

Ecosystem Investigations And Management

The term ecosystem can be defined as the interrelationship between plants and animals and their environment. Understanding these interrelationships is fundamental to the ability to manage a watershed. While every ecosystem is unique, of importance is the extent that uniqueness, in turn, dictates unique management practices.

Within the Ohio River Valley, these ecosystem interactions, their rates, apportionments, causes and effects are not thoroughly understood due, among several reasons, to its vastness and highly diverse nature. That diversity results from its wide spectrum of landscape and natural resources features. For example, over 130 species of fish have been identified in its surface waters in addition to numerous other species of macroinvertebrates (including nearly 100 species of freshwater mussels) many of which are considered rare or endangered. Clearly, the Ohio River Valley's ecosystem is sufficiently unique, justifying as a priority the need for targeted research.

Understanding the stresses and influences on an ecosystem is also requisite to effective management actions. Stresses result from mining, urbanization, agricultural practices, discharge of industrial and domestic wastes, alteration of stream channels, construction/operation of reservoirs and dams and in-stream structures such as are associated with commercial/industrial port facilities and marinas.

Finally, climate and hydrologic influences are crucial and must be well understood.

Most conceivable issues challenging the goal of ecosystem characterization and management are present in the Ohio Valley.

Examples of Research Needs:

Biotic Aspects

- Development of aquatic species/community goals for the various habitat/ecoregion types in the Basin
- Impact evaluations of aquatic habitats and communities and how changes influence sustainability

Abiotic Aspects

- Design and implementation of efficient systems to acquire, disseminate and archive multiple data series for flow and quality
- Development of improved techniques for estimating current and predicting future stage and stream discharge utilizing data from gaged and specific ungaged sites
- Development of integrated models for flow and sediment transport taking into account seasonal fluctuations

Special Concern Research Area

Zebra Mussels

The Zebra Mussel (an introduced species from Europe) was first identified in Lake Erie in 1988, discovered in the Tennessee River in 1991 and in the Pittsburgh area in the Ohio River in 1995. Now found at points along the entire length of the Ohio River, these mussels colonize on physical structures imposing significant costs for periodic removal and preventive measures. Their presence has overwhelmed native mussel beds interfering with reproductive and behavioral patterns. While extensive research is underway in the Great Lakes Basin, similar efforts in the Ohio River Basin have been extremely limited. Initial findings of research in the Ohio Valley appear to show significant differences in how the Zebra Mussel impacts streams versus lakes. Research is therefore needed in the Ohio Valley regarding Zebra Mussel behavior, environmental requirements, sensitivities and tolerances as well as impacts to water users, structures and commercial/recreational vessels.

Examples of Research Needs:

Biotic Aspects

- Colonization rates, status and trends
- Impacts of prevention efforts
- Impacts of mussels on water quality and the river ecosystems
- Control