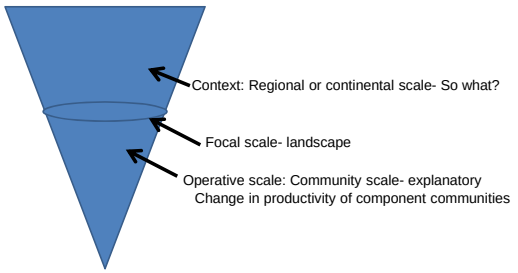
Interpretation of hierarchical diagram



Lab 2: Developing an hierarchical scale for an ecological process

Example: Plant biomass growth over varying spatio-temporal scales

At what scales could we consider this process?
What variables should we measure?

Note: Actually we will consider only phytomass.

Studying plant biomass growth over varying spatio-temporal scales

Biomass scale	Temporal scale	Spatial scale	Measured variables
Single leaf (multiple cells)	Several minutes to hours	Individual leaves	CO_2 assimilation, air temp., RH, soil moisture
Individual plant (multiple leaves)			
Population (multiple plants)			
Community (multiple populations)			
Landscape (multiple communities)			
Continental (multiple landscapes)	decades		

Expressing the question that is being addressed at each scale helps you to develop what the measured variables should be at that scale.

Studying plant biomass growth over varying spatio-temporal scales

Biomass scale	Temporal scale	Spatial scale	Measured variables
Single leaf (multiple cells)	Several minutes to hours	Individual leaves	CO_2 assimilation, air temp., RH, soil moisture
Individual plant (multiple leaves)	Growing season (1-5 months)	Square meters	Phytomass produced, precipitation, Plant size or age
Population (multiple plants)			
Community (multiple populations)			
Landscape (multiple communities)			
Continental (multiple landscapes)			

Studying plant biomass growth over varying spatio-temporal scales

Biomass scale	Temporal scale	Spatial scale	Measured variables
Single leaf (multiple cells)	Several minutes to hours	Individual leaves	CO_2 assimilation, air temp., RH, soil moisture
Individual plant (multiple leaves)	Growing season (1-5 months)	Square meters	Phytomass produced, precipitation, Plant size or age
Population (multiple plants)	Growing season	0.1-1 ha	Phytomass produced, precipitation, Plant density, coverage
Community (multiple populations)			
Landscape (multiple communities)			
Continental (multiple landscapes)			

Studying plant biomass growth over varying spatio-temporal scales

Biomass scale	Temporal scale	Spatial scale	Measured variables
Single leaf (multiple cells)	Several minutes to hours	Individual leaves	CO_2 assimilation, air temp., RH, soil moisture
Individual plant (multiple leaves)	Growing season (1-5 months)	Square meters	Phytomass produced, precipitation, Plant size or age
Population (multiple plants)	Growing season	0.1-1 ha	Phytomass produced, precipitation, Plant density, coverage
Community (multiple populations)	Growing season or multiple growing seasons	0.1-1 ha	Phytomass by species or life form Species composition
Landscape (multiple communities)			
Continental (multiple landscapes)			

Studying plant biomass growth over varying spatio-temporal scales

Biomass scale	Temporal scale	Spatial scale	Measured variables
Single leaf (multiple cells)	Several minutes to hours	Individual leaves	CO_2 assimilation, air temp., RH, soil moisture
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Community (multiple populations)	Growing season or multiple growing seasons	0.1-1 ha	Phytomass by species or life form Species composition
Landscape (multiple communities)	1 to several decades	$1x10^4$ to $1x10^6$ ha	Remotely sensed data vegetation index- Land type cover, land use change
Continental (multiple landscapes)			

Studying plant biomass growth over varying spatio-temporal scales

Biomass scale	Temporal scale	Spatial scale	Measured variables
Single leaf (multiple cells)	Several minutes to hours	Individual leaves	CO_2 assimilation, air temp., RH, soil moisture
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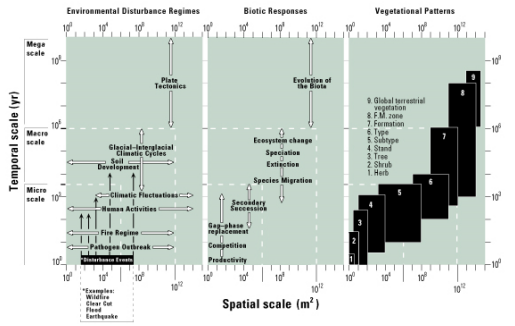
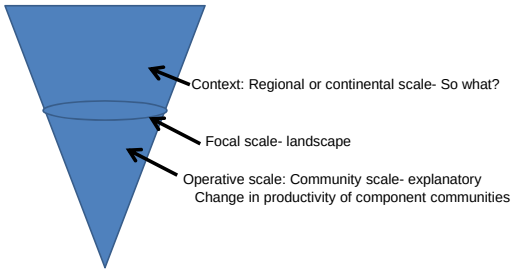
Community (multiple populations)	Growing season or multiple growing seasons	0.1-1 ha	Phytomass by species or life form Species composition
Landscape (multiple communities)	1 to several decades	$1x10^4$ to $1x10^6$ ha	Remotely sensed data vegetation index- Land type cover, land use change
Continental (multiple landscapes)	1 to several decades	$1x10^8$ to $1x10^{10}$ ha	Remotely sensed data vegetation index- AVHRR, MODIS Land type cover, land use change

Space-time hierarchy proposed by Delcourt et al. (1983) describing the relationships between disturbance, biotic responses, and vegetational patterns



Source: Turner et al. 2001, Figure 2.1

Interpretation of hierarchical diagram



Now it is your turn