

WK VII LANDSCAPE STRUCTURES: EDGES AND BOUNDARIES

Referensi:

Dramstad, Olson & Forman (1996) dan Farina (1998)

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PENGANTAR EKOLOGI LANSKAP (ARL 230)
DEPARTEMEN ARSITEKTUR LANSKAP
SEMESTER GENAP
Monday, 26 March 2018

JADWAL KULIAH PENGANTAR EKOLOGI LANSKAP

Week	Date	Topic	PIC
I	8 Feb 2018	Introduction to Landscape Ecology	HSA
II	15 Feb 2018	FOUNDATION: Times Changes, Objective	HSA
III	22 Feb 2018	Development of Landscape Ecology; Landscape Ecology Today	HSA
IV	1 Mar 2018	Patches	KAS
V	8 Mar 2018	Corridors and Connectivity	SWI
VI	15 Mar 2018	Mosaics	SWI
VII	22 Mar 2018	Edges and Boundaries	KAS
VIII		Mid-term Exam (UTS)	

References:

1. Principles and Methods in Landscape Ecology → Almo Farina
2. Landscape ecology principles in Landscape Architecture and Land use Planning → Wenche E. Dramstad, James D. Olson, Richard T.T. Forman
3. International Journals

PPT would be uploaded to the BLOG

Landscape Structure

- Size, shape, composition, number and position of patches, or landscape elements within a landscape (Molles 2007).
- Patch**: a contiguous area sharing a narrow range of values for an identified set of descriptive parameters; a more-or-less homogeneous region



Landscape Structure

- Mosaic (Natural)**: the entire landscape, divided into any number of patches of discrete size and shape; an abstraction of the actual landscape



Landscape Structure - Mosaic (Anthropogenic)



Source

Landscape Structure - Mosaic (GIS-based)



Source: Wy

Restoration Ecology - Landscape Perspective

• Patch

– All patches have edges

- Edges have abiotic environments that are different from the interior of a patch → differences in biota & processes
- The larger a patch, the more interior (core) it contains

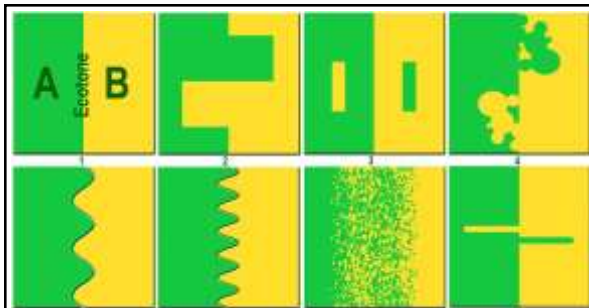
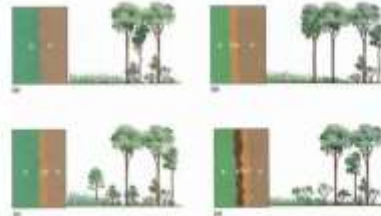
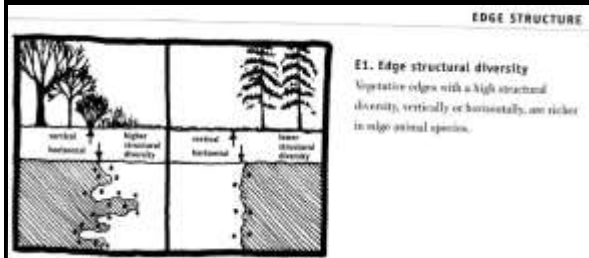


Fig.1 & 2 show simple ECOTONES with equal and homogeneous surfaces in both cases. Fig.3 shows an inclusion of each medium in the other, creating multiple ecotones, which are shown in a more complex form in figure 4. Fig. 5 & 6 show the edges of forests or banks treated in such a way as to lengthen the ecotone considerably without excessively modifying the environment. Fig.7 shows a common interpenetration of media (such as that found at the edge of a forest). Fig.8 shows an ecotone that could have been formed by an animal modifying its environment.

EDGES

5 principles

Edge



E1. Edge structural diversity
Vegetative edges with a high structural diversity, vertically or horizontally, are richer in edge animal species.

