Ecology 2

Don't forget the Pop Growth SimuText (see Ecology2 lecture)

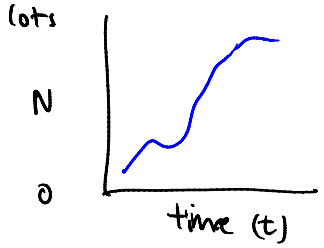
- send answer to iClicker Question 30A now.
- Gypsy moths II: patterns
- Population growth
  - linear
  - exponential
  - logistic
  - gypsy moth
  - human
- iClicker Question 30B

Due in lab **this** week:
⇒ Pre-lab for Animal Behavior (Lab Manual p 127 & on-line)
⇒ Animal Diversity Lab Report

Final Exam Wednesday 5/19 11^{30} - 2^{30} here (info in Ecology 5)
(same rooms as usual)

Gypsy moth defoliation ~ population size
- usually low
- spike in 1981 – why up? why down?
  ⇒ started in center; ended at edges

Population growth N = population size (or density)
t = time



growth rate = $\frac{\text{change in } N}{\text{time}} = \frac{\Delta N}{\Delta t} = \frac{dN}{dt}$
= slope of line

① simplest model of growth = linear growth
= same # of individuals born each hour
(like cars from an assembly line)

time:	0	1	2	3	4	5
N:	1	3	5	7	9	11

N:	1	3	5	7	9	11
rate	+2	+2	+2	+2	+2	constant rate

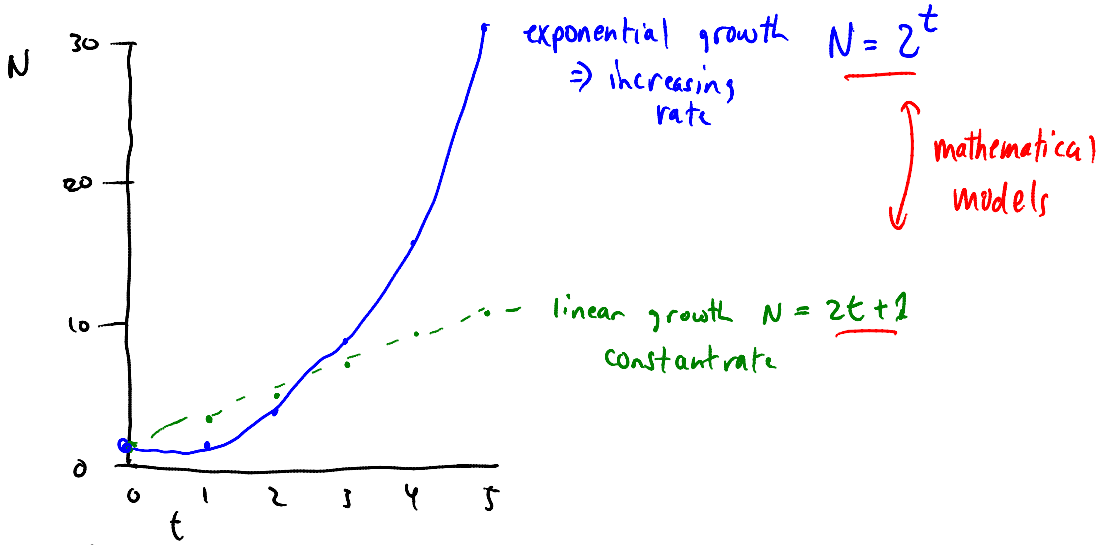
④ more realistic model : exponential growth

* each individual produces same # of offspring per time

ex. each yeast cell divides into 2 cells every hour

∴ more yeast cells ⇒ faster growth rate

time	0	1	2	3	4	5
N	1	2	4	8	16	32
rate	+1	+2	+4	+8	+16	rate is always increasing



Exponential growth - works for many organisms

ex humans ⇒ more people → more people having children → faster growth rate

⇒ exponential growth

Unrealistic - only works when resources are unlimited (approximately)

- true when N is small or resources are plentiful

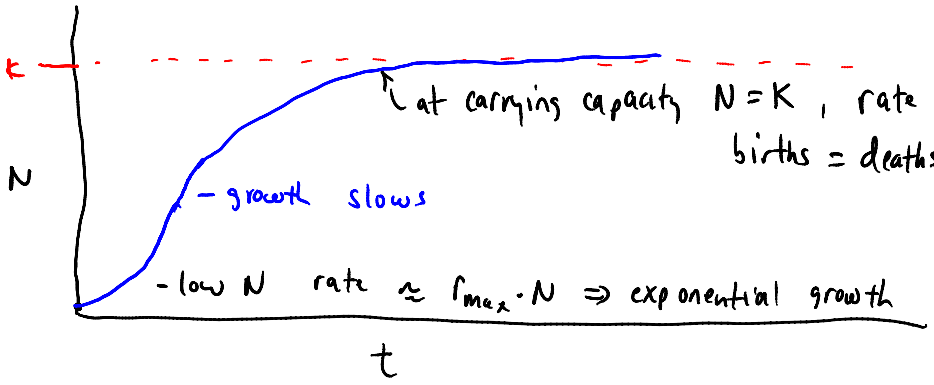
⑤ more realistic model = logistic growth

* resources are limited ∴ environment has carrying capacity = K

= max # or density that the environment can stably support (due to food limitation, waste production, space, etc.)

