

BIODIVERSITY¹

Biodiversity is the variation of life forms within a given ecosystem, biome, or for the entire Earth. Biodiversity is often used as a measure of the health of biological systems.

Once we have produced the range maps for the all the species found at a particular site (see our page on species distribution maps), we can use the range map polygons to calculate the biodiversity of the site.

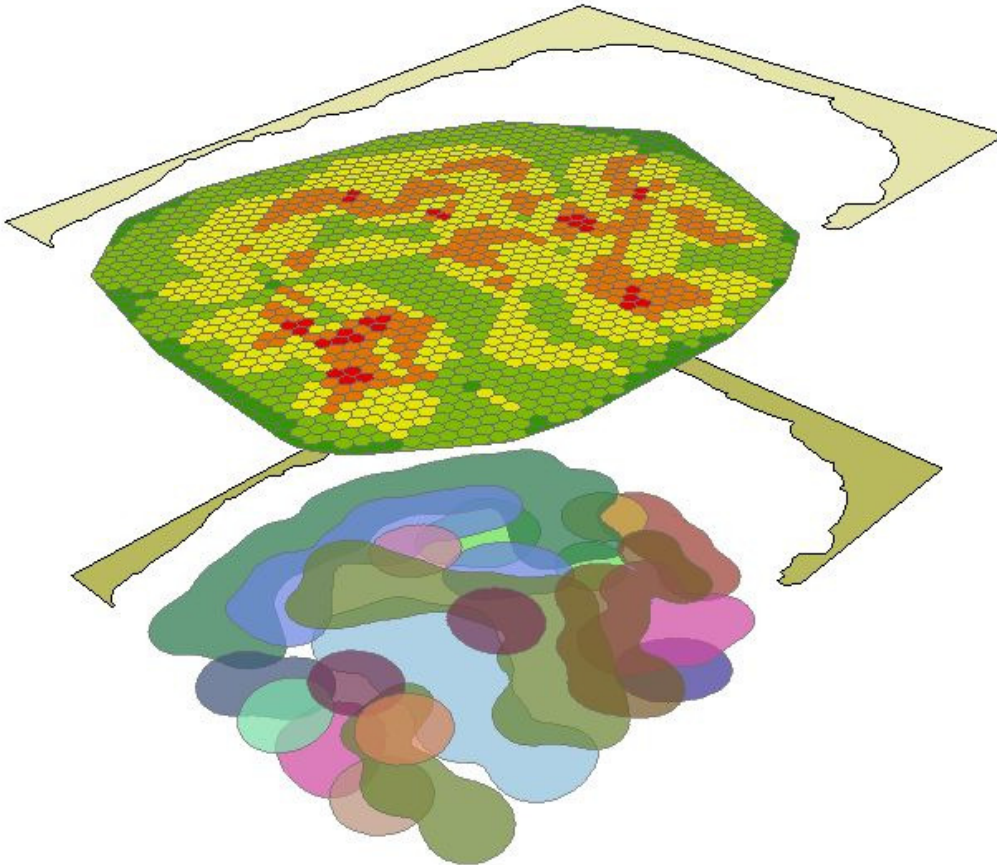
Biodiversity Indices

Some of the biodiversity indices which we can calculate are:

- **Shannon's diversity index** - the Shannon's diversity index is an "information index" which measures biodiversity based on the principle that diversity can be measured much like the information contained in a code or message (e.g., the longer and more complex the code, the greater the diversity). The Shannon's diversity index is affected by both the number of species and their equitability, or evenness. A greater number of species and a more even distribution of species both result in an increase in Shannon's diversity. The maximum Shannon's diversity for a sample is found when all species are equally abundant. Values of the Shannon's diversity index for real communities typically fall between 1.5 and 3.5.
- **Shannon's evenness** - Shannon's evenness is derived from Shannon's diversity index. Evenness is a measure of how similar the abundances of different species are. When there are similar proportions of all species, evenness approaches a value of 1.0. When the abundances are very dissimilar (some rare and some common species), then the value for evenness decreases.
- **Simpson's dominance index** - the Simpson's dominance index measures biodiversity based on the probability that two individuals randomly selected from a sample will belong to the same species (or some category other than species). Simpson's dominance index ranges from 0 (all taxa are equally present) to 1.0 (one taxon dominates the community completely).
- **Species richness** - species richness is the simplest measure of biodiversity, and is simply a count of the number of different species in a given area. Species richness is also referred to as alpha-diversity. Species richness is commonly used, along with other factors, as a measure for determining the overall health of different biological ecosystems. High species richness for a given area indicates a high level of ecosystem stability, thus allowing the ecosystem to better withstand natural or anthropogenic disturbance (i.e. fires, floods, disease, deforestation, etc.). Therefore, high levels of species richness in ecosystems typically characterize these ecosystems as healthy and robust.

¹ Reference: <http://www.oceanecology.ca/biodiversity.htm>

Biodiversity Analysis Example



Shown above is an example of the variation of species richness throughout a site. The bottom map shows all the species range polygons overlaid on one another. The top map shows the species richness for the site based on the range polygons. Red indicates areas of high species richness, whereas green indicates areas of low species richness.

The following values were calculated for this site:

- Species richness = 16
- Shannon's diversity index = 2.44
- Shannon's evenness = 0.88
- Simpson's dominance index = 0.30

These values indicate that this site has a relatively even distribution of species and a moderate level of biodiversity.