Title: Riparian Shade Credit Programs: Valuing Ecosystem Services Benefits and Optimal Riparian Restoration

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Abstract:
The degradation of water quality due to the change is water temperature, is increasingly seen as a pollutant that can have a significant impact on the local ecosystem. Increases in water temperature caused by human activities, typically the use of water as coolants by power plants, sewage treatment plants and other factories, can lead to a decrease in the oxygen levels which can kill indigenous aquatic species, change the ecosystem composition and lead to invasion by thermophilic species. One solution available to policy makers to reduce thermal pollution has been the creation of water cooling systems which can be expensive to operate and maintain. An alternative solution that has recently garnered a lot of interest is the use of riparian buffers to provide tree shade to naturally reduce the thermal pollution. Oregon currently has such a shade credit program.

In 2002, the US Environmental Protection Agency and Oregon Department of Environmental Quality determined that the wastewater discharged into the Tualatin River, though exceptionally clean, was too warm for salmon and trout. The District had the option of spending about $150 million on a wastewater cooling system that also had a substantial operating cost each year. Instead, Clean Water Services has partnered with other governmental organizations to offer incentives to farmers who would allow trees and shrubs to be planted on portions of their properties that border streams. This would allow the water in the stream to be cooled naturally through shading. In exchange for a multi-year conservation easement, the property owner receives a payment and direct assistance in establishing native plant buffers along streams. Rather than spending $150+ million on a facility to cool water, the District has spent about $4.3 million on payments to property owners since 2004. This is a substantial savings to ratepayers. The plantings also generate additional ecosystem service benefits.

In this presentation I discuss results from two research projects related to Oregon’s shade credit program. The first project uses a choice experiment survey to understand the public’s willingness to pay for the additional ecosystem services generated by the riparian plantings. The respondents were randomly selected from CWS ratepayers and each respondent answered 12 choice questions. The survey was conducted online and received 800 responses. Preliminary results find significant willingness to pay for the water quality, air quality and preservation of the fish and wildlife in the Tualatin basin. We also find that respondents’ willingness to pay for the ecosystem attributes is influenced by the current water quality as well as environmental attitudes. The results show that this program has value beyond the reduction of thermal pollution and this implies that these values should be considered when evaluating the effectiveness of the program.

The second project introduces a spatially explicit land use modeling framework that can be used to identify the optimal locations for a cost-effective shade credit program. I present results using simulated data for Oregon’s shade credit program and compare the outcomes of various riparian restoration options. The framework is then used to identify the optimal (least cost) riparian restoration options to achieve the TMDL for temperature for the Tualatin river. I find that there is a trade-off between minimizing cost and the number of sites and that it is possible to achieve clustered habitat areas for relatively low additional cost.