**Instructions:** Perform a thought experiment below. Write a 3-5 p. paper (single-spaced, 12 pt. font, 1” margins, not counting reference list or figures or tables) synthesizing your ecological knowledge and library research findings with your own logical deductions. Use the complete citation style of the journal *Ecology* and note that points will be deducted for incompletely or incorrectly cited references, as well as spelling and grammatical errors. Read and cite at least 5 papers from the primary literature that report original research data and several review articles (You can use Biosis or Web of Science to find relevant papers, or ask us for leads).

**Regime Shifts Along Spatial Gradients Topic**

Take an explicitly spatial approach by hypothesizing where, along elevational, depth or latitudinal gradients, species interactions that affect ecological communities shift. Then, postulate how these boundaries might change (e.g. move up or down from current positions along gradients) under altered external forcing by land use practices, climate change, or biotic change, such as extinction, invasion, or trait evolution.

My general outline:

One of the easiest scenarios to analyze in this situation is the relationship between elevation and biodiversity.

For example, imagine you are climbing up the side of the mountain. At the bottom of the mountain (lower elevations), you may notice an abundance of species present for both plants and animals. That is because at these lower elevations, more species are able to thrive and reproduce as conditions are favorable to growth and development.

As you travel up the mountain, you may notice that biodiversity decreases as elevation increases. Higher elevations are less likely to support an abundance of species as changes in temperature and air pressure are not favorable to species who are not adapted to high-elevation conditions.

Now, think of how organisms interact along this elevation gradient. At lower elevations, species interactions will be increased as the shear number of organisms leads to greater interactions. Species in these low-elevation areas are also likely to adapt more easily when faced with change. High-elevations, however, do not support a vast array of organisms, and therefore, have decreased interactions. Organisms in these areas tend to be more widely dispersed as they search for areas to adequately meet their specific needs. These organisms are more readily affected by shifts in climatic conditions because their adaptations are highly specific to that area. The area where many of these species interactions greatly decrease along the gradient is referred to as the "tree line," which is the area where trees no longer grow along an elevation gradient. This is where the greatest shift in abundance and interactions will occur.

In terms of alteration, think of how these species, which are adapted to survive in specific conditions along the mountain, might be affected if climate change were to occur. If temperatures increase, the tree line may shift downward, and organisms that are adapted to higher elevation conditions will be forced to either adapt to new conditions, move upward along the mountain to find more desirable conditions, or face population extinction in the given area. If temperatures decrease, the opposite scenario would occur as populations in lower elevation areas may be forced to migrate to new areas or adapt to new conditions in order to survive.

You can also think of biotic change in terms of shifts in vegetation. If vegetation in the area changes along the mountain, species will be forced to shift either upward or downward along the gradient in order to find a habitat that is desirable for growth and development. Precipitation may also affect shifts in boundaries along the elevation gradient.

http://onlinelibrary.wiley.com/wol1/doi/10.1111/j.1600-0587.1995.tb00341.x/abstract