E1. Keragaman Struktur Edge

Edge tanaman dengan keragaman struktur yang tinggi, baik vertikal maupun horizontal, lebih banyak memiliki spesies hewan Edge.

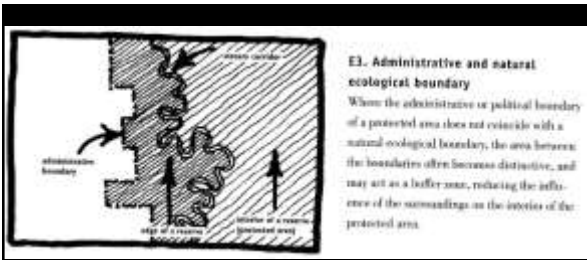


E2. Edge width

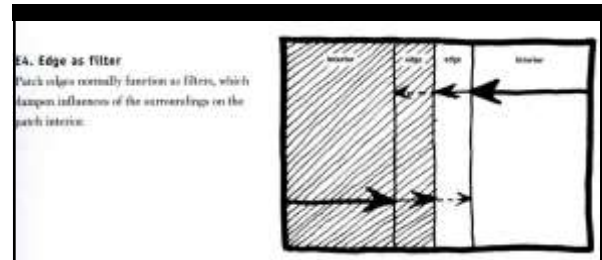
Edge width differs around a patch, with wider edges on sides facing the predominant wind direction and solar exposure.

E2. Ketebalan Edge

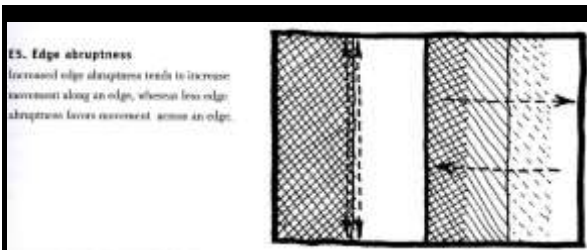
Ketebalan / Kelebaran Edge berbeda di sekeliling patch, dengan Edges yang lebih lebar berada pada bagian yang menghadap arah angin dan cahaya.



E3. Batas Ekologi Administratif dan Alami
 Batas administratif atau politik **tidak bertepatan** dengan batas ekologi, kawasan diantara *boundary* sering menjadi berbeda dan bisa menjadi zona penyangga (*Buffer Zone*), mengurangi pengaruh sekelilingnya terhadap *interior* Kawasan Lindung (*Protected Area*).



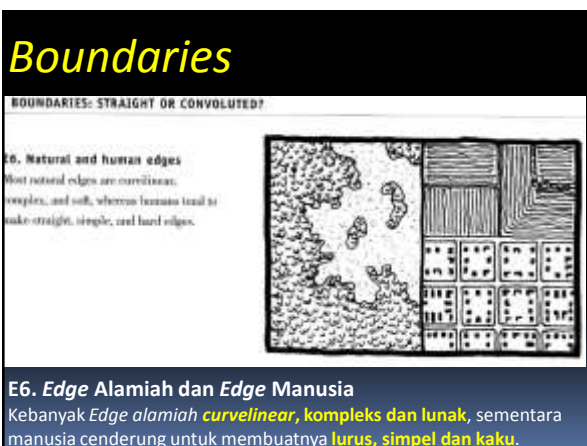
E4. Edge sebagai penyangg (Filter)
Patch Edge biasanya berfungsi sebagai **penyangg (filters)**, yang mana mengurangi/mereduksi pengaruh sekeliling terhadap *patch interior*.



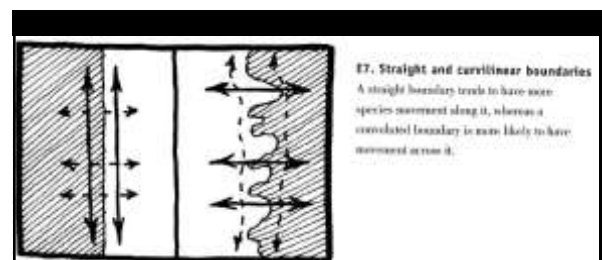
E5. Kecuraman Edge
 Kecuraman *Edge* yang meningkat cenderung meningkatkan pergerakan **sepanjang** *Edge*, sementara *Edge* yang tidak curam cenderung membuat pergerakan **melintasi** sebuah *Edge*.

