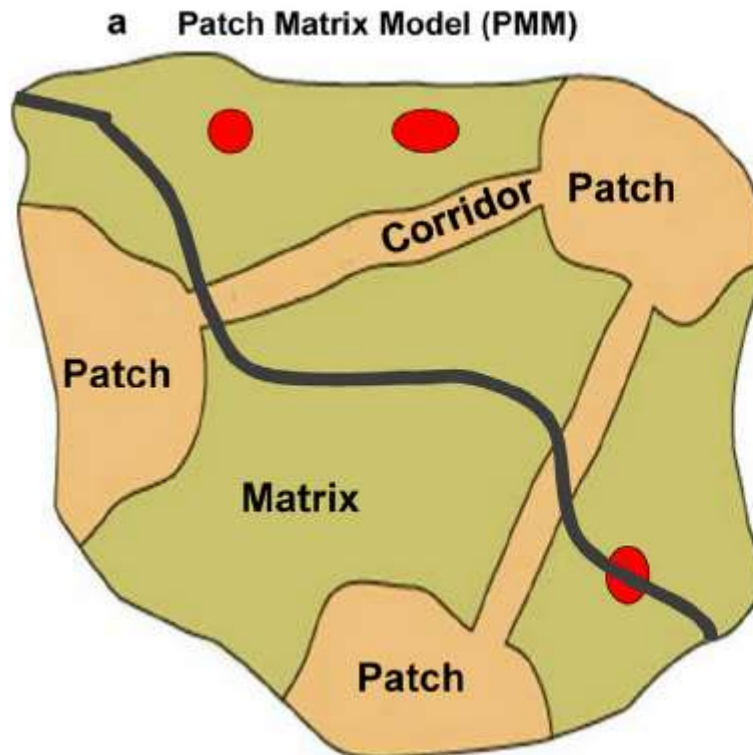


PRISTUPI I TIP METRIKE

1. MATRIKS
2. PLOHA
3. KORIDOR

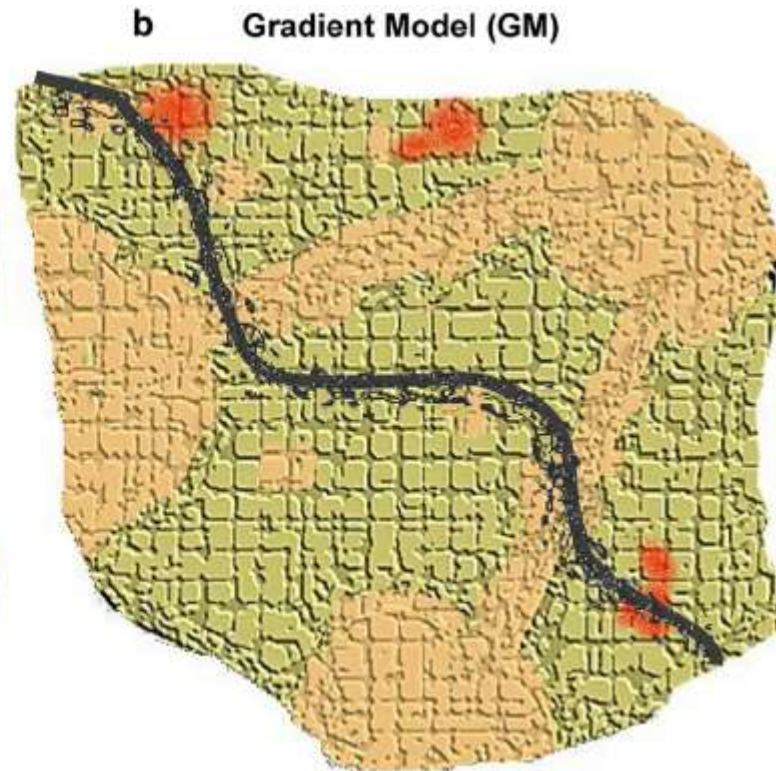


MODEL PLOHA MATRIKSA (PMM)



Metrika krajobraza

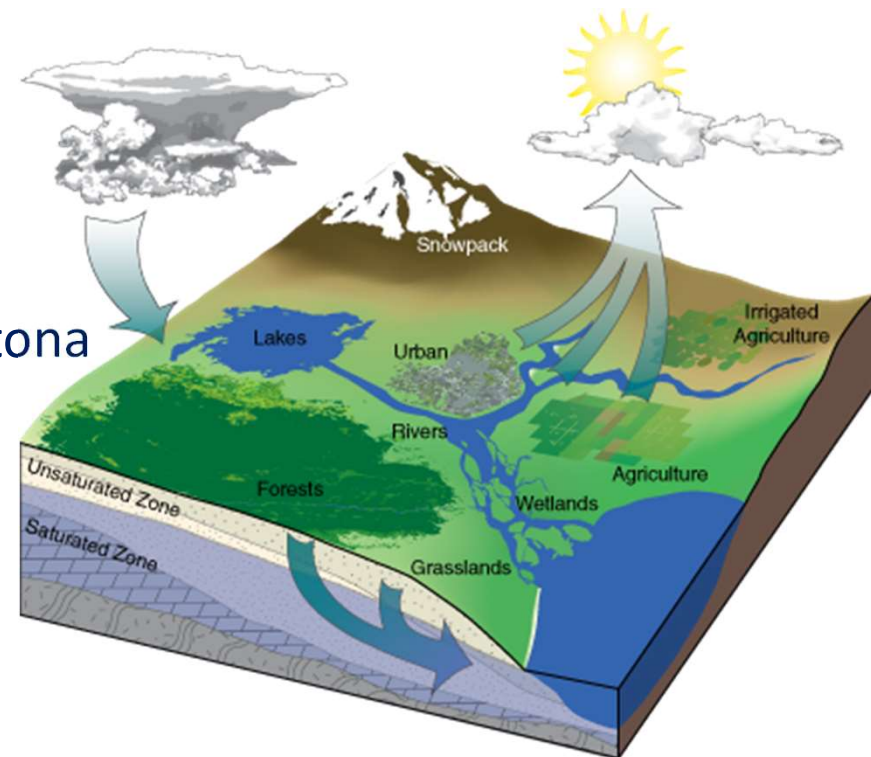
MODEL GRADIJENTA (GM)



Metrika površina

EKOTONI?

