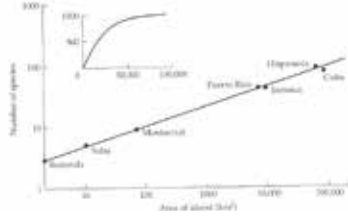


Species-area curve

FIGURE 13.1 The empirical relationship between number of species (S) and island area (A) for reptiles and amphibians of the West Indies, plotted from the original data of Darlington (1957). Note that both axes are logarithmic, and the points are well fitted by a straight line and the equation $S = cA^z$, where c and z are fitted values. Inset depicts this relationship in arithmetic space. (After MacArthur and Wilson 1967.)



Lomolino et al., 2006

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Species-area curve

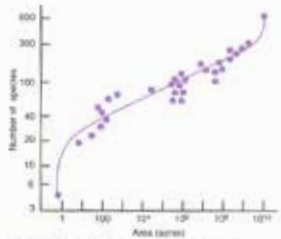


FIGURE 14.1 The relationship between sampling area and bird species richness in North America. The data are plotted on a log-log graph to render the species-area curve into a relatively straight line. As the size of the sampling area increases, the number of bird species found also increases (after Preston, 1960).

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Species-area curves for different animal groups

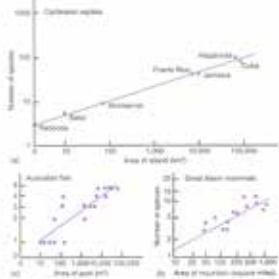
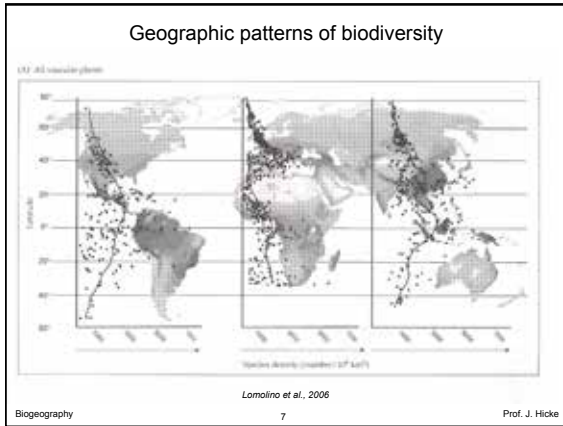


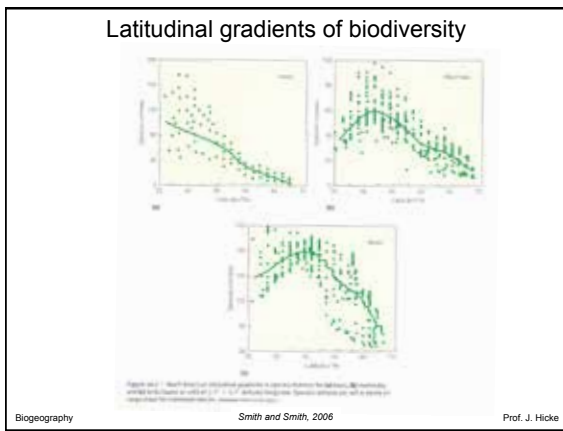
FIGURE 14.6 The relationship between island area and species richness for reptiles and amphibians in the Caribbean. The relationship between fish species richness and logging island area in the Australian rainforest, and between forest mammal species richness and mountain range area in isolated mountains in the Great Basin of North America after MacArthur and Wilson, 1967; Foster and Squires, 1968; and Brown, 1979.