BOUNDARIES

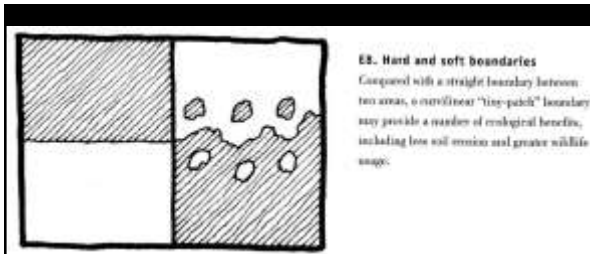
9 principles



E6. Edge Alamiah dan Edge Manusia
 Kebanyak *Edge* alamiah **curvilinear, kompleks dan lunak**, sementara manusia cenderung untuk membuatnya **lurus, simpel dan kaku**.

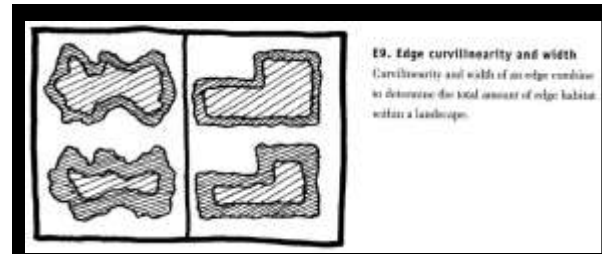


E7. Boundary STRAIGHT dan Boundary CURVILINEAR
STRAIGHT Boundary cenderung memiliki banyak pergerakan spesies di sepanjang tepiannya, berbeda dengan **CURVILINEAR Boundary** yang cenderung mempunyai pergerakan melintasi tepiannya.



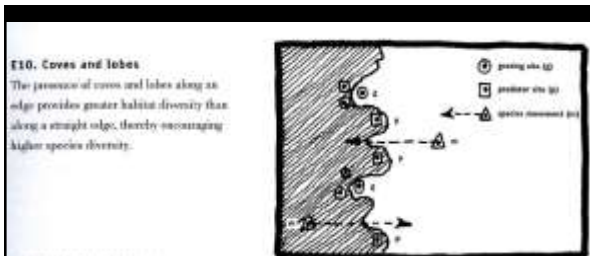
E8. Boundary KERAS dan Boundary LUNAK

Bila dibandingkan dengan **HARD Boundary** di antara dua kawasan, **SOFT Boundary** cenderung memiliki banyak keuntungan ekologis, termasuk di dalamnya erosi tanah yang sedikit dan satwa liar yang banyak.



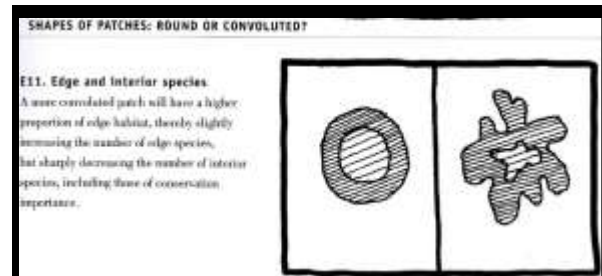
E9. Edge Curvilinearity dan Edge Width

Kombinasi *curvilinearity* dan lebar sebuah Edge menentukan **jumlah Edge habitat** di dalam lanskap. Pola organik memberikan Edge habitat yang lebih tebal dan beragam.



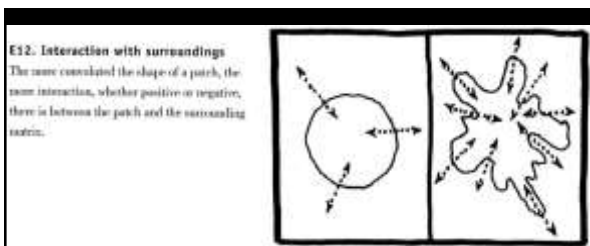
E10. Teluk (Coves) dan Tanjung (Lobes)

Keberadaan Teluk-Tanjung di sepanjang Edge menyediakan **keragaman habitat yang lebih besar** dibandingkan dengan Edge yang lurus, bahkan bisa meningkatkan keragaman spesies.



