Roles in Ecosystems :

- Every creatures has a role to play in an ecosystem.

- The role an organism plays in its environment is called its "niche", and includes...

  - its role in the food chain
    (producer or autotroph, consumer, herbivore, carnivore, decomposer or saprobe, predator, prey)
  - its habitat
  - everything it does to survive and reproduce

- every creature has a niche, and this serves to reduce competition between species living in the same place.

  Ex. Hawks and owls living in the same area have different niches...

  Hawk : prefers hunting open areas during the day, soaring high overhead, uses keen color vision to find hidden prey, and nest high in tall trees overlooking their hunting grounds.

  Owl : hunts in forests at night, using short silent wings, poor color vision, but really good at hearing and detecting movement. They nest in thick forested areas.

  Ex. Many species of tree birds. Like warblers for example, use the same types of trees to feed in, but prefer to use on particular

part of the tree for feeding.

When a new species (exotic species) moves into an ecosystem that is stable, this causes competition for a niche, and instability.

Competition can be defined as two or more organisms in conflict with each other over a resource in limited supply. It is caused by exotic organisms or dramatic population size changes (overcrowding, immigration, etcetera) -or by a decrease in something organisms depend on. *Some level of natural competition is healthy for populations because it allows natural selection to work - "selecting out" those that are less suited for survival, while "selecting" those that are better suited.*

There are two kinds of competition :

(A) Intraspecific competition - where two or more members of the same species compete over something.

(Ex. Two black bears competing for fish moving up a river, or gulls fighting over a bag of garbage)

(B) Interspecific competition - where two or more members of different species compete for

something.

(Ex. Hunters, foxes, hawks, wolves, weasels all competing for ptarmigan in an area)

Competition at different trophic levels can be diagramed using a "food web". For that reason, most ecologists prefer food webs over the simplistic food chain - since it is a more accurate description of the competition and interdependence of species in a community.

Food webs also give us a way of looking at how stable an ecosystem can be in the face of change : the more interdependencies there are, the more easily the community can adapt to change - so the ecosystem remains relatively stable.

(Ex) If the population of one component goes up or down, there will be a "ripple effect" throughout the whole web, and other populations change in size or behavior to make up for that change and balance out the system again.

The more relationships there are between creatures,

the more resistant the whole web is to environmental changes (either natural, or human caused). The group of creatures that can handle these changes the best are omnivores - since they have the most food options available to choose from.

Bioaccumulation....Biomagnification...Bioamplification

.

First and Second Generation Pesticides :

- first generation pesticides are substances that are naturally occurring in the environment.

  Ex. Nicotine sulfate

- Second Generation Pesticides are substances that are synthesized in a lab setting.

  Ex. 1939 - DDT - dichlorodiphenyltrichloroethane

Evidence showing DDT accumulation in food chains was collected during the 1950's and 60's. At first, insects and small birds were directly affected. Later, raptors were affected This drew national attention to the issue - these birds were suffering reproductive problems (laying soft shelled eggs with higher infant mortality)

DDT use was banned in 1971, but continues to be used in other places where legislation is more lax. Today,

we use water soluble insecticides. They are broken down in soil, in liver tissue, and become relatively harmless.

Problems with these newer alternatives include...

1. Faster breakdown, leads to more frequent use.
2. They are not selective killers, rather they impact a wide variety of species.
3. Other creatures that feed off the bodies of the affected organisms are in turn affected.

The issue of chemical resistance :

Whenever a new pesticide is applied, it always seems to be very effective in the beginning - high lethality. However, there's always some creatures that will survive the application. Over time, the survivors reproduce, and eventually the behavior or trait becomes more common, so the population changes over time to become "resistant" to the chemical being applied.

Ex. Spruce budworm - when conditions are favourable, this population explodes in numbers. They pesticides we use have been found in nearby water supplies.