- Značenje ekotona
- Definicije
- Hijerarhijska vizualizacija
- Vizualizacija kopnenog ekotona
- Važnost ekotona
- Funkcije ekotona
- Prostorno vremenske skale ekotona
- Uzrok nastanka ekotona
- Koncept ekotona
- Rubni efekt
- Vodeni ekotoni
- Zaštita



ZNAČENJE EKOTONA

EKOTON – eng. ecotone

- ETIMOLOGIJA:

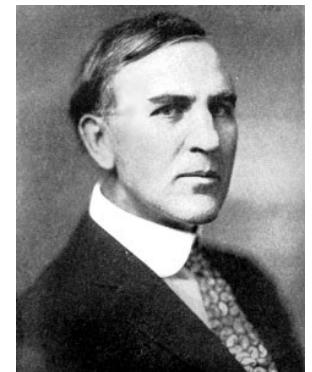
eko od grč. oikos = kuća, kućanstvo + grč. tonos = napetost

- NEOLOGIST:

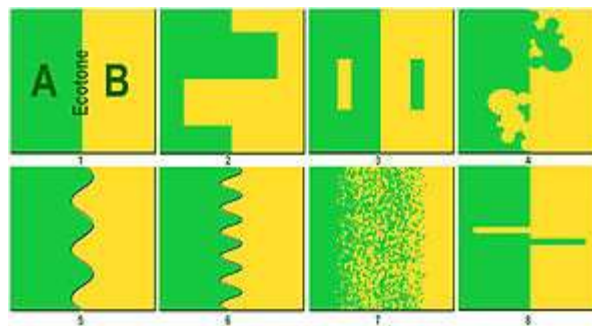
1905. god. Frederic Edward Clements

- ZNAČENJE:

= zona napetosti između dviju biljnih zajednica ili većih staništa gdje glavne vrste iz susjednih zajednica/staništa dosežu svoje ograničenje



Frederic Edward Clements
biljni ekolog
(SAD, 1874-1945)

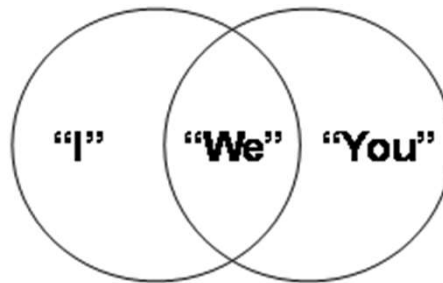


DEFINICIJE

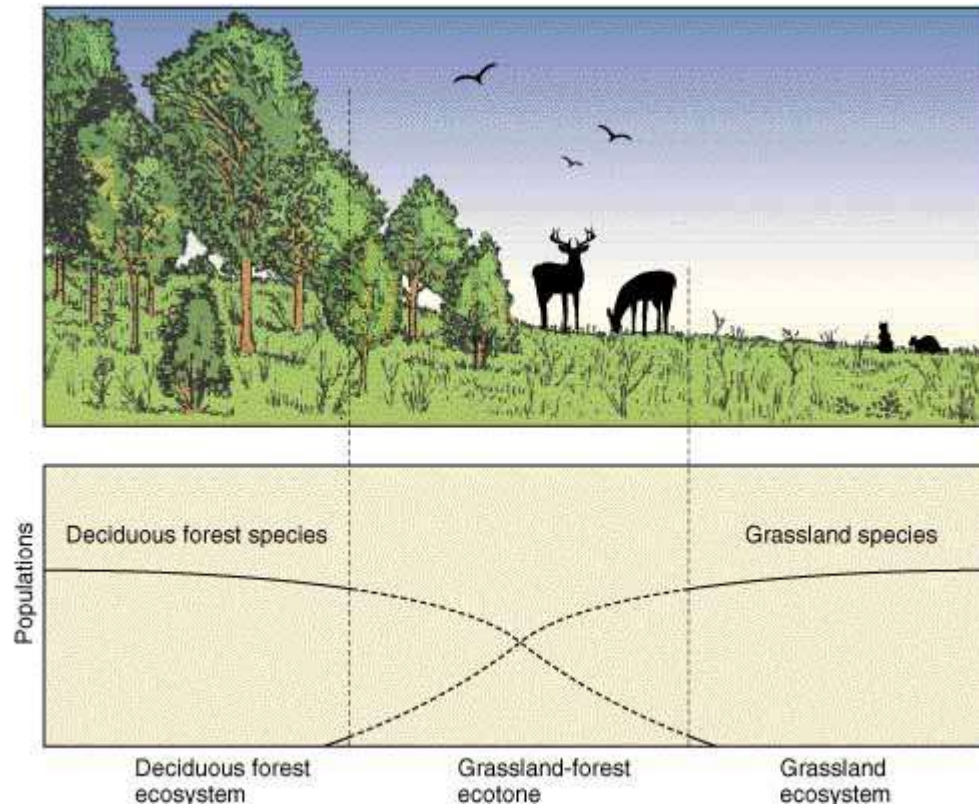
1. A **transition area** between two adjacent **ecological communities (ecosystems)** (Holland, 1988)
2. A **transitional zone** between two communities containing the characteristic species of each
3. The **juncture** between two biotic communities (e g , grassland and forest) Ecotones offer more biotic diversity than "pure" communities at the interface--the "edge effect " Ecotones were ideal places for aboriginal settlement because they afforded optimum resource exploitation (Moratto 1984:589)
4. A habitat created by the juxtaposition of distinctly different habitats; **an edge habitat**; an ecological zone or boundary where two or more ecosystems meet
5. A transition between two communities or **vegetation types** It is a junction zone narrower than the adjoining community areas themselves. The ecotonal community commonly contains many of the organisms of each of the overlapping communities and, in addition, organisms that are characteristic of and often restricted to the ecotone. Often, both the number of species and the population density of some of the species are greater in the ecotone than in the communities flanking it. Organisms which occur primarily or most abundantly or spend the greatest amount of time in contiguous communities are often called "edge species," while the tendency for increased species richness and density at community junctions is known as the "edge effect "
6. A **boundary** between two types of ecological communities
7. A transition zone between two distinct habitats that contains species from each area, as well as organisms unique to it (Morris 1992)
8. The transition between 2 communities; ecotones contain species from each area as well as organisms unique to it
9. The **region** that exists between two different ecosystems
10. The boundary or transition zone between adjacent **plant communities**
11. A **habitat** created by the juxtaposition of distinctly different habitats; an edge habitat
12. An **ecological zone** or boundary where **two or more ecosystems** meet
13. A habitat created by the juxtaposition of distinctly different habitats; an edge habitat; or an eco- logical zone or boundary where two or more ecosystems meet
14. A transitional zone between two habitats
15. The transition zone between two biotic communities, such as between the Ponderosa pine forest type and the mixed conifer forest, which is found at higher elevations than the pine
16. The **area** influenced by the transition between plant communities or between **successional stages** or vegetative conditions within a plant community (Thomas 1979)
17. A habitat created by the juxtaposition of distinctly different habitats; an edge habitat; or an ecological zone or boundary where two or more ecosystems meet
18. A **transition line** or strip of vegetation between two communities, having characteristics of both kinds of neighboring vegetation as well as characteristics of its own
19. Transition zone between two diverse communities (e g the tundra-boreal forest ecotone)
20. A **zone of gradual transition** between two **distinct ecosystems, communities, or habitats**
21. A transitional area between two adjacent ecological communities
22. The transition zone between two **biotic communities**, such as between a ponderosa pine forest and a grassland
23. A transition between two **distinct communities**
24. Boundary zone between two **unique community types**
25. A transitional zone between two **adjacent communities**, containing species characteristic of both as well as other species occurring only within the zone
26. A transition zone; a region of **overlapping [organismal] associations**, as that between two **biomes** or two adjacent ecosystems (Little & Jones 1980)
27. Transition zone between two structurally different communities
28. A transition area between two adjacent ecological communities usually exhibiting competition between organisms common to both

