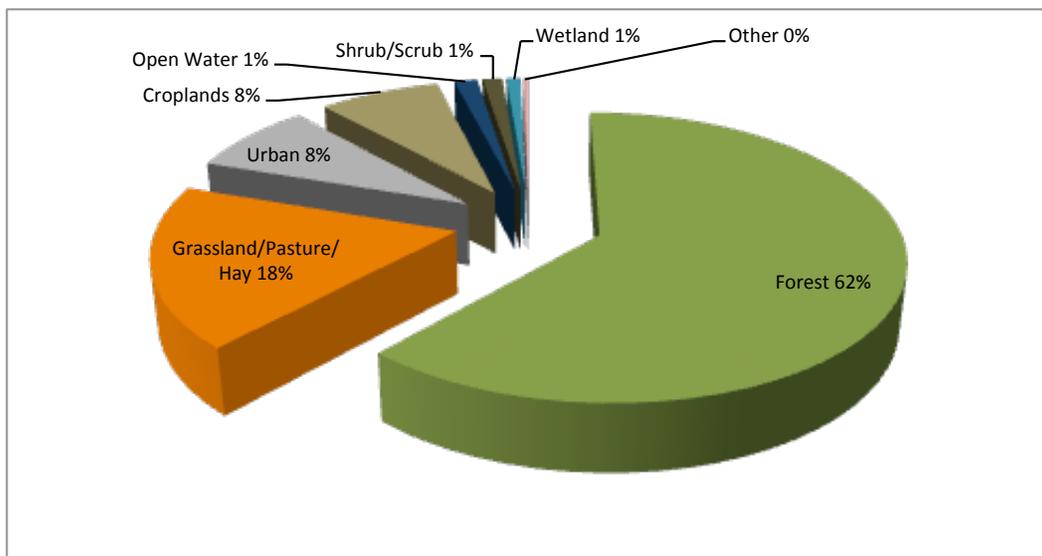


Landscape-level Challenges

Appalachia is in an era of monumental conservation challenges. These include: the wholesale loss and fragmentation of natural habitats; genetic isolation of species; increasing threats associated with wildfire and change in natural disturbance regimes; dramatic changes in the water cycle with an increased risk of flooding as well as water scarcity; and the expansion of harmful invasive species. The effects of these threats will be exacerbated by expanding and emerging land-use changes and the changing climate. It is imperative that natural resource management agencies, science providers, conservation organizations and other industries and communities work together to understand the impacts of these stressors and determine how best to address these challenges within the Appalachian region.



Agriculture and Forestry

Forested riparian corridors are inadequate or lacking along significant stretches of Appalachian streams, and this may be the biggest challenge to overcome in relation to these industries. Best management practices (BMPs) required to mitigate these impacts are well established but more widespread use of BMPs is needed. The Appalachian LCC could serve an important role in coordinating monitoring to establish baseline and incremental improvements in habitat quality, habitat connectivity, and population viability as a result of strategically planned BMP implementation. Human dimensions research would help clarify reasons that landowners might decline to participate in BMP cost-share programs, and identify the most effective incentives to increase participation.

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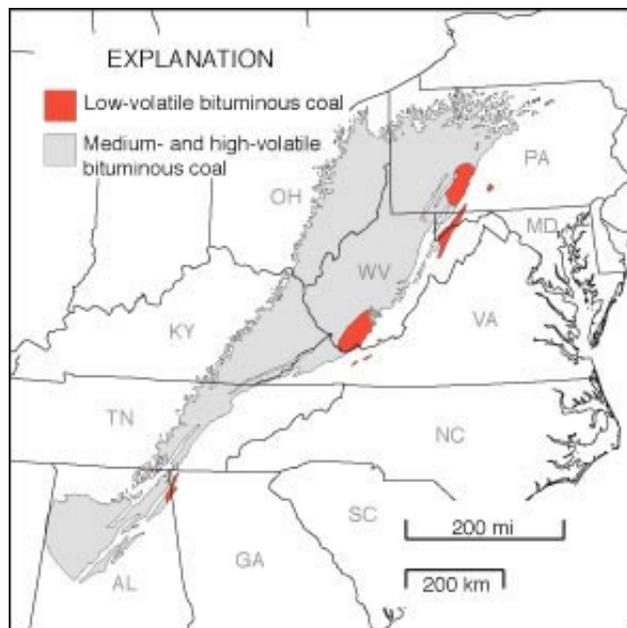
Urbanization

