

“By being aware that what occurs on land also affects stream quality, residents become advocates for responsible land use, as well as volunteer stream guardians.”

– Downstream Alliance trainer, Chain-Wen Wang, who teaches volunteers to monitor stream health

HUMAN ACTIVITIES

Scientific studies and public insight suggest that some of the activities within the Mid-Atlantic Highlands that are contributing to environmental stress include the following:

- Urban infringement and rural sprawl;
- Timbering and agriculture;
- Mining;
- Raw sewage discharges; and
- Stream alteration.

URBAN INFRINGEMENT AND RURAL SPRAWL

Urban infringement and sprawl are not just issues in large metropolitan areas. Although the majority of the Mid-Atlantic Highlands is rural, the land is not immune to the effects of sprawl and infringement. As the population in urban areas both within and surrounding the Mid-Atlantic Highlands continues to grow, the rural landscape, including valuable agricultural land and family farms, is slowly being

transformed. Of great concern is the eastern expansion of Pittsburgh and the western expansion of the Baltimore-Washington corridor, which are slowly cutting the Mid-Atlantic Highlands in half from east to west (Figure 10).

With this infringement comes more roads, more houses, and more supporting infrastructure like pipelines and utility lines. These changes in land use and land cover contribute to flooding, forest fragmentation, invasive species introduction, riparian habitat loss, air pollution, and sources of persistent pollutants. With an increase in impervious surface area from roads, parking lots, driveways, and roofs comes greater runoff. Increased development also contributes to the loss of riparian habitat, which further aggravates flooding. In addition, because rainfall no longer soaks into the ground, base flow from groundwater needed to sus-

tain streams during dry periods also decreases.

Unconstrained development or sprawl in rural areas also chops up or fragments the forest into smaller and smaller patches, with the resultant loss of wildlife habitat and natural areas that previously permitted the rain to soak into the ground. As the number of

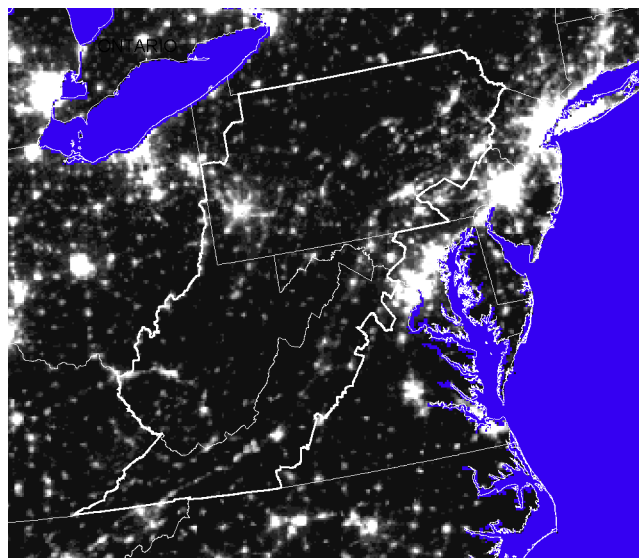


Figure 10. Lights in the night sky (white areas) show urban areas encroaching on the Highlands.

patches increases, so does the likelihood that non-native, invasive species will be introduced. More traffic and housing development brings more pollutants from automobile exhaust, and runoff from fertilizer and pesticide applications to home yards and commercial properties.

Second-home development is increasing in the Mid-Atlantic Highlands. In several counties, second homes represent 25% or more of the housing development. Forest County, Pennsylvania, leads the nation with 75% of its housing development in second homes. The type of second home varies, as does its impact. For example, if it lacks a proper sewage system, or if forest cover is entirely removed to build the house, a second home development can aggravate existing problems as much as other commercial and residential development.

As with most land use changes, there are a series of

cascading effects that arise with these human activities. Some of the attendant problems of sprawl—traffic, congestion, unplanned development and clearing, and associated stressors—are changing the Mid-Atlantic Highlands environment.