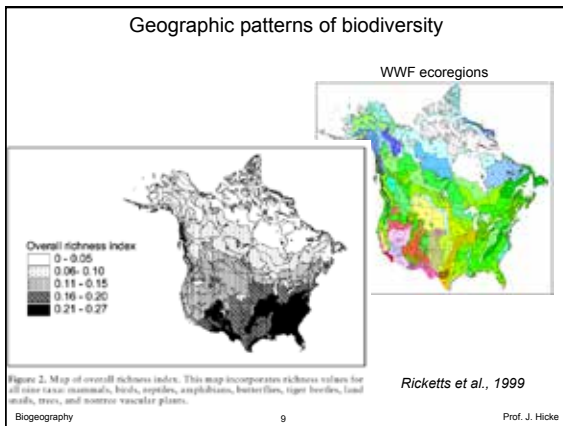
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Species richness (S) at high latitudes is 1-10% of S at lower latitudes

TABLE 14.2 Examples of Latitudinal Gradients of Species Richness for Selected Terrestrial and Marine Organisms

Organism	Region	Low Lat. Species Richness	High Lat. Species Richness
Mammals	N. America	8° N	240
Mammals	S. America	13° N	207
Land birds	N. America	8° N	800
Reptiles	N. America	30° N	80
Amphibians	N. America	38° N	40
Arts	S. America	29° S	220
Orchids	S. America	0°	2500
Marine fish	N. America	32° N	239
Marine mollusks	N. America	25° N	500

low latitudes

high latitudes

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S at high elevations is less than that of S at lower elevations

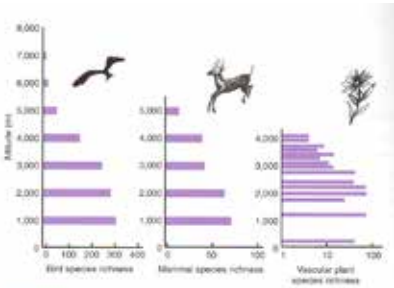


FIGURE 14.4 Declining species richness of birds and mammals at higher elevations in the Himalayan Mountains (after Squire et al., 1986; Hunter and Manson, 1982; Vajda et al., 1987).

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Fragmentation of tropics drove allopatric speciation



FIGURE 14.8 Suggested extent of tropical rainforest in South America, Africa, and Southeast Asia during the last glacial maximum approximately 20,000 years ago (after Teller, 1987). However, not all biogeographers believe that the fragmentation of rainforest was as severe.

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Local biodiversity differences can be explained by historical theory

Lake Baikal: 1 M years old: 580 benthic invertebrates, many endemic

Great Slave Lake: 10,000 years old: 4 benthic invertebrates



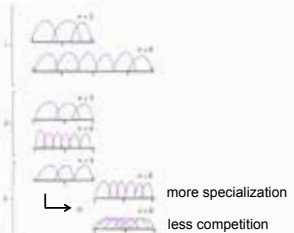
www.lib.utexas.edu/maps/middle_east_and_asia/asia_ref04.jpg

www.worldlakes.org/uploads/GreatSlave%20Lake_locatmap.gif

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Relevant theories about resource gradients and niches

1. differences in length of resource gradient
2. more specialization
3. more resources



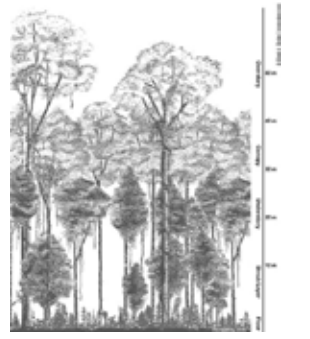
more specialization
less competition

FIGURE 19.9 Hypothesized resource gradients and niche spaces in non-still high-diversity geographic areas. The top example represents a situation in which the high diversity region has greater resource and species richness than the gradient region, and available niche space. The second example represents a situation in which gradient length, not niche richness, is the major factor in determining species richness. More species become available during the gradient's peak, and the gradient region has a higher species richness than the gradient region. The third example represents a situation in which resource abundance is higher in the peak and high biodiversity, and the low-diversity region represents a situation in which the resource abundance is lower than in the gradient region. The fourth example represents a situation in which the gradient region has a higher species richness than the gradient region, but the gradient region has a higher resource abundance than the gradient region.