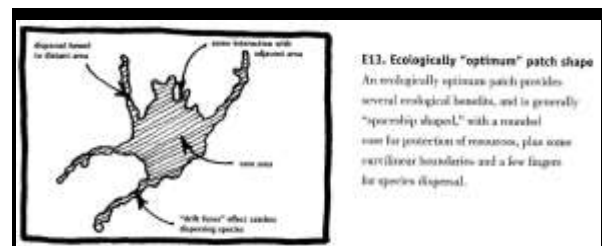
E11. Spesies pada Edge dan Interior

Semakin berliku patch akan memiliki proporsi edge habitat yang lebih tinggi, sehingga meningkatkan jumlah spesies Edge, **NAMUN** menurunkan jumlah spesies interior, termasuk pada kawasan yang penting untuk dikonservasi.



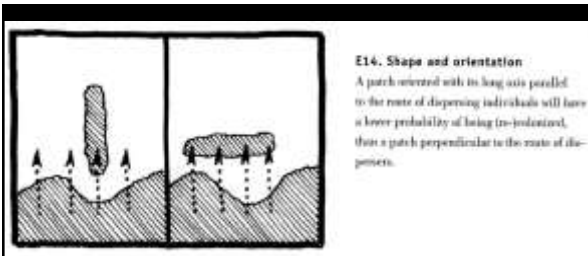
E12. Interaksi dengan sekelilingnya

Semakin berliku bentuk *patch*, **semakin banyak interaksi**, baik positif maupun negatif, interaksi terjadi antara *patch* dan *matrix* di sekelilingnya.



E13. Bentuk Shape "OPTIMUM" secara Ekologis

Patch yang secara ekologi OPTIMUM menyediakan beberapa keuntungan ekologis, dan biasanya seperti "**SPACESHIP SHAPED**", dengan inti yang membulat untuk melindungi sumberdaya, plus beberapa **CURVILINEAR BOUNDARY** dan beberapa "**FINGERS**" untuk penyebaran spesies.



E14. Shape and orientation
 A patch oriented with its long axis parallel to the route of dispersing individuals will have a lower probability of being in-isolated, than a patch perpendicular to the route of dispersers.

E14. Bentuk dan Orientasi

Patch yang berorientasi sepanjang axis paralel dengan rute berpencarnya individu akan memiliki peluang yang rendah untuk di **RE-KOLONISASI** daripada patch yang tegak lurus dengan rute penyebaran.

CASE(S)

Edges and Boundaries

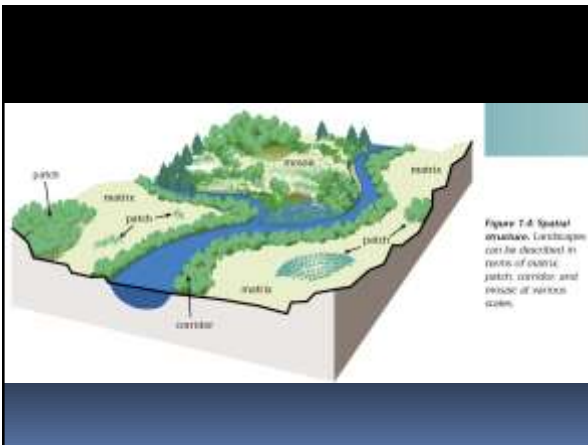


Figure 1.6: Spatial structure. Landscapes can be described in terms of exotic patches, corridors, and matrix of various sizes.