TIMBERING AND AGRICULTURE

Land use practices such as timbering and agriculture also can affect aquatic organisms and terrestrial wildlife. Increases in erosion from timber removal are generally short-lived if proper timbering practices are followed. The construction of skid and haul roads, however, can have longer lasting effects because of the creation of forest patches. Compaction from harvest related activities can slow or eliminate the regrowth of trees in these areas. In addition,

improper road construction can contribute significant sediment loads to nearby streams.

The removal of forest for agriculture generally has greater effects on both aquatic and terrestrial organisms than



Photo: Dave Clark

other forest practices. Both the loss of forest cover and forest fragmentation affect wildlife and bird species.

Agricultural land use is the largest contributor of sediment to streams in the US. Increased agricultural fertilizer and pesticide concentrations are also associated with current farming practices. Large confined animal operations can significantly concentrate waste in one area of the watershed and, if improperly handled, runoff or discharge of this waste can affect the fish and other aquatic organisms in the receiving streams. Conservation tillage, fertilizer and pesticide management programs, treatment of confined animal waste and similar agricultural management practices can significantly reduce these problems. Improper management can yield sedimentation, persistent pollutants, or permanent habitat destruction.



Photo: Dave Clark

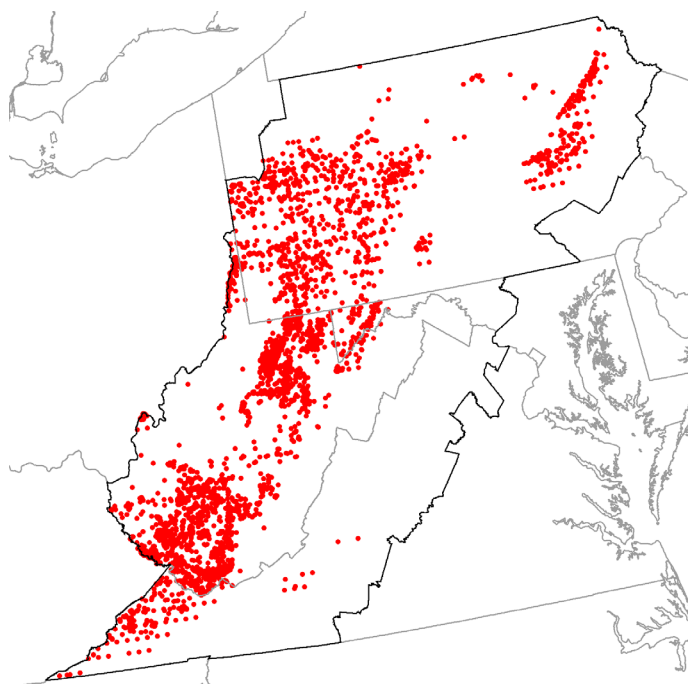


Figure 11. Abandoned mine lands (red dots) are pervasive in the Highlands and have a cumulative effect on the environment.

MINING

While coal mining has contributed to economic development and national prosperity, it has left behind a legacy of abandoned mines, acid mine drainage, persistent pollutants, and riparian habitat loss in the Mid-Atlantic Highlands (Figure 11). Abandoned mines can contribute acidity, toxic metals, and stream sedimentation for many years after mining activities have ended. Mining reclamation usually returns the land to grasses, which significantly improves runoff water quality, but does not reclaim the land back to forest.

Current mining practices, such as mountaintop mining, can eliminate entire headwater stream reaches needed to support downstream fisheries

and aquatic life.

Mountaintop mining involves the removal of large quantities of soil and parent material from the tops of mountains to expose underlying coal seams. While some of the overburden material is retained for reclamation purposes, large quantities are deposited in adjacent hollows and coves. Current mountaintop mining activities in West Virginia affect over 100,000 acres. Based on current government projections, over the next twenty years the total area of forests affected is likely to triple.

