

food web case study essay sample

[Food & Diet](#)



In this case study, we will explore different math techniques used in order to demonstrate the predator-prey relationship in an ecological community.

These math techniques are primarily used today in information technology to solve problems that present themselves such as those of efficiency. These problems can be solved by using graph theory, showing the relationship between different sets and subsets. In Food Webs, the sets will be the animals and their relationships to one another. There are different concepts that incorporate the food webs case study such as competition, boxicity, and trophic status.

When it comes to competition, what the graph shows us are the different methods in which two different animals can coexist in their environment. It comes down to the availability of resources such as food availability, PH balance and the temperature. When we look at a competition graph, we see the different animals and plants and how they compete against each other to obtain those resources. The graph also explains how in an environment, different species will pray on each other, but even given this fact they can still coexist. When we narrow down the number of factors in a graph to for example, temperature, ph and nutrients, a Euclidean space is created and we can see the different species that can coexist or pray on each other in this 3D space.

As explained in the text, “ A food web of an ecological community is a directed graph with a vertex for each species in the community and a directed edge from the vertex representing species A to the vertex representing species B if and only if A preys on B”.(McGuigan) This explains that when there are two species with a common prey, they will

compete with each other. For example a great white shark and an orca compete for a seal. There will be a vertex for all three of those species and two vertices will be joined by an undirected edge since it will represent their common prey. The seal has a prey which is fish and it can be shared as a common prey as well by the shark and the orca.

The trophic status is the measurement of the status of a certain species in a food web. It provides a sort of ranking to specific species. When we look at a food web graph, we look at the distance from a specific vertex, in this case an animal, to the very bottom of the graph. In the above example of the graph, we see that Orca and Shark have the same distance so they have the same ranking. If we take it a step further though, we can say that the Shark is also prey to the Orca. In that case, then the Orca vertex takes the longest distance to the bottom, thus it becomes the top trophic status in the environment.

“ The boxicity of a graph is the smallest n such that G is the intersection graph of a family of boxes in Euclidean n -space”. (McGuigan) What this tells us is that boxicity can be used in a competition graph in order to see what is the minimum number of factors that are essential in describing the competition in a community.

References

McGuigan, A Robert; Food Webs. Applications of Discrete Mathematics.
McGraw Hill.