SUKUS DEFINICIJA

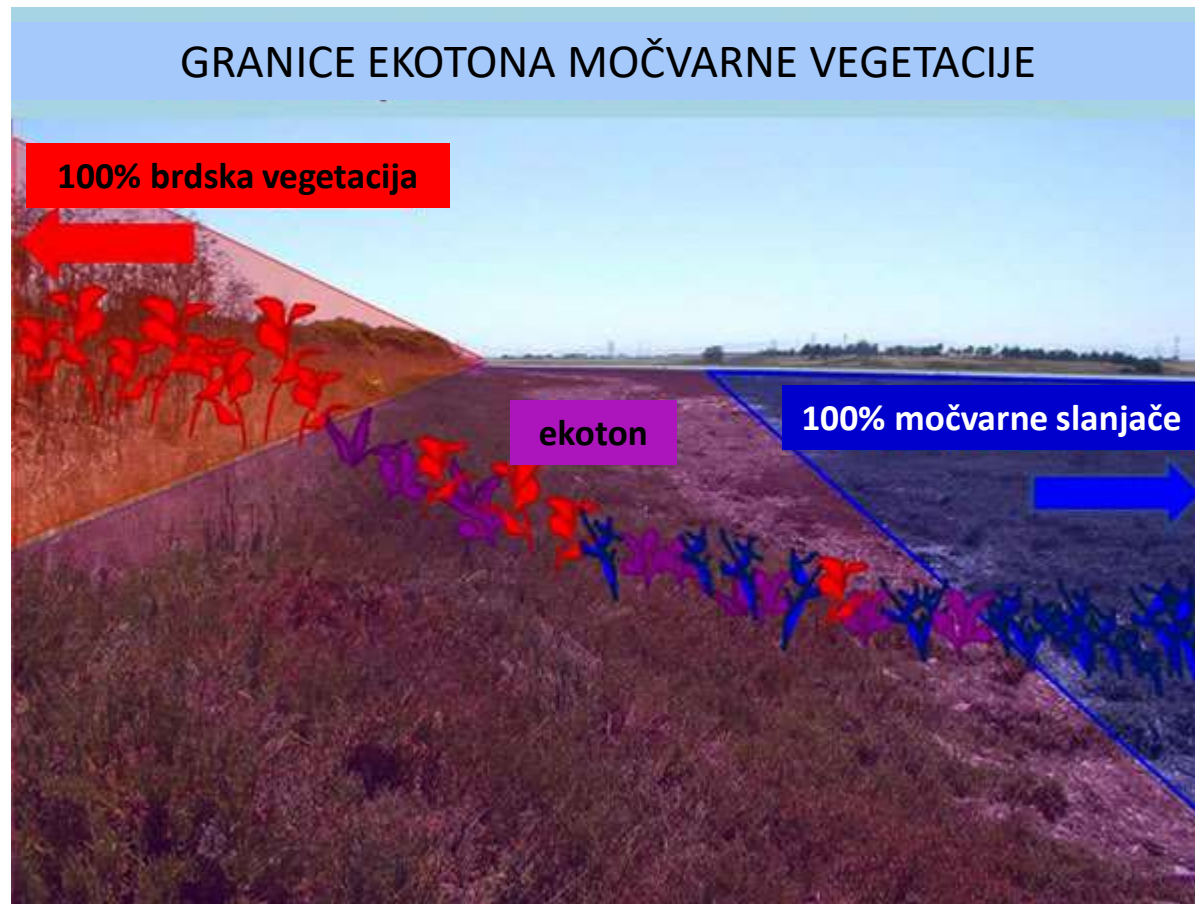
- Mjesta na kojima se izmjenjuje energija i gdje je količina materije najveća
- Tranzicijska mjesta/lokaliteti između različitih staništa
- Zone napetosti između sustava različite starosti



