

Ecological Succession

Community (Ecosystem) Development

Temporal Change in Community

Driven by Biotic and Abiotic Processes

Succession:

More, Different Species; Increased Spp Diversity

Increased Gross Productivity & Respiration

Biomass Increases to Maximum

Net Productivity Declines

Mechanisms of Succession

Facilitation: *Pioneer Species Modify Environment*

Permits/Enhances Entry of Persistent Species

Inhibition: *Pioneer Species Monopolize Resources*

Competitively Resist Entry of Mature Species

Independence: *Null Hypothesis*

Species Interaction Unimportant

Species Sequence Reflects Life Histories

Actual Succession:

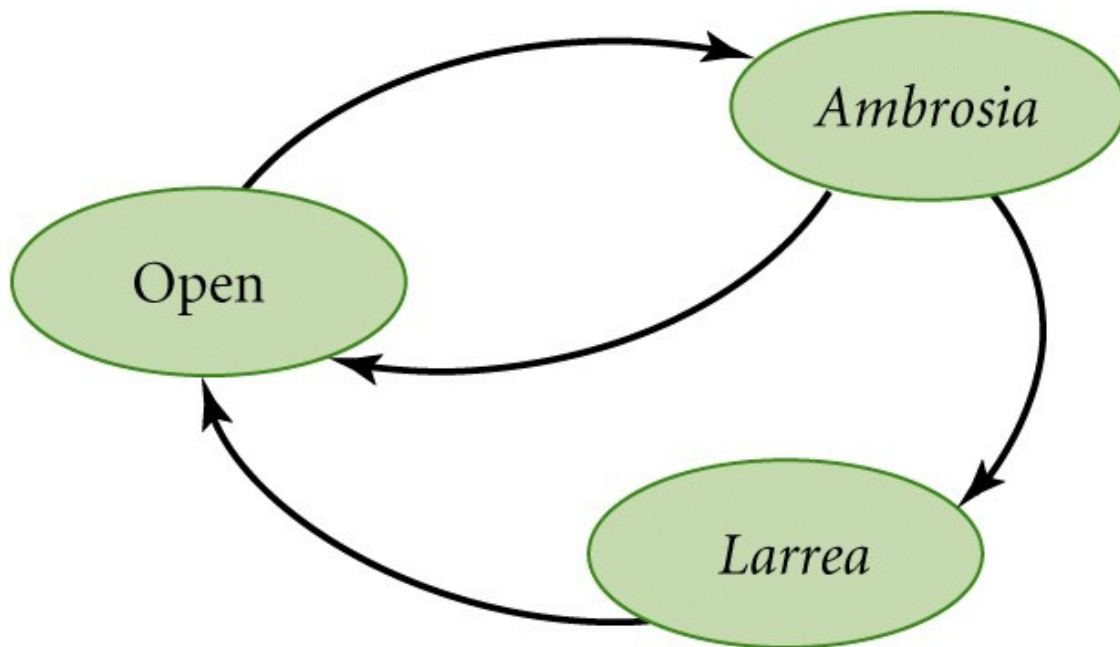
Facilitative and Inhibitory Effects

Difficult to Predict When/Where +/- Dominate

Need Model for Succession: *General Biotic Effects*

Markov Model

Creosote Succession (Ricklefs & Miller 2001)



$s(t)$: 3 elements; 4 non-zero transitions

Does *Ambrosia* (wormwood) facilitate or inhibit *Larrea* (creosote)?

Creosote seedlings found under wormwood canopy;
No reverse transition

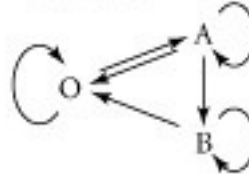
Ambrosia facilitates *Larrea*

Idealized

Future state	Present state		
	O	A	B
O	+	+	+
A	+	+	0
B	0	+	+

(a)

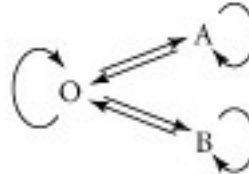
Facilitation model



Future state	Present state		
	O	A	B
O	+	+	+
A	+	+	0
B	+	0	+

(b)

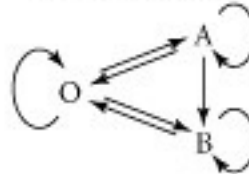
Inhibition model



Future state	Present state		
	O	A	B
O	+	+	+
A	+	+	0
B	+	+	+

(c)

Tolerance model



Future state	Present state		
	O	A	B
O	+	+	+
A	+	0	+
B	+	+	0

(d)

Cyclic model