The sprawl of urban and rural development associated with increasing human populations is a growing threat in the Appalachians. Urbanization alters ecological structure and function and leads to a homogenization of biotic communities. Human settlement patterns create complex landscape mosaics that typically fall on a gradient from natural areas through exurban and suburban to urban. The amount and degree of habitat fragmentation that results from development varies depending on the interspersion of housing or other infrastructure and natural areas within a landscape. The Appalachian LCC could support the development and use of urban expansion modeling based on current land-use patterns and econometric models in a large-scale planning effort to better integrated the human uses to achieve a more sustainable matrix of conservation lands.

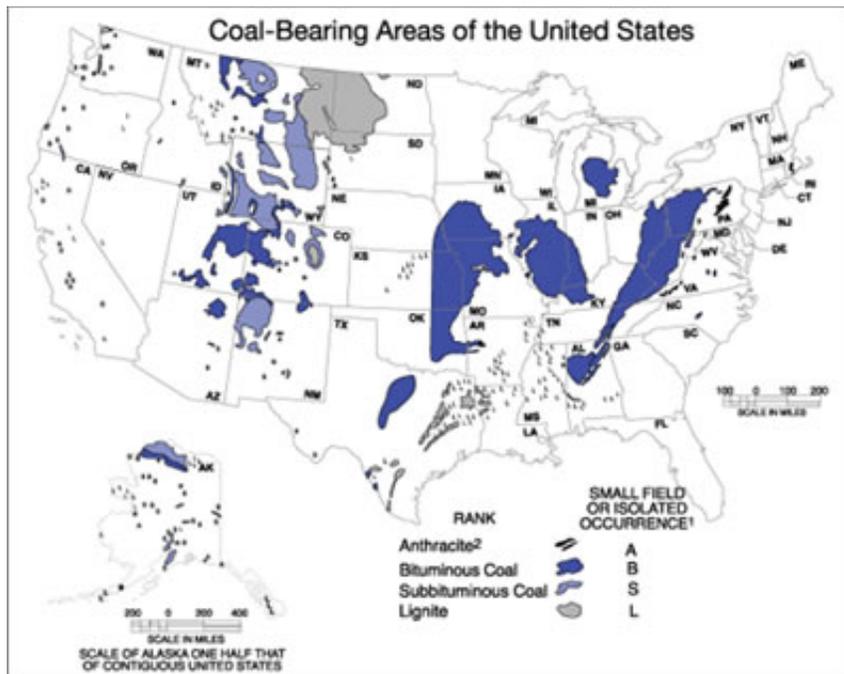
Energy Opportunities & Challenges

Energy development has emerged as a significant economic opportunity for Appalachian communities that carries with it complex challenges for natural resource sustainability and species conservation. Coal, natural gas, and wind development each come with their own benefits and costs.

Coal Mining. Surface mining and underground mining techniques are both prevalent within the Appalachian LCC. Environmental concerns include degraded groundwater and surface water from coal fines and chemicals used during processing, acid mine drainage from active and abandoned mines, risks of accidental releases and spills, and direct loss of forest and stream habitats especially through valley fills associated with mountaintop removal. Problems exist on lands that were not subject to reclamation requirements and these abandoned mine land. Environmental problems associated with abandoned mine lands include surface and ground water pollution, non-reclaimed or inadequately reclaimed refuse piles and mine sites (including some with dangerous high walls), sediment-clogged streams, damage from landslides, and fumes and surface instability resulting from mine fires and burning coal refuse. Environmental restoration activities under the abandoned mine reclamation program correct or mitigate these problems. The federal Office of Surface Mining also oversees the Appalachian Regional Reforestation Initiative (ARRI), a voluntary program developed focuses on restoring forests where deforestation has occurred as a result of coal mining in the Appalachians. The Appalachian LCC has an opportunity to help advance these efforts.