POPULACIJA / EKOSUSTAV

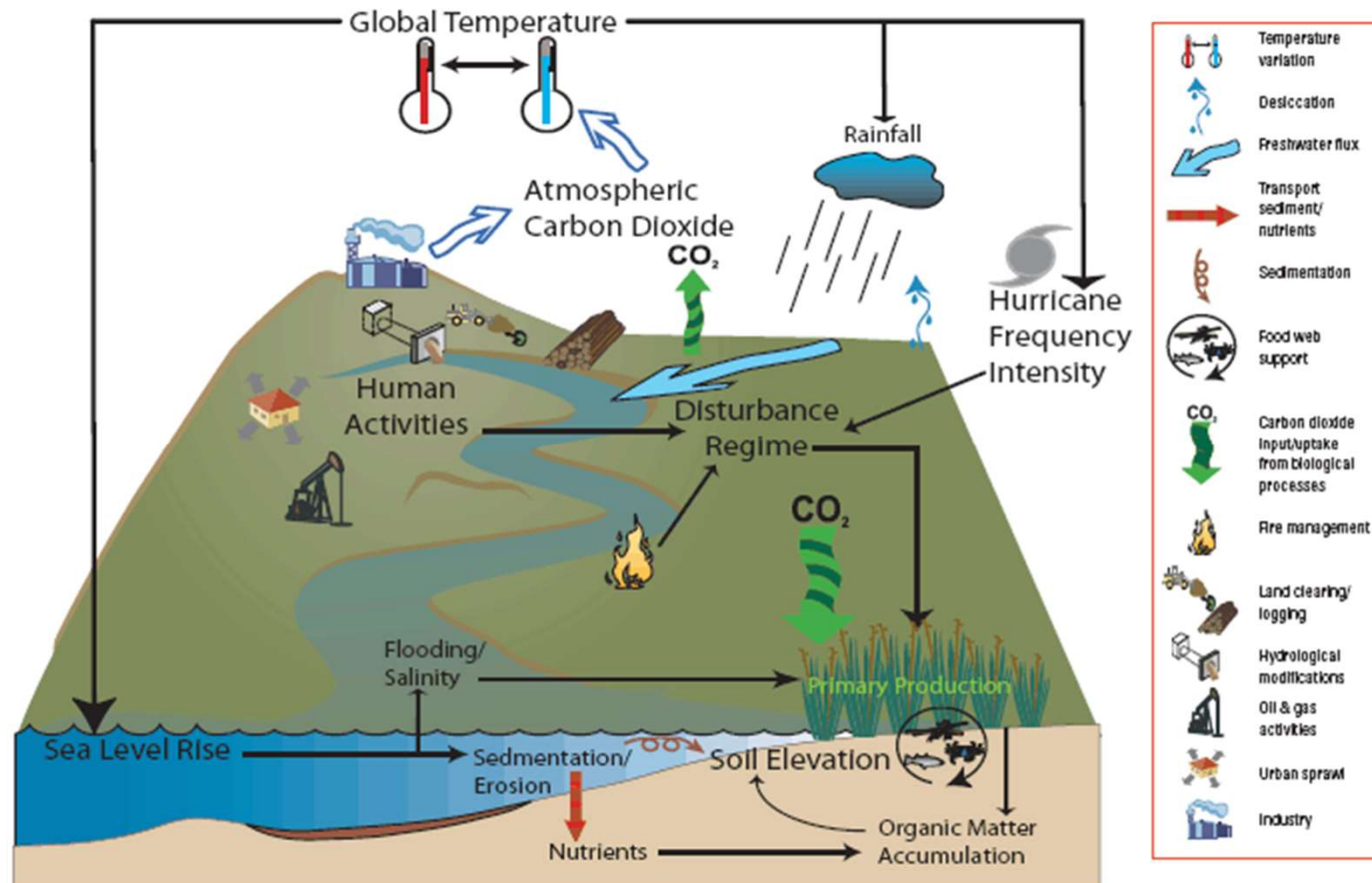


VIZUALIZACIJA EKOTONA



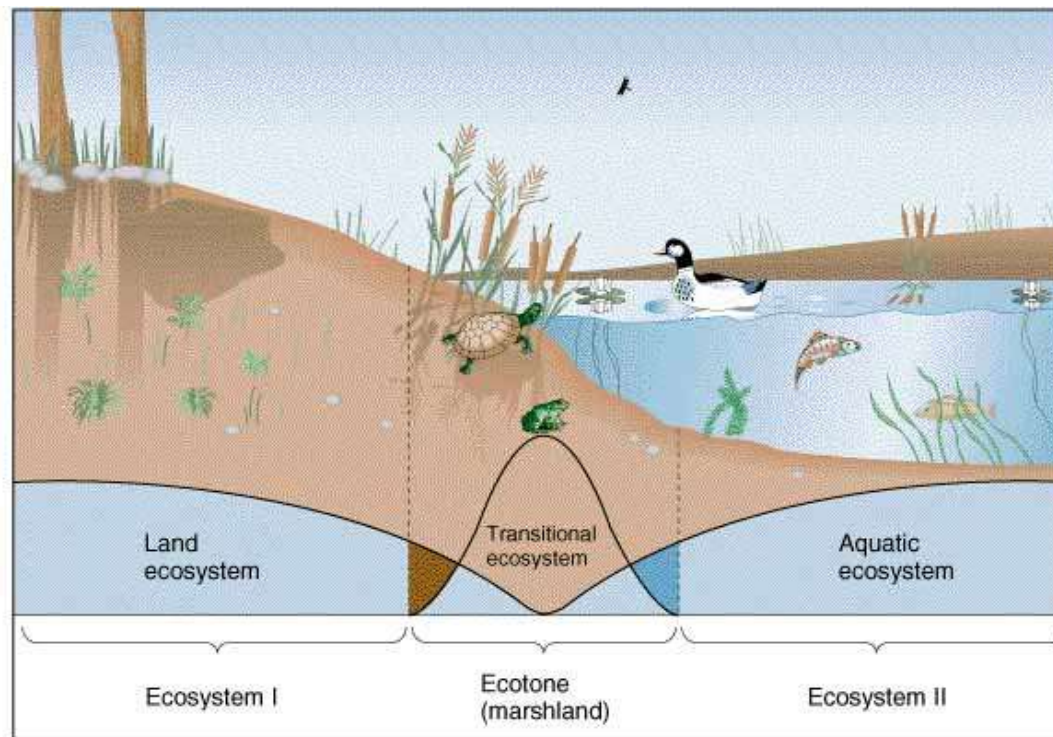
VAŽNOST EKOTONA

- Ključne strukture za funkcioniranje okoliša
- Iako reduciraju prostor u krajobraznom mozaiku, pridonose reguliranju protoka izmjene između heterogenih prostora