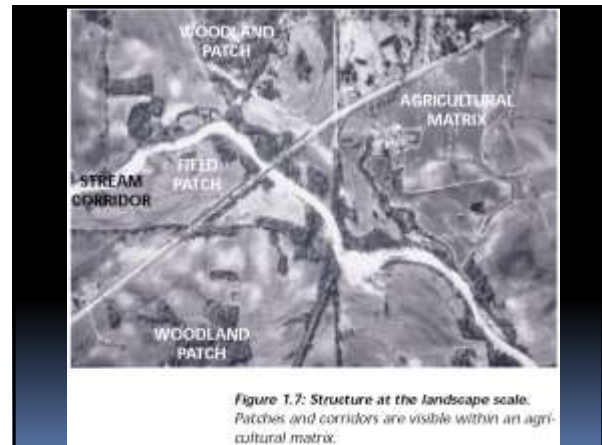
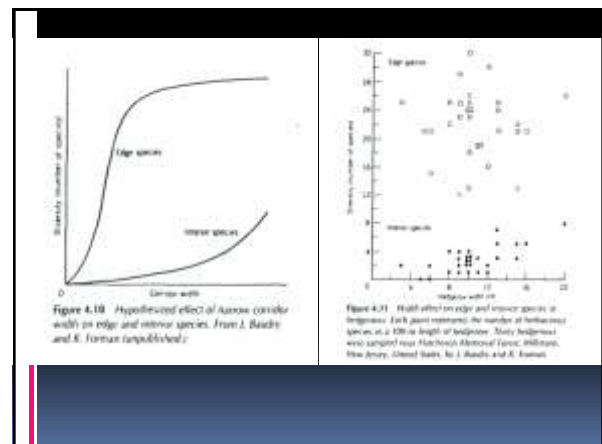
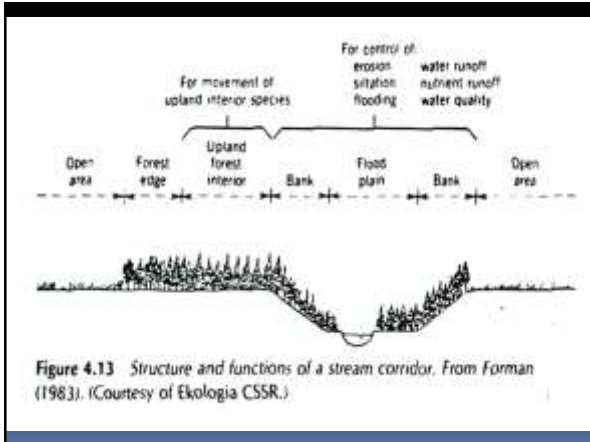


Figure 1.7: Structure at the landscape scale. Patches and corridors are visible within an agricultural matrix.



Figure 1.8: Structural elements at a stream corridor scale. Patches, corridors, and matrix are visible within the stream corridor.





Habitat Edges

- The outlying boundary area of a patch exposed to the surrounding matrix
- Edge effect:** The effect the patch edge has on the persistence of an organism
 - Effect is based upon resource availability, as well as exposure to predation and parasitism

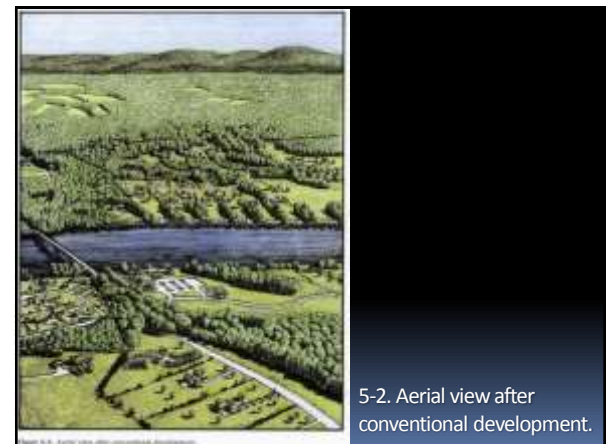
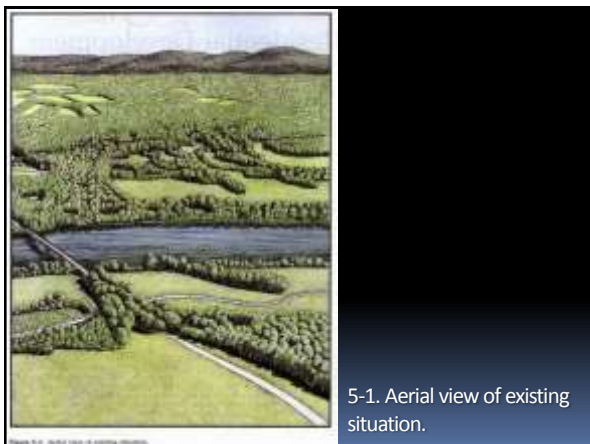
Boundaries

