Marine Communities

by Hank Foglino

You reel in the fish, net the crab, dig up the clam and are rewarded by a great dinner that evening. You don't see the prey until they leave their watery world and come up into yours, hydrosphere and atmosphere, respectively. Did you ever wonder what living under the surface is like? Your catch was part of a community, lived in a habitat and had its own niche.

A community is comprised of all living things inhabiting a defined area. Many of the marine organisms that are distributed throughout the world's oceans live in a specific community. The establishment of a community occurs when a group of organisms settles upon an area that meets its physical and biological requirements. For example, blackfish and other reef fish are drawn to rocks, flounder and fluke like soft sandy bottoms, mussels and fiddler crabs like it wet and dry and go for the inter-tidal communities. The number of living organisms in the community may be large or small and has nothing to do with the size of the area. The bottom of the ocean is vast but with little food, so the population of living species is low. A crack in a reef or a solitary rock or two on the bottom will attract small species that are eaten by larger animals, and the area may become a large community existing in a small area (Ref: *Artificial Reefs*, LIBW, January, 2008).

Microscopic communities also may exist living on a scrap of organic detritus. Within the community are habitats where certain species congregate which may be a function of size and the way food is captured. There may be several species of fish in the same reef community; each one has its own niche, depending on what it eats and what its enemies are. The mortality of the occupants depends on how well each does its job for what it is suited, depending upon its color, size, feeding habits and other characteristics. Communities with high biodiversity, such as coral reefs, have many inhabitant species that interact with each other. The success of each organism depends on a favorable balance of physical and biological factors. The study of this balance and its effect on the inhabitants of a community is called ecology.

Some of the physical factors affecting the health of the community are temperature, salinity, pH, and turbidity. The organisms in the community may be classified as steno or eury, steno meaning narrow and eury meaning broad. So a stenothermal species can do well only in a narrow band of temperatures. As an example, if you have tropical fish in your aquarium, they will not last without a water heater, but in the wild, fish that don't fare well in cold water migrate south when summer ends. A eurythermal species, on the other hand, can tolerate a broad band of temperatures. Spending money is not something I do well, so in my aquarium I have killies, which are plentiful at the shore. They can withstand a wide range of temperatures without harm. I have been talking about temperature, which is all the hype now with global warming being the current ecological buzz words. The same applies for the rest of the aforementioned physical factors. Looking at killies again, they are also eurysaline, i.e. they can withstand a broad range of salinity up to and including fresh water. Figure 1 illustrates the affect of changes in the physical environment and its effect on population size. (Again, I use temperature, but it could apply to any of the other physical parameters.)