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- Prisutna je velika biološka raznolikost
- Pridonose integriranju sustava
- Imaju veliku stopu primarne i sekundarne produkcije



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- Prisutna je velika biološka raznolikost
- Pridonose integriranju sustava
- Imaju veliku stopu primarne i sekundarne produkcije
- Novitet u evoluciji (Smith et al. 1997)
- Socijalna, estetska i ekološka uloga u ruralnom krajobrazu (Burel et Baundry 1995)

FUNKCIJE EKOTONA

Ekotoni kao stanične membrane

1. PASIVNA DIFUZIJA
2. AKTIVNA DIFUZIJA
3. FILTERI ILI BARIJERE
4. AKUMULACIJA
5. PONOR
6. IZVOR
7. STANIŠTE

PROSTORNO-VREMENSKE SKALE EKOTONA

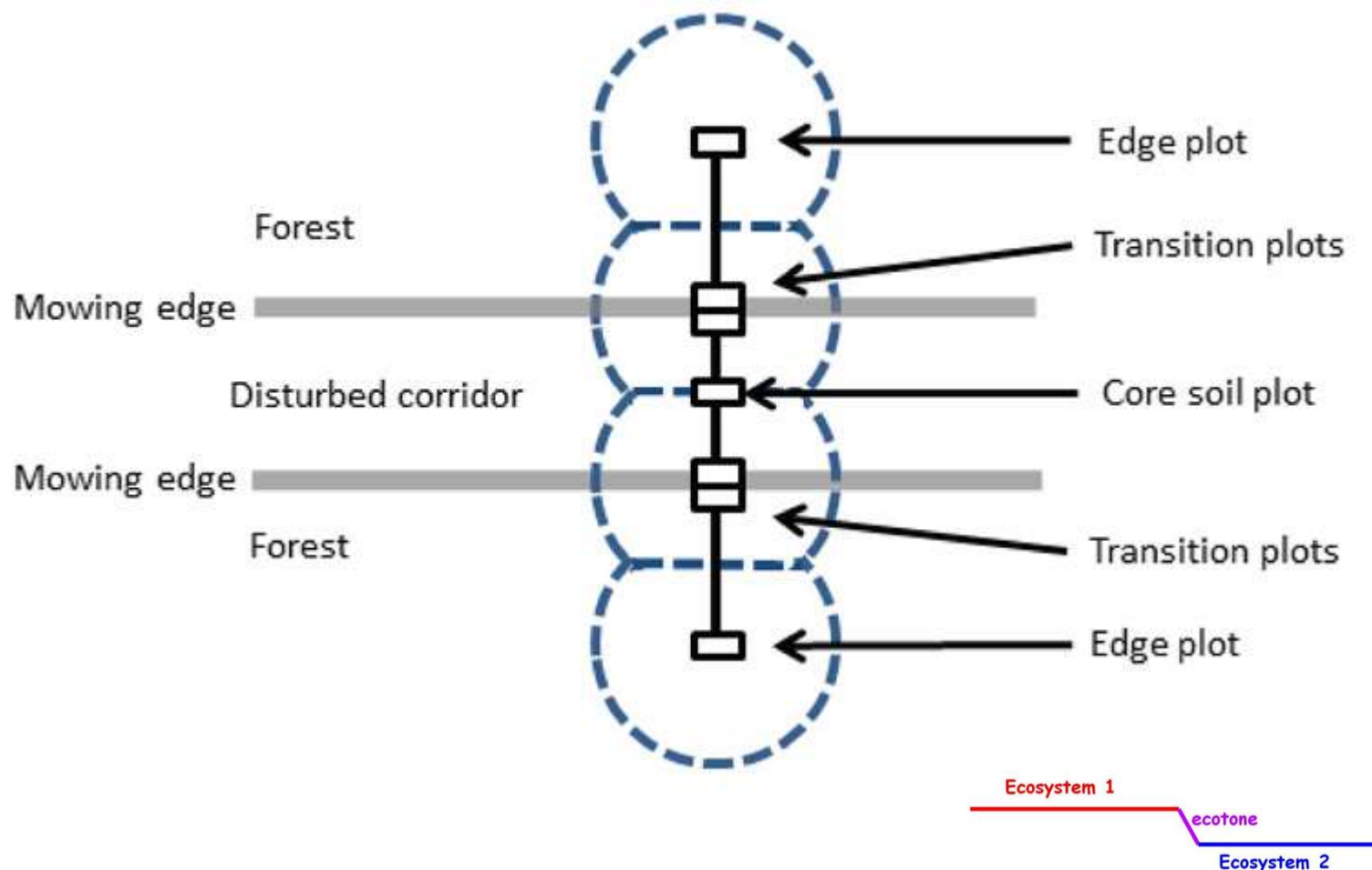
- PROSTORNE
 1. MIKRO-EKOTON
 2. MEZO-EKOTON
 3. MEGA-EKOTON
- VREMENSKE
 1. POVREMENI EKOTON
 2. SEZONSKI EKOTON
 3. STALNI EKOTON

UZROK NASTANKA EKOTONA

- EGZOGENI ČIMBENICI
 1. Topografija
 2. Klima
 3. Hidrografija
- ENDOGENI ČIMBENICI
 1. Ekološka sukcesija / kompeticija
 2. Stres
 3. Ljudska aktivnost

