



Visionmaker Module 1: Introduction and background information for teachers

Module 1 focuses on the biodiversity EPI. Biodiversity in this website represents species richness, the total number of species in an ecological community. It does not refer to other indices of ecological health such as species richness or genetic diversity. The species are not listed by name, but counted by taxa, groups of living organisms. The taxa are amphibians, birds, mammals, plants, reptiles, freshwater fish, and marine fish.

In Lesson 1, students will review an ecosystem considered natural and another that includes the built environment. To review the definition and components of an ecosystem, students will start with a natural one. These include but are not limited to: estuary, beach, salt marsh, freshwater marsh, hardwood swamp, pond, meadow, shrub land, oak hickory forest, hemlock/ Northern hardwood forest (See Ecosystem Tool Key for complete list). The natural ecosystem explicated in this lesson plan is a pond, however, teachers can choose any natural ecosystem as an example, preferably local to New York City (and thus covered on the website.) The built environment will be their school, inside or out.

To understand Visionmaker, students will be introduced to the study of landscape ecology. Landscape ecology is the study of heterogeneous ecosystems, their patterns, and interactions *over* time. One key tool used by these scientists is geographical information systems (GIS), an advanced technology that is used to model, store, and analyze geographic data. The creators of Visionmaker used numerous spatial databases integrated with satellite imagery to create the modern land cover layer, and a painstaking reconstruction process (see welikia.org) to create the 1609 land cover layer.

In Lesson 2 students will explore species-area relationship, an important principle in ecology, by using the M2409 website. Starting with their block (or City Hall if the school is not located in Manhattan), students will record the number of species found on their block and subsequent blocks as they expand the extent of their visions in both 1609 and 2014. The students should discover logarithmic growth of number of species to area. If they have not yet studied logarithmic growth, explain that it is slow growth.

After looking at the relationships between area and number of species, students will practice, using the modifier tools (See Ecosystem Tool Key for complete list), ways to alter ecosystems without overwriting the base layer. In this exercise, they will add green roofs to the extent possible in their visions. While this exercise will likely have an effect on variables such as storm water runoff and greenhouse gas emissions, it will probably not change the biodiversity index. This is not an accidental inclusion but meant to highlight how the site only models real-world phenomena; it does not represent nature exactly. The extension activity, which challenges students to reintroduce an endemic species that is now locally extinct (wolves, North American river otter, lynx, beavers, bald eagles and white tailed deer), requires some work on the part of the instructor. Students need to research what the needs of their species are and then create habitat changes that could conceivably support their species, but the software will not indicate whether the students have created an optimal environment for reintroduction. The instructor can go as deeply into habitat reintroduction as they'd like to: habitat shape, successful reintroductions, corridor building, conflicts with human populations, economics.