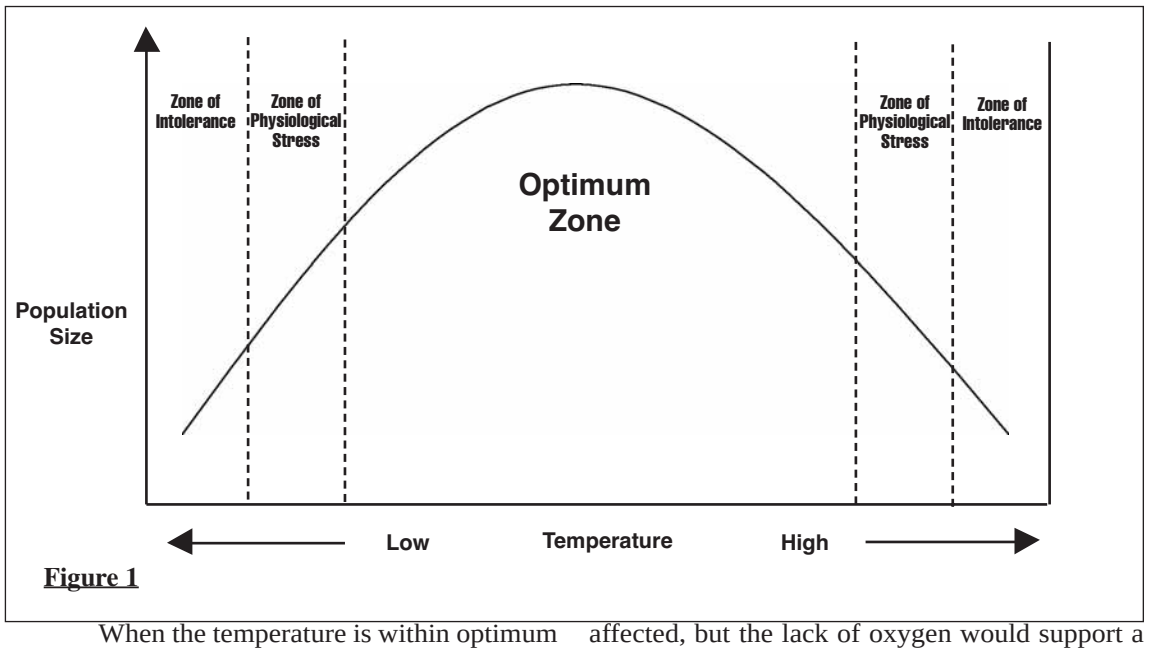

Figure 1

When the temperature is within optimum range of the organism, the organism is healthy and procreates, resulting in a high population. For a steno type, the optimum zone is narrow, whereas for a eury type, it is wide. When the temperature rises or falls into the zone of physiological stress, the organism does not necessarily die, but the birth rate suffers. As an example, when a boy fish approaches a girl fish and suggests that they fool around, she may moan, "Not tonight, the temperature is too high, the pH is too low and the salt is getting in my eyes." The rest of the female population usually follows suit; ergo - the population goes down. In the Zone of Intolerance, the organism cannot exist and the population is wiped out.

Life is a balanced equation. With growth comes new problems in a community. Every organism needs food, water, a place to hide from predators and enough room to function. Therefore, an area can support only a number of healthy organisms at a time, the number being a function of conditions at the time. This number is called the carrying capacity. Natural disasters such as storms and earthquakes and man-made contributing factors such as oil spills and shorefront development can destroy a portion of the habitat, decreasing the carrying capacity and leaving the inhabitants without enough food or places to hide from predators. The population then weakens and decreases until it reaches the carrying capacity of the new habitat. During the process entire species may disappear.

An example of exceeding the carrying capacity is the deer population on Long Island, especially on Fire Island. Normally, the wild predators would keep the population growth of deer under control by culling out the weak and/or sick animals. Here on Long Island, the only predator seems to be the automobile. Therefore, when habitat is destroyed by land development, the deer population has less natural food and begins encroaching on human habitat, eating vegetation planted by humans. The deer on Fire Island actually beg for food and are not the healthiest of animals.

In the marine environment, we have habitat destruction, changes in physical parameters, introduction of new parasites, and toxic pollutants. It should be noted that the change of physical parameters is interrelated. As an example, if the temperature increases, less oxygen can be held in solution, so a eury-temperature fish would not be affected, but the lack of oxygen would support a smaller population.

Some of the environments found on Long Island are:

Rocky Inter-tidal Communities - A quick glance at the bleak shorelines with crashing waves alternating wet and dry periods, and changing salinity due to run-off might give the impression that this is not such a good place to live. However, the waves constantly stir up the surface and the bottom, making nutrients and dissolved gases available to support the phytoplankton that is eaten by a plethora of marine organisms. The rocky areas also offer a large variety of habitats and niches. The flora and fauna found here have developed traits for survival. Plants are pliant and wave back and forth with the impacts of the waves. If they were rigid, they would easily snap under pressure. Those that are dry during low tides are usually covered with a slimy coating to keep them moist until the tidal waters return. This coating is also extremely bitter and not at all appetizing to any grazing animal that could reach it at low tide. Mussels open and fiddler crabs come out of their holes to feed when submerged. At low tide, mussels have the ability to close tightly when high and dry, maintaining inner moisture. Fiddler crabs retreat to their burrows. The organisms inhabiting the inter-tidal zone have adapted the necessary traits for survival, making it one of the most populated areas in the marine environment.

Sand Beach and Cobble Beach Communities - The sand particles swirling about in the surf make living in the area almost impossible. Their razor-sharp edges work into soft body tissues and wear away protective shells. They mingle with food particles, making it difficult for organisms to distinguish nourishment from swirling sand; movement can leave trails for predators to follow. When tumbling cobble (larger pebbles and stones) is present, many of the smaller organisms are crushed during a high sea state. Fast-digging mollusks, crabs and worms may survive, but for the most part, this community does not have many habitats and/or niches.

Salt Marshes and Estuaries - These can be considered the "nurseries" of the marine environment. Usually too shallow for large predators to enter and protected from the pounding waves and tidal variations, they are ideal environments for

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