KONCEPT EKOTONA

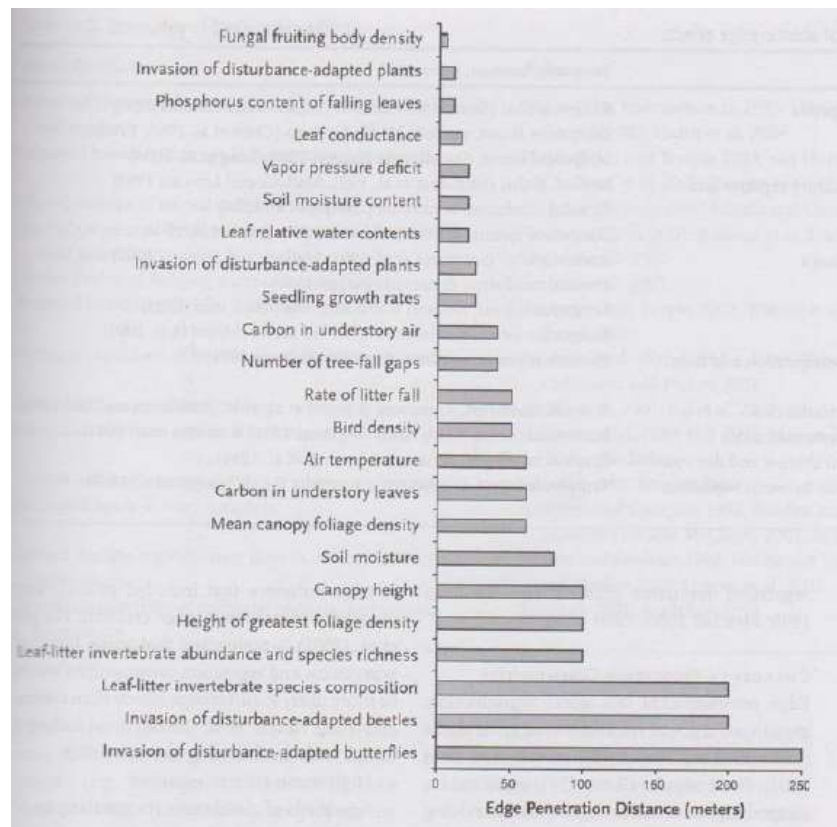
- dinamične, višedimenzionalne tranzicijske zone – unutrašnja heterogenost



CADENASSO i sur. 2003, FARINA 2006, RIES i sur. 2004

INTENZITET RUBNOG UTJECAJA

- Rubni utjecaj:
 1. učinak abiotičkih i biotičkih procesa na rubu
 2. razlike u sastavu, strukturi ili funkciji u blizini ruba i na rubu u odnosu na susjedna staništa



