

# Species interactions in ecosystems biology essay

[Science](#), [Biology](#)



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The fundamental life processes such as growth, nutrition and reproduction depend extremely on the interactions between individuals of same species (intraspecific) or of different species (interspecific). Some of the interactions or associations are beneficial to each other and some are harmful some may be neutral. The various types of possible interactions/associations can be: A. Neutral B. Beneficial C. Harmful

A. Neutralism the most familiar type of interspecific interaction where neither population affects the other. The interactions are said to be indirect or incidental.

## **B. Beneficial Association/Interactions:**

1. Proto-cooperation: It is mutually beneficial non obligatory association between two species. For example - Birds removing pests from the bodies of bovine animals etc. in absence of interaction, the bird have the option of finding alternative food sources and so do the bovine does not depend upon the birds to survive. The Crocodile bird (*Pluvianusaegyptius*) often goes inside the mouth of the crocodile and feed on parasitic leeches. In this way the bird procures its food and the crocodile is relieved of the blood sucking parasites.

Mutualism (Symbiosis): It is mutually beneficial, absolutely

obligatory association between two species. Example -The association between bees and flowers; bee gets food in the form of nectar, flowers gets its pollen transported by the bee to areas. Without the flower the bee was not able to collect pollen and the plant would not have its pollination that will affect its survival ability. Benefit in the term of nutrients exchange is often termed as " syntrophism". Lichen (association of algae with fungus) is the association in which algal part gets protection and simple nutrients provided to it by the fungal hyphae. The fungus obtains and use CO<sub>2</sub> released by the algae during the process of photosynthesis. Microorganisms may also form symbiotic relationships with plants. An example is the nitrogen fixing bacteria, Rhizobium-legume association; the plant is benefited by getting readily available nitrate released by the bacterial partner, whereas Rhizobium is getting protection and finished food from the plant. A similar type of interaction is the Anabaena-Azolla, the association, extremely important in paddy fields, where nitrogen is often a limiting nutrient. Symbiosis between actinomycetes, Frankia with the roots of Casurina and Alnus (non-legumes) is very common in temperate forest. Another type of symbiotic association which exists between the fungus and the roots of higher plants called Mycorrhiza. The fungus gets essential organic nutrients and protection from the plants. The plants uptake phosphorus, nitrogen and other inorganic nutrients made available by the fungus. Zoochlorella lives on the outer tissues of sponges. The alga prepares food and gives O<sub>2</sub>. In turn the host provides with the matrix and nitrogenous wastes. Commensalisms: In this association where one organism/partner is benefited and the other partner remains unaffected. For example, many fungi are capable of

degrading cellulose to glucose, which is used by many bacteria. Remora attaches to shark and is taken to new feeding places and also food pieces falling from the sharks prey serve as food to the Remora. Epiphytes growing on trees for mechanical support, hardly affect the trees. Red billed ox-pecker (*Buphagus erythrorhynchus*) often feeds on the ectoparasites like lice, ticks and mites etc on the skin of rhinoceros. Hermit crab (*Eupagurus prideauxi*) is found to live inside the empty shell of gastropods and allows sea-anemone (*Adamsiopallicata*) to fix on its shell. The sea-anemone provides camouflage (protective colouration) and defend the crab from its enemies, while crab helps in the fast transit of the sea anemone and provides new feeding grounds. Scavenging: is a direct food linked interspecific interaction in which the scavenger or saprobiont consumes the dead bodies of other animals, either died naturally or is killed by some other animals. Scavengers sanitize the environment and the available food is ultimately disposed of so that a major part of nutrients enter the nutrient recycling process. Animals such as vultures, foxes, hyenas, etc. are natural scavengers. Dogs, crows and ants are infrequently seen to do the work of scavengers.

C. Negative (Harmful) Associations/Interactions: 1. Antagonism/ Ammensalism: The relationship in which one species is inhibited by another species in the same environment. The inhibition may be direct or indirect; very common for the production of antibiotics. The phenomenon of antagonism may be of three types, i. e. antibiosis, competition and exploitation. In the process of antibiosis, the antibiotics or metabolites synthesized by one organism inhibits the growth and survival of another organism. *Bacillus* secreting an antifungal agent inhibits the growth of several soil fungi. 2. Competition: Active competition

may exist among the organisms for available nutrients and space. The limiting food and space may result in favoring one species over another. Hence, competition can be defined as "the injurious effect of one organism on another because of the removal of some resource of the environment". For example, tiger and leopard competing with each other for preying upon deer.

4. Parasitism: A heterospecific association where one organism lives inside or on the body of another for food and shelter. The parasite is dependent on the host and forms metabolic relationship with the host. So, in this host-parasite relationship, one (parasite) is benefited while other (host) is adversely affected, although not inevitably killed. Parasite can be ecto- or endoparasite. E. g. leech, Ascaris, Fasciola.

5. Predation: Predation is an association / exploitation in which predator organism kills and feeds on the prey organism. Generally, the predator is stronger and stout as compared to the prey. E. g. Tiger preying on a deer.

### **3. 11ECOSYSTEM SERVICES**

Ecosystem function is the ability of the ecosystem to provide goods and services through natural processes to satisfy human needs, either directly or indirectly. Ecosystem functions are apprehended as a subset of ecosystem structures and function. Natural processes are the result of complex relations between living organisms and the physical and chemical components of ecosystems through the universal driving forces of matter and energy.

#### **There are four primary groups of ecosystem functions**

(1) Regulatory functions: refers to the capacity of the natural and semi-natural ecosystems to regulate life support systems like photosynthesis,

respiration and ecological processes like nutrient cycles, energy flow, evaporation, precipitation etc. This in turn helps to provide fresh air water and land for our sustenance.(2) Habitat functions: Natural ecosystems provide shelter and substrate to the wildlife. It contributes to the conservation of biological diversity at all levels as well as to the evolutionary process.(3) Production functions: The vital process like photosynthesis enables the autotrophs to trap solar energy and convert it into food. These are then consumed and utilized by the secondary organisms for their survival and a variety of other functions.(4) Information functions: Human evolution took place in the wild and nature serves as the reference point for the multidimensional development of a person. The beauty, serenity and diversity in nature provides excellent platform for spiritual enrichment, intellectual development, recreation etc. The ecosystem function moves toward a holistic view of the natural goods and services, which is shown in Table -