RAW SEWAGE DISCHARGE

In some places, raw sewage is still discharged into streams from individual homes and

small communities, negatively affecting water quality. These discharges destroy fisheries and release pathogens that create public health problems. Many of the local problems arise either because existing state and federal wastewater programs do not cover these small communities with fewer than 10,000 residents, or because small communities lack the resources to do detailed technical studies to document their needs. Based on a national 1996 EPA Clean Water Needs Survey, Pennsylvania and West Virginia were among the top three states with the greatest financial needs for small community wastewater treatment facilities. The full extent of this problem is unknown, but is expected to be extensive, given the small size of many of the towns throughout the Mid-Atlantic Highlands. These communities need additional resources and support to correct this problem and not only improve their quality of life, but also the water quality of the receiving streams.

STREAM ALTERATION

Stream alterations include stream channelization, dredging, damming, or similar changes in the streams. Stream channelization has been used in the past to help reduce flooding in localized areas.

This simply moves the water more quickly downstream to another area where flooding might occur, and as more areas develop, channelization becomes less effective in reducing flooding. In addition, stream channelization destroys stream habitat for fish and other aquatic organisms. Dredging is used to deepen a stream or river. Dredging is often used to remove instream sediment, which in many cases is sediment that has washed in to the stream because of inappropriate watershed or riparian area management practices. More often, dredging removes natural instream habitat, which affects the fish and other organisms that need this natural habitat.

A more permanent change in streams and rivers occurs when the stream is dammed. Over 50% of the rivers in the US have been dammed and are no longer free-flowing. These dams serve as obstacles to the movement of fish upstream to spawn or repopulate areas that might have been previously damaged. They also change the entire system from a stream ecosystem to a pond or lake ecosystem. The region still has a number of free-flowing streams, but with increased concern about flooding and increased demand for water supply, the idea of constructing dams is gaining popularity again.

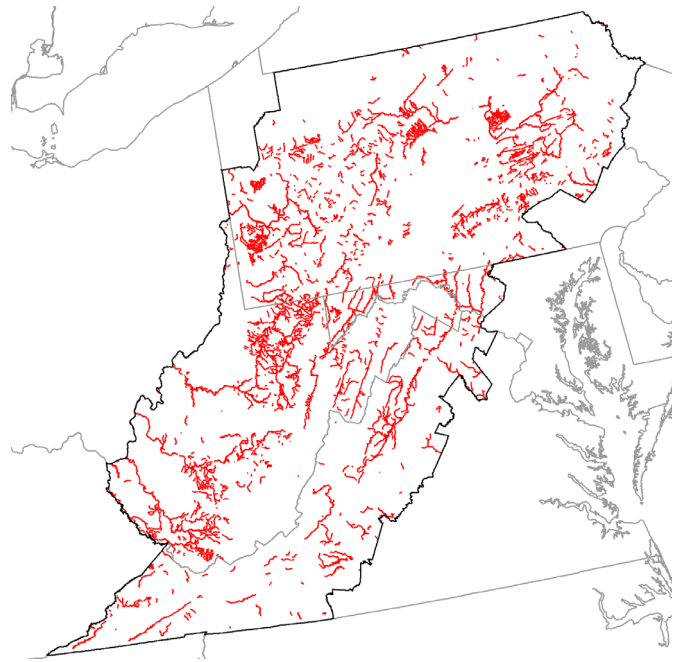


Figure 12. Each red line represents a stream segment that is not meeting water quality standards.

Human activities typically have multiple, not single effects, and introduce multiple stressors that have a cascading effect on the environment. For example, constructing a new road can lead to forest fragmentation, which contributes to loss of riparian habitat and affects instream habitat. This contributes to the loss of sport fish, which impacts fishing and other recreation activities, and results in economic consequences for the local community. When the individual streams affected by the stressors and pollutants are listed together, a clear picture of the total effects can be seen across the region (Figure 12). Many Mid-Atlantic Highlands streams are not attaining water

quality standards established to protect them. To meet these standards, stressors and pollutants need to be removed and the habitat restored.

The data indicate that, even though the Mid-Atlantic Highlands region is a special place, it is a place with existing and emerging problems. A Highlands Action Program with strong environmental stewardship is needed to solve these problems. This Program must also protect the special places and restore damaged ecosystems in the region. These efforts must work in concert with economic and cultural realities of the Mid-Atlantic Highlands.