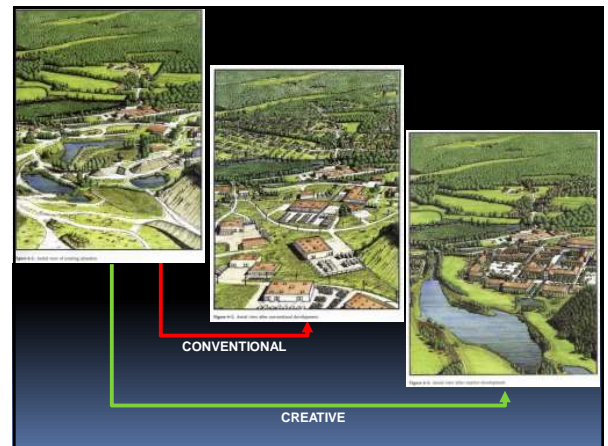
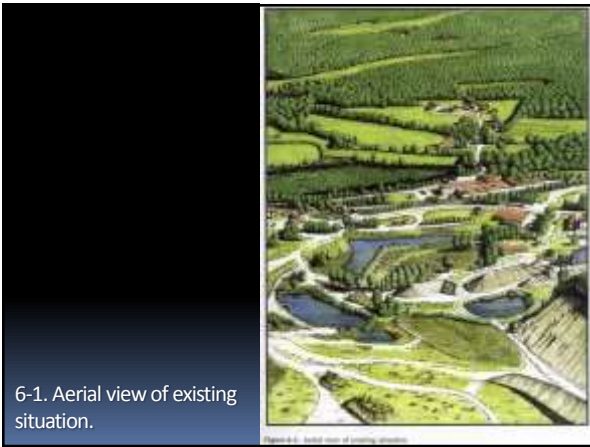
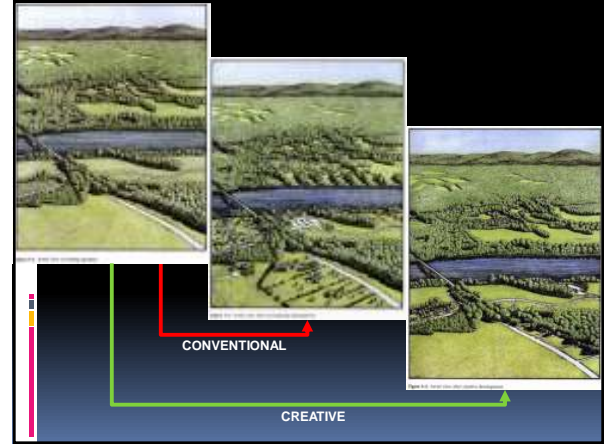
The **TRANSITION** zone between two distinct landscape elements (e.g. patch and matrix) is variously called:

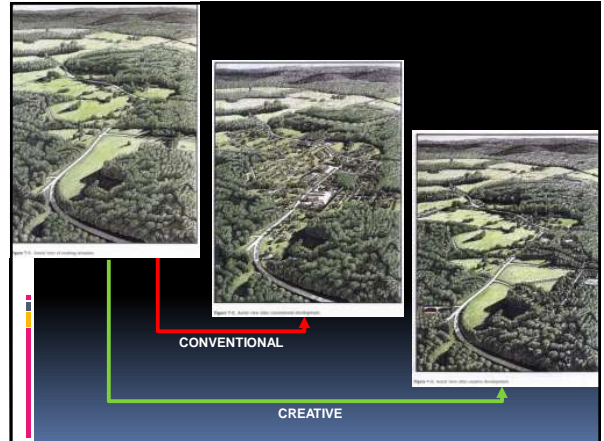
- an **EDGE**
- an **ECOTONE**
- a **BOUNDARY**

BOUNDARIES

- This **TRANSITION** area possesses some characteristics of both landscape elements but is neither completely one nor the other. Therefore, some people refer to an **ECOTONE** as a landscape element (habitat type) unto itself.
- EDGES** are often **DRIER** and **HOTTER**, with more weedy species, than the patches of which it is an edge. Others recognize that although it may have some emergent properties, an edge/ecotone/boundary's **PRIMARY FUNCTION IS AS A BARRIER** (permeable or impermeable) to **ECOLOGICAL FLOWS** (movement of matter [including organisms] and energy).







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Terima kasih

before

after