New report highlights best practices for sustainable rural infrastructure

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Chesapeake Bay Foundation Clagett Farm uses conservation practices that have been implemented in partnership with U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) in Upper Marlboro, Maryland, on Feb. 21, 2018. Their conservation plan addresses soil health, drainage and farm road design. The soil here has been analyzed using a new handheld device that use electrons to determine the chemical makeup of soil samples. This farm, surrounding residential and military lands are part of the Chesapeake Bay watershed. Public domain photo courtesy of Lance Cheung / USDA.

Interstate highway systems and networks of dense urban roads typically receive top billing on maps, in infrastructure legislation and in travelers' daily commuting routes. However, more than 80% of all US roads are considered low-volume roads—defined as those that carry fewer than 1000 vehicles per day. According to a new report published by the Ecological Society of America, "The Ecology of Rural Roads: Effects, Management and Research," this less-traveled road network can have an

outsized impact on surrounding ecosystems, altering the local hydrology, affecting wildlife populations and shuttling invasive species into new areas.

"Rural roads provide important transportation connections for rural populations but,while apparently innocuous, can lead to drastic changes in whole landscapes, including the plants and animals that live in them," said Alisa W. Coffin, a research ecologist at the United States Department of Agriculture's Agricultural Research Service Southeast Watershed Research Laboratory in Tifton, GA.

Proper planning and maintenance of rural roads improves farmers' ability to get products to market, creating more reliable conditions for agricultural trade and for other social and economic opportunities. Maintaining and improving rural infrastructure is important not only for surrounding rural communities, but also for the broader public that depends on the goods and services that these communities produce. However, roads may also introduce heavy metals and road salt into waterways, alter flooding regimes and even change the rate at which nearby trees release water into the atmosphere. Animal deaths from vehicle collisions on rural roads can dramatically alter wildlife populations. When transportation planners fail to account for these cumulative impacts, it compromises the clean water and healthy ecosystems that support the wildlife and people that live nearby.

Road ecology is a relatively new discipline, and Coffin and her colleagues hope their paper can increase awareness of the importance of low-volume rural road networks. The report also describes best management practices and policy applications.

"Transportation authorities are increasingly looking to the science of road ecology for solutions on how to improve our transportation systems while also mitigating for their negative ecological effects," said Coffin.

"The science shows that new roads bring additional negative effects and that mitigation improves ecological outcomes."

The report is No. 23 in *Issues in Ecology*, a series of reports published by the Ecological Society of America that use commonly understood language to present the consensus of a panel of scientific experts on issues related to the environment. Previous reports in the series are available at https://www.esa.org/publications/issues/.

Provided by Ecological Society of America