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|  |  | .navigate |  |  | we don't need no .introduction \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |  |
|  | [[home](http://docs.google.com/index.htm)]  [[abstract](http://docs.google.com/abs.htm)]  [[introduction](http://docs.google.com/intro.htm)]  [[hypothesis](http://docs.google.com/hypo.htm)]  [[experiment](http://docs.google.com/exp.htm)]  [[data](http://docs.google.com/data.htm)]  [[conclusion](http://docs.google.com/conc.htm)]  [[we recommend](http://docs.google.com/rec.htm)]  [[daily log](http://docs.google.com/log.htm)]  [[other](http://docs.google.com/other.htm)]  [[bibliography](http://docs.google.com/bib.htm)] |  |  | ***What sort of interactions go on between a community of organisms in an ecosystem?*** **Well, to answer that, we must first ask, what is a community and what is an ecosystem?**         A community is all the organisms that inhabit a common environment and interact with each other.  And example of such a community is the variety of organisms living within the Arroyo Del Valle creek.  These organisms interact with each other.  Algae produces oxygen for the myriad water creatures that inhabit the lake, and various animals hunt and eat other organisms in the creek.  These interactions between different organisms form the community of the area.  The community inhabits an ecosystem, which is the interacting system of both the abiotic and biotic parts of the environment.  The abiotic conditions of an environment are very important, because they affect the organisms living in the ecosystem immensely.  If such cycles as the nitrogen cycle are inhibited somehow, plants in the ecosystem will be severely hampered in any endeavors to grow. ***How do the organisms grow in the ecosystem?***   There are two polar extremes in organism growth.  Some organisms, the r-strategists, grow exponentially, and quickly breach the carrying capacity.  This overproduction of offspring is usually soon followed by a sharp drop in population because the ecosystem cannot support such a large amount of organisms.  These r-strategists follow an exponential equation of growth.  The exponential model of growth was presented by the famous British economist, Thomas Robert Malthus (1766-1834), who stated that populations tended to increase much faster than the supply of food.  The exponential equation for growth of a population is:    dP/dt = (b � m)\*P = r\*P    dP/dt is the change in population with respect to time.  �b� stands for the amount of births in the time interval, �m� stands for the amount of deaths in the time interval, and P is the population size.  (b � m) can be abbreviated by r, which is the rate of the exponential.  There are three cases in an exponential function: the blue is where r is positive, and the population is growing, the red is where r is zero and the population stays the same size, and the green is where r is negative and the population is decreasing in size.      The second case of growth for organisms is the K-strategist model.  This model, so called because K stands for the Carrying Capacity of the system, was developed by the Belgian Mathematician Pierre Verhulst in 1838 who brought forth the concept that the rate at which the population is growing may be limited by the density of the population.  The so-called Logistic model is defined by the differential equation:  dP/dt = r0\*P\*(1-P/K)    In this model, there are three outcomes.  The blue is where the initial population, P0 is greater than the Carrying Capacity.  It swiftly drops down the population size to reach the carrying capacity.  The second outcome is where P0 equals the carrying capacity.  In this case, nothing happens, because any rise or fall in population is going away from the carrying capacity, which the equation wants to converge to.  The final outcome, in the green, is where P0 is less than the carrying capacity, and it moves upwards to reach the carrying capacity level.  The logistic model has two equilibria in its system: when P is equal to 0 and when P is equal to the carrying capacity.  Once it reaches either, it will stay there unless the population is upset by, say, a natural disaster.      ***Predator-Prey Interaction***            Organisms in an ecosystem interact with each other, usually in a predator-prey interaction.  In a food chain, the consumers on top rely on their prey below them to stay alive.  When a lower level organism is removed from the food chain, this causes drastic consequences for all organisms above them on the food chain.  For example, if there were huge runoffs of sewage or fertilizer into the Arroyo Del Valle, an algae bloom would likely occur in the water due to the increased levels of nitrates and phosphates.  Since there is a huge growth in the population of algae, the population sizes of the organisms that feed on them grow in turn because of the overabundance of food.  This ripple effect continues down the line, as each predator population gains size because of the abundance of the prey population that it feeds on.  However, when the algae bloom ends and the algae population returns to normal, the organisms that feed on the algae find themselves starving for lack of food.  They die in turn.  This also ripples down the populations of organisms in the creek causing many of them to die.  This effect is one of the interactions we hope to see in our simulation. |  |
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