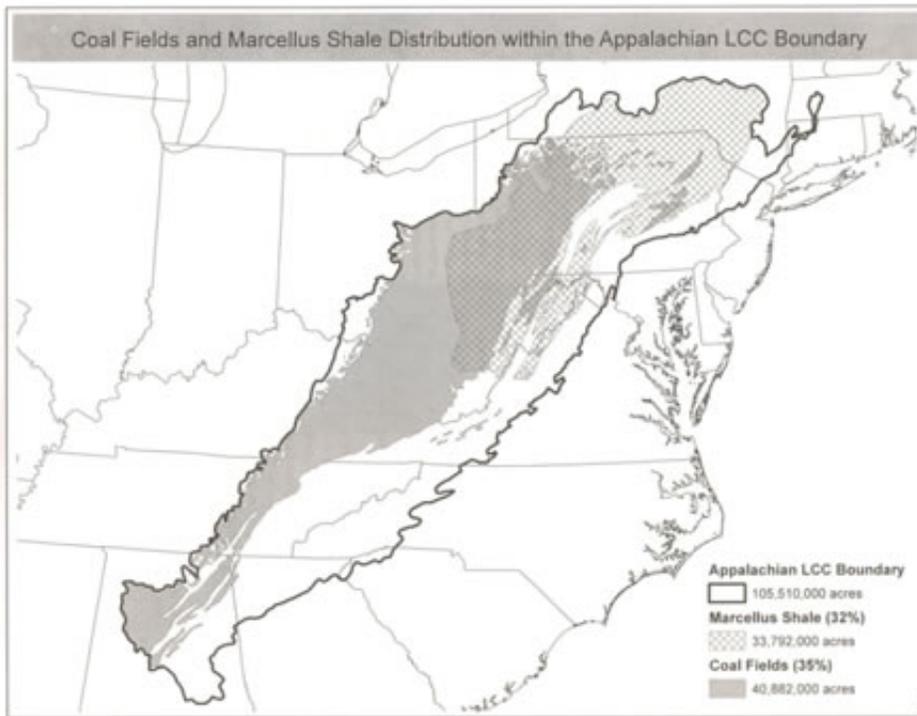


Map: Bituminous Coal (low, medium, high)



Map: Coal-Bearing Areas Across the US

Natural Gas / Shale Extraction. The Marcellus shale formation, a gas-productive formation spread across Pennsylvania, West Virginia, New York, Ohio, Maryland and Virginia, has become the premier natural gas industry focus in the Appalachian Basin. Shale gas has long been produced from shale with natural fractures. Recently, however, there has been increased development of gas shale due to the introduction of techniques that create artificial fractures around well bores – a procedure known as hydraulic fracturing or “fracking”. Researchers in other regions estimate that horizontal wells, undergoing multi-stage fracturing, can use between 5 and 6 million gallons of water. In addition to water and sand, other compounds are injected into the hydraulic solution including friction reducers, biocides, surfactants, scale inhibitors, and hydrochloric acid is also used as part of the fracturing process. It is possible that the potential for some Marcellus shale drill cuttings to generate acid and mobilize metal pollutants, presenting a serious threat to aquatic systems and communities. The Appalachian LCC has a tremendous opportunity to engage the gas industry, universities, communities, governmental and non-government partners to develop best management practices for development of Marcellus shale production including addressing concerns for habitat fragmentation resulting from land clearing for well pads and access roads. The associated Utica formation will be another area of expanding energy exploration in the not-too-distant future.



Map: Coal Fields and Marcellus Shale (Natural Gas)

Wind Energy. Promoting green energy development is a national goal of our country, and wind-powered energy is the most rapidly growing renewable energy source. The Appalachians topography is perfect for siting wind turbines, as evidenced by its long-term significance as an important migratory corridor for birds and bats. The Appalachian LCC has the opportunity to support work in one area to help better understand and assess the cumulative effects of wind turbines and turbine fields on migratory birds and endangered bat populations. The LCC is also well placed to help distribute the scientific findings and to deploy management response techniques across the broader landscape to benefit multiple species and multiple conservation partners.