

THE RELATIONSHIP BETWEEN HUMAN AND ECOLOGICAL HEALTH

Ecology is, in the most general terms, the study of the interrelationships between organisms and their environment. There are many branches of ecological study, but the basic definition of ecology emphasizes that all organisms and their environment are interrelated. Organisms are affected by their environment, the environment is affected by organisms, and both directly and indirectly organisms are affected by other organisms. Some organisms affect their environment passively, for example a tree provides shade and transpires water through its leaves which have a moderating effect on temperature and humidity. Other organisms modify their environment actively, like the groundhog who moderates the temperature and humidity of its environment by burrowing underground. Humans are organisms who have developed tools to change their environment in very profound ways, which has allowed us to colonize and even prosper under a very wide range of environmental conditions. But humans, like all other organisms, are also directly and profoundly affected by the natural environment in which we live.

Because biological organisms are adapted to an extraordinary range of environmental conditions, ecological or ecosystem health is a difficult concept to define in simplistic terms, but certain basic principles apply. Two principles that are used as measures of ecosystem health are energy flow and stability. Energy flow is the relative rate at which energy and nutrients are cycled through the system. For cycles and flows to occur, the terrestrial ecosystem must include structured interrelationships between the basic abiotic (non-living) components of sunlight, soil, water, and nutrients, and the biotic (living) components of producers, consumers, and decomposers. The developmental change in ecosystem structure is termed succession. As succession proceeds, ecosystems tend to become more complex (have more trophic levels) because each type of organism establishes a unique niche for exploiting the flow of energy and nutrients. When ecosystems become more complex (i.e. have greater species diversity), they also become more stable because diversity provides redundant pathways through which energy and nutrients can be cycled. Diversity also provides a larger pool of genetic information, which is like having more options for solving problems that have not happened yet. Later stages of ecological succession (especially in forest ecosystems) are also better able to moderate environmental variables like temperature and humidity, and therefore better able to withstand extreme environmental events like droughts, deluges, cold-snaps and windstorms.

The ecosystem of the Palmerton Valley is generally unproductive because the soil is highly eroded, low in nutrients and organic matter, and contaminated with toxic metals. The flow of energy and nutrients is greatly diminished because decomposing organisms are lacking and plants, which form the base of the food chain, are greatly reduced both in terms of size, total numbers and diversity. With the soil stripped bare and the ability of the sparse and diminutive vegetation to moderate its environment greatly diminished, life on Blue Mountain and Stony Ridge is exposed to higher wind velocities and greater extremes of temperature and humidity. When damage from fires, storms and infestation occur, as they have many times in the past, the ability of the ecosystem to regenerate itself is extremely compromised. Similarly, the Aquashicola Creek has been the recipient of the enormous volume of soil and industrial wastes that have washed off the mountain, Stony Ridge and the Cinder Pile. This material accumulated in some segments of the creek to the point that the U.S. Army Corps of Engineers had to dredge the channel to reduce the potential for flooding. At many locations the creek lacks shade to keep it running cool during summer months, leaf litter to fuel the aquatic insect populations fish need for food, and suitable habitat for fish and other aquatic organisms to spawn, rest and feed.

To date the primary emphasis of local, state and Federal agencies like the U.S. Environmental Protection Agency has been to focus concerns about contamination from the Palmerton Zinc Superfund Site on risks to human health. It is appropriate as a starting point to identify and remediate risks to human health first, when prioritizing cleanup efforts at such a large and complex site. But EPA's mandate under Superfund is to protect Human Health and the Environment. This is scientifically sensible, for as we have seen from the preceding paragraphs, man is affected by his environment in many significant ways. The cycling of energy and nutrients through an ecosystem are free ecological services that humans rely upon for assimilating wastes, maintaining productive forests, fields, rivers and streams, and cleansing and recharging the air with oxygen. The ability of forests to moderate temperature and humidity make the extremes of winter and summer more bearable and energetically less costly. The roots of healthy vegetation reduce soil erosion, facilitate groundwater recharge, reduce the potential for flooding, and maintain reliable sources of clean water. The system of ecological checks and balances helps protect us from infestations that spread disease and destroy crops, often without help from chemical pesticides. In fact this aspect of applied ecology is the basis for what is now known as modern integrated pest management.

There are numerous ways that a healthy ecosystem provides direct and positive economic benefits. People prefer to live and work in areas that are aesthetically pleasing and have a healthy environment. Palmerton is an attractive town and a nice community to live in, but the unsightly scars left by over a century of industrial activities detract from our community's positive image. Palmerton does not suffer from the stigma of being declared a Superfund site. Visitors to our town will tell you it is the stark visual image of the old abandoned industrial buildings, the slag covered earth, the obviously distressed vegetation and the barren mountainside that offend those normally unaccustomed to viewing such a distressed ecosystem. Have you ever wondered what it is about certain landscapes that people are almost universally attracted to? What is the appeal when we declare a landscape to be scenic? Maybe there is some evolutionary basis to our sense of landscape aesthetics which has, throughout human history, helped us to select sites where good food and clean water are plentiful and the agents of disease and discomfort sparse.

Finally, good human health requires plenty of regular physical exercise in an attractive and relaxing environment. While cardiovascular stimulation is a major component of a healthy exercise regime, many individuals find their efforts more rewarding by recharging their spiritual energy in a pleasant outdoor setting. To quote Bob Hill, Biodiversity Coordinator for Pennsylvania's Department of Conservation and Natural Resources, "Research has shown that humans need "supportive" environments which aid our moods, and emotions, and allow us to enjoy our surroundings....Studies have shown that when people view trees their heartbeats slow and they exhibit lower blood pressure and relaxed brain wave patterns." Considering the scientific, ecological, economic and psychological benefits of living in a clean, healthy environment, community support for a complete and comprehensive cleanup clearly makes the most sense for Palmerton.