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Eco 602
Reading Questions Week 1

1. A model can be defined and differentiated as phenomenological or mechanistic based on why it was chosen. Phenomenological models include analyses that are reflective of data patterns and fit well with the patterns that are shown. On the other hand, mechanistic models are not based on observed patterns, rather they are based on theory. Mechanistic models are chosen to display the underlying aspects of the data that are not seen by observations.

   If I were to approach a research interest based on a phenomenological model, I would create a table of observational data (i.e., species name, number of times observed, time of day, weather condition). Based on the trends I observed from the data I recorded, I would select functions and distributions that best displayed these. If I were to approach a research interest based on a mechanistic model, I would devise a plan based on what I predict would best illustrate the theoretical expectation of the data collected. This means the actual data collected could fit into the functions and distributions selected very differently than was expected by theory.
2. Scientific bias can completely change the way data is presented and perceived. Often times, a scientific bias is the result of focusing closely on two particular variables that are thought to be correlated with one another. When we anticipate that these two variables are going to show a relationship, we might not consider that dependent variable is impacted by numerous other factors.

   In the climate change example in McGarigal, we see in the first testimony that the researcher only considers that climate change is the result of a change in nesting behaviors among birds. In the fourth testimony, we learn that there is another statistically significant factor that is correlated with nesting behavior changes--habitat-induced

changes. This demonstrates how a scientific bias, in this case assuming that climate change is the only important variable, can be problematic.

Biases have negative consequences because they hide information that may be critical to know, and this information may not be scientifically communicated at all. Not only does scientific bias inhibit the ability to convey all information to the scientific community and general public, but it has negative implications for management plans when the whole story is unknown. In other words, the changes that you might expect to see as a result of a proper management plan may not occur due to external factors that were left out that are inhibiting the conservation area.

3. The two primary components of the dual model paradigm are the deterministic and stochastic models. The deterministic component defines the environmental process by using models that demonstrate the expected values without considering randomness and error. This component is helpful for qualitative, not quantitative comparisons. The stochastic component accounts for variation and sources of error in the expected data pattern. Probability distribution models are often used to do so.

   The two components can be demonstrated in models that are used to predict the population trends of coyotes in New York City. For this research, a deterministic model would be useful for predicting that an increase in scavenging opportunities (roadkill and garbage) and evolutionary adaptations in the species would be expected to provide beneficial conditions for the coyote population to increase in urban areas. This model is great for predicting the scenario in an ideal world; however, the stochastic component will give us a better picture of the data in reality. This model will account for the variation due to sources that we are not collecting data for (i.e., human density, habitat destruction, climate change) and will quantify confidence of our model and significance of the factors.

4. An ecological population accounts for all individuals that exist at a given time across all geographic regions. The ecological does not generally vary based on the scope of a

research question. A statistical population is a subset of an ecological population (usually in a particular region(s)), and it does depend on the scope of the research question.

5. If I were studying the impact of cattails on disturbed eutrophic sites, I could use a categorical/nominal scale to measure the native plant and animal species. These variables (native plants and animals) can be organized by species name which is why a categorical and nominal scale would be appropriate. Another possibility that could be used for this study is a continuous variable on a ratio scale. A ratio scale could be used to measure mass of cattails (mass is a continuous variable).

I did not get the chance to collaborate with other students.