LINDENMAYER I FISCHER 2006

RUBNI UTJECAJ



MAKSIMUM
UNUTRAŠNJOSTI
STANIŠTA I
MINIMALNI RUBNI
UTJECAJ

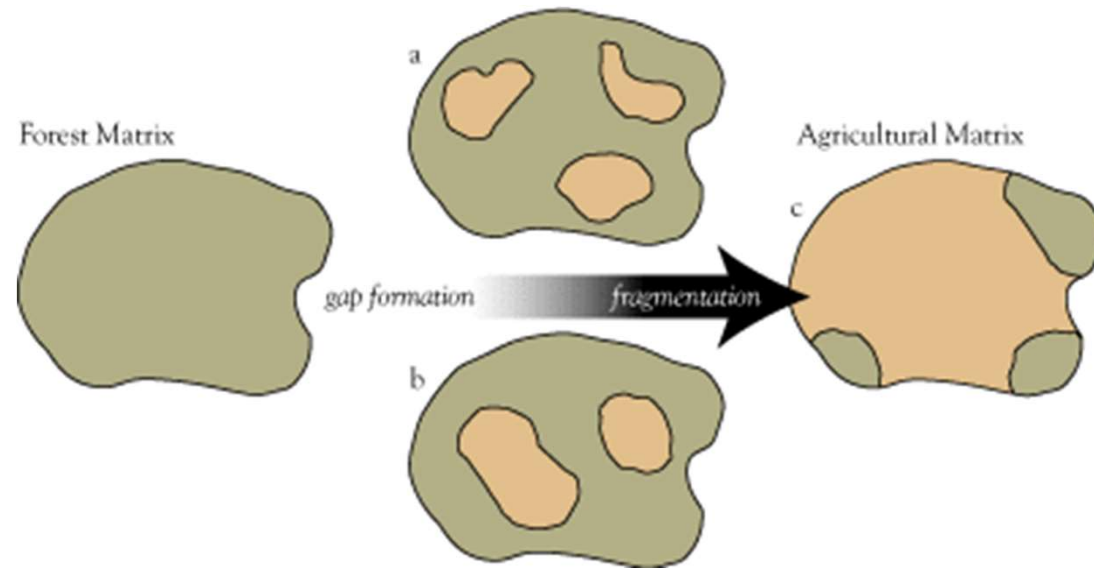


MAKSIMUM
RUBNOG UTJECAJA
I BEZ UNUTRAŠNJIH
STANIŠTA

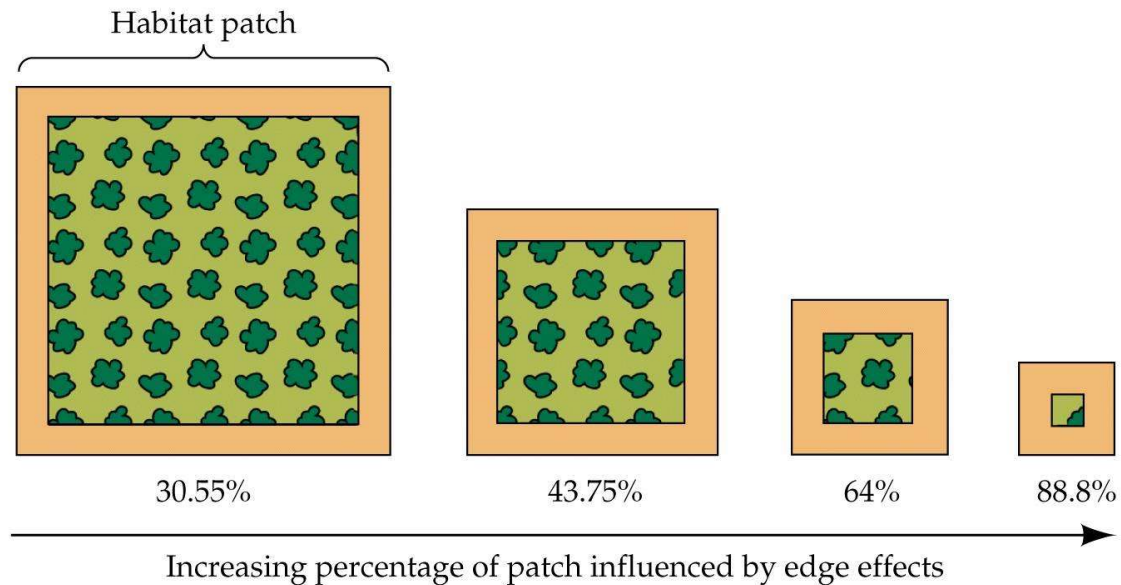


POVEZANE JEZGRE
STANIŠTA
ČVOROVIMA KAKO
BI SE SPRIJEČILA
FRAGMENTACIJA
STANIŠTA

RUBNI UTJECAJ



RUBNI UTJECAJ

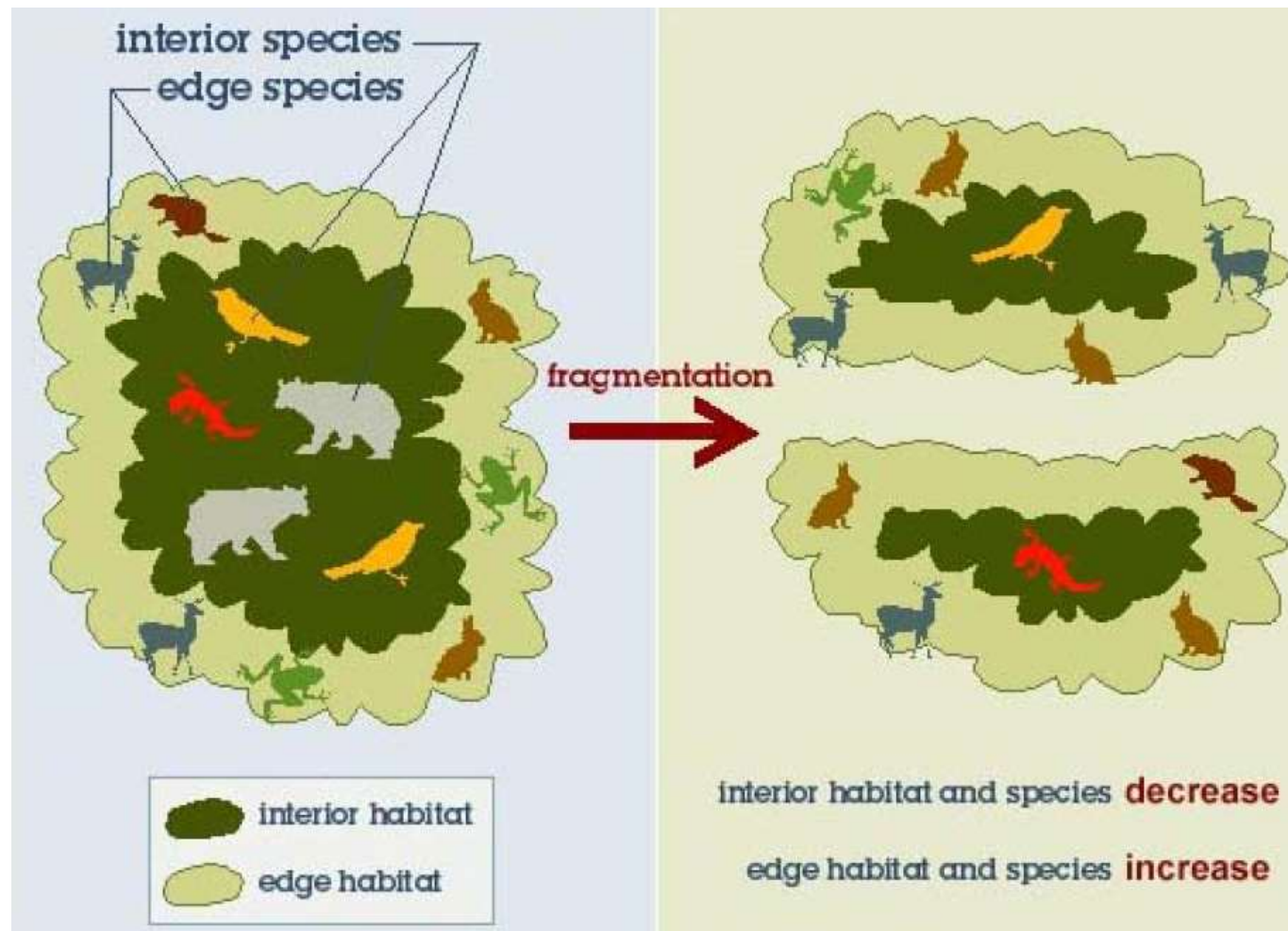


© 2001 Sinauer Associates, Inc.

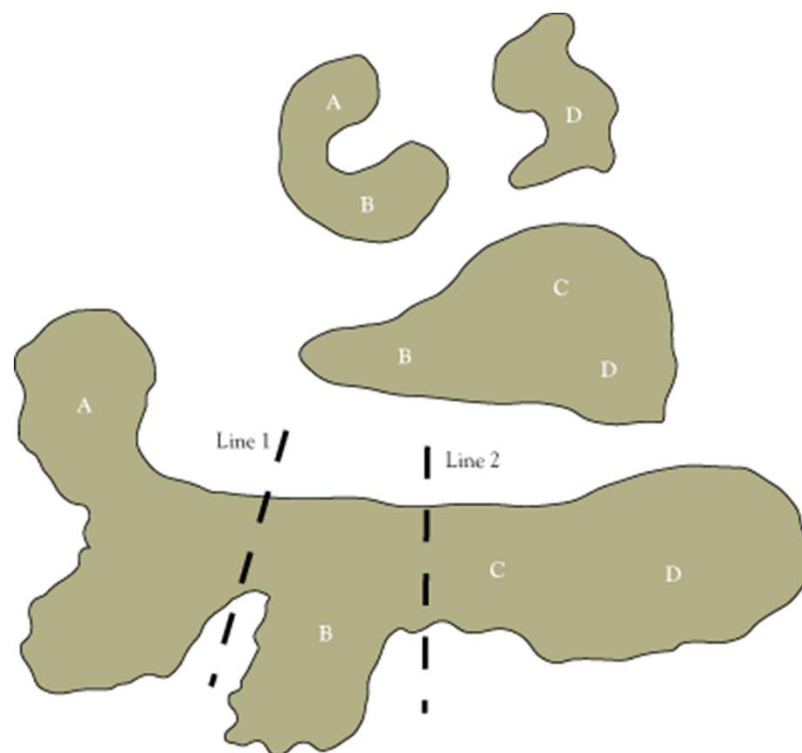
The “Edge Effect”