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Habitat variability influences biodiversity

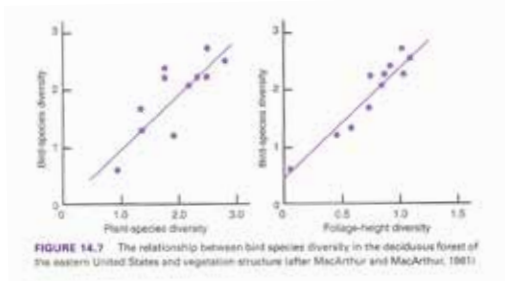
Vertical structure of a rainforest



www.mongabay.com

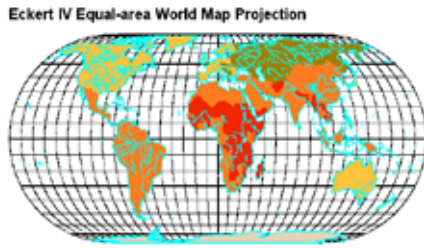
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Increases in bird species diversity in response to habitat variability



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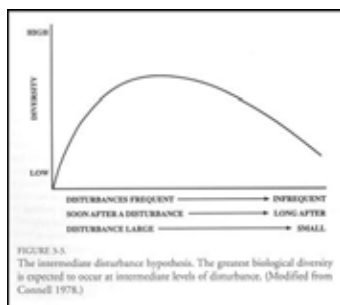
Large area in tropics allows for greater S



atlas.nrcan.gc.ca/site/english/learningresources/carto_corner/eckert.gif#image_view

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Intermediate Disturbance Hypothesis



efc.muskie.usm.maine.edu/Landscape_Ecology_for_Planners_files/slide0061_image078.jpg

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Following disturbances, where is biodiversity highest?

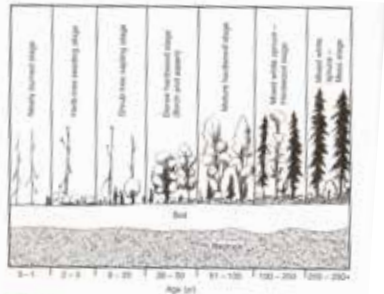


FIGURE 5.7 Restored post-fire succession in a boreal white spruce (*Picea glauca*) forest within the Chukotka Territory, 1985.

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Evidence against disturbance as a control on global biodiversity patterns

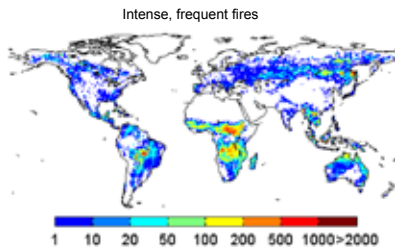


Fig. 6. Mean annual fire emissions ($g C m^{-2} year^{-1}$) averaged σ 1997-2004.

van der Werf et al., 2006

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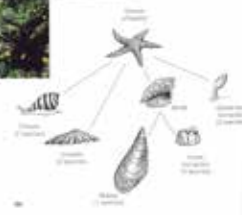
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Predator controls on biodiversity

Artificial exclusion experiments



Figure 21.6 All the rocky intertidal pools in the Pacific Northwest, including the one in which this starfish lives, contain a diverse assemblage of species. The starfish is a predator that feeds on many of the species in the pool. In the absence of the starfish, the diversity of the pool would be much higher. The starfish is a keystone predator that controls the diversity of the pool.



Prey species before: 15
Prey species after: 8

Smith and Smith, 2006

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Increases in diversity with increasing evapotranspiration

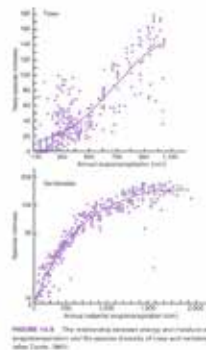


FIGURE 14.9 The relationship between energy and productivity is related to the relationship between the diversity of life and evapotranspiration (after Forman, 2005).

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Types of ecosystem services



Pereira and Cooper, 2006

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