



## **Unconventional gas development and its effect on forested ecosystems in the Northern Appalachians, USA**

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Worldwide unconventional shale-gas development has the potential to cause substantial landscape disturbance. The northeastern U.S.A. Appalachian Mountains across the states of Pennsylvania, West Virginia, Ohio, and Kentucky, are experiencing rapid landscape change as unconventional gas development occurs. We highlight several years of our research from this region in order to demonstrate the unique effect unconventional development has had on forested ecosystems. Infrastructure development has had a wide-reaching and varied effect on forested ecosystems and their services, which has resulted in temporary disturbances and long-lasting ones altering habitats and their viability. Corridor disturbances, such as pipelines, are the most spatially extensive disturbance and have substantially fragmented forest cover. Core forest disturbance, especially, in upper watershed positions, has resulted in disproportionate disturbances to forested ecosystems and their wildlife, and suggests a need for adaptive land management strategies to minimize and mitigate the effects of gas development. Soil and water resources are most affected by surface disturbances; however, soil protection and restoration strategies are evolving as the gas play changes economically. Dynamic soil properties related to soil organic matter and water availability respond uniquely to unconventional gas development and new, flexible restoration strategies are required to support long-term ecosystem stability. While the focus of management and research to date has been on acute disturbances to forested ecosystems, unconventional gas development is clearly a greater chronic, long-term disturbance factor in the Appalachian Mountains. Effectively managing ecosystems where unconventional gas development is occurring is a complicated interplay between public, private and corporate interests.