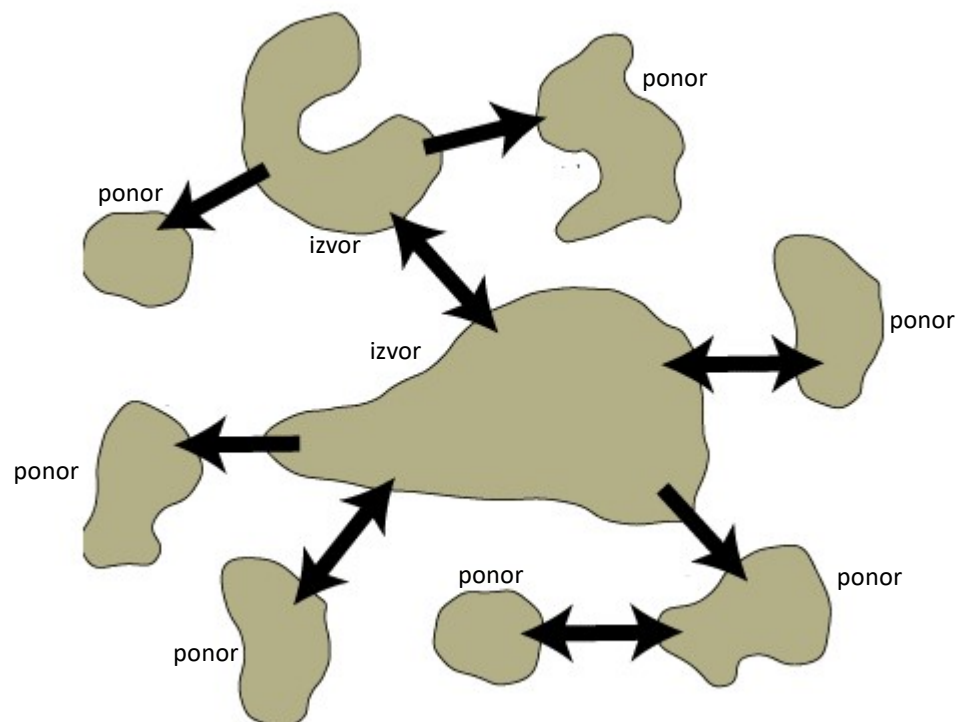
VRSTE I RUBNI EFEKT



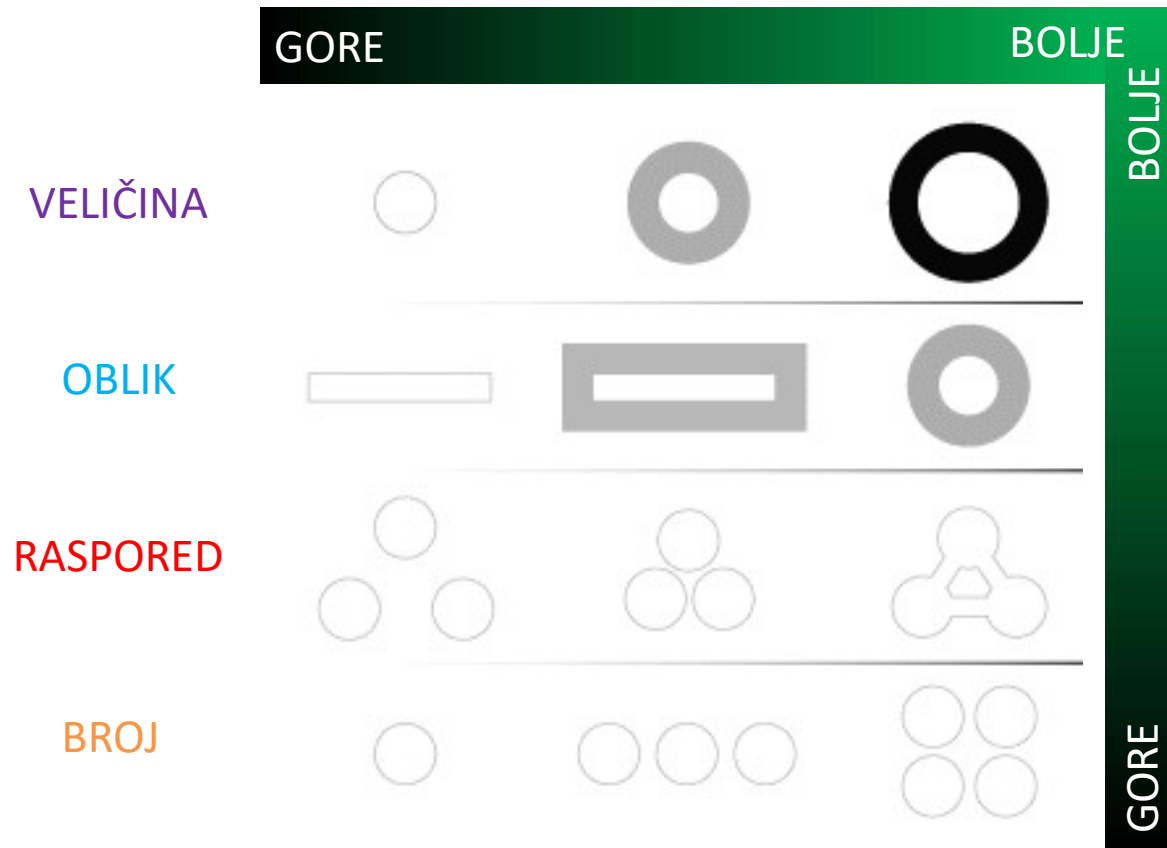
PRINCIPI ZAŠTITE EKOTONA



PRINCIPI ZAŠTITE EKOTONA



PRINCIPI ZAŠTITE EKOTONA



- ✓ Veličina, oblik, konfiguracija i broj ploha utječu na količinu unutarnjeg staništa u plohi.
- ✓ Male, pojedinačne, pravokutne plohe pružaju posljednju količinu unutarnjeg staništa, a velike kružne plohe pružaju najviše unutarnjeg staništa!