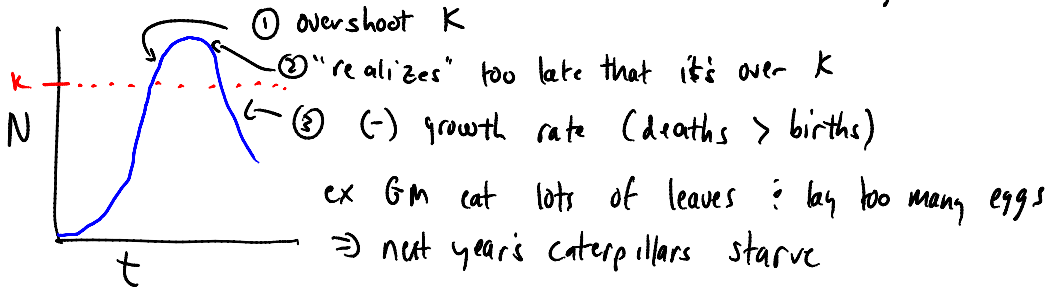
$$\text{growth rate} = r_{max} \cdot N\left(\frac{K-N}{K}\right)$$

r_{max} ↑ maximum rate

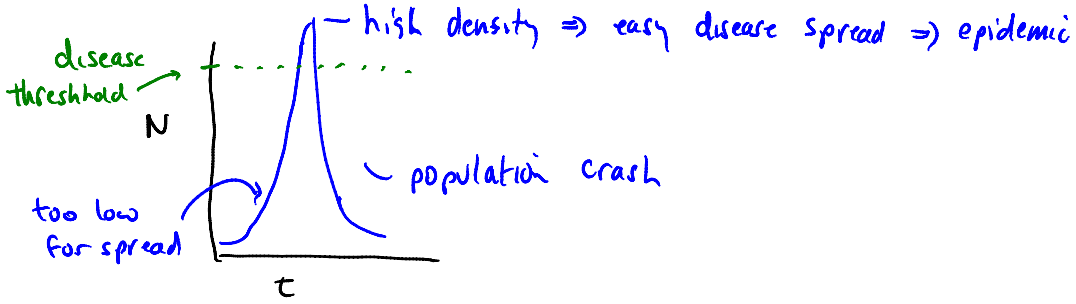


logistic model does not take into account:

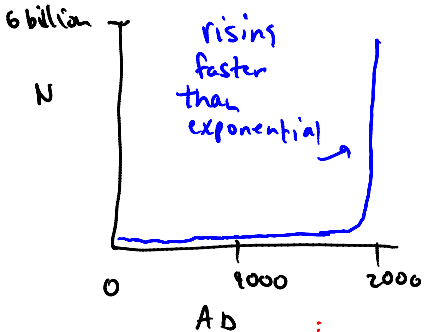
① time delay between resource limitation & reduction in growth rate



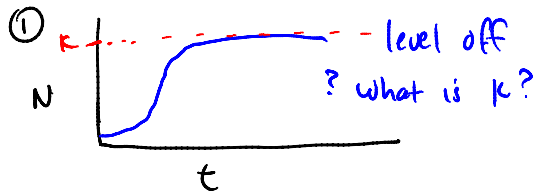
② high density effects - ex disease (virus & fungus) of GM
- no effect until density is v. high ⇒ allows rapid contagion
- then epidemic kills lots

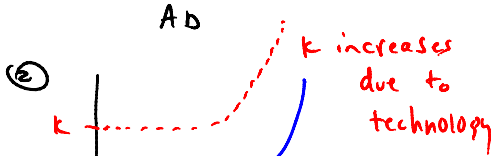


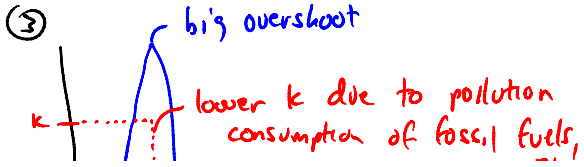
Human population growth

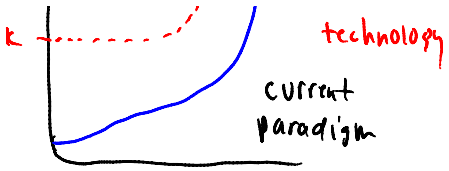


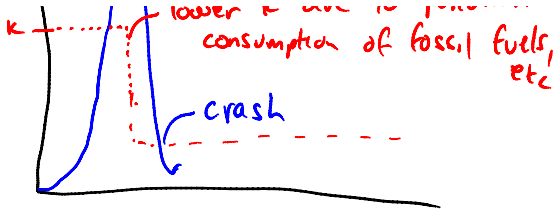
What's next? scenarios











Gypsy Moth Diseases

Caterpillar

Killed by Virus

Killed by Fungus