The Effect of Trees on Crime in Portland, Oregon

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By Geoffrey H. Donovan and Jeffrey P. Prestemon

Portland, OR (October 19, 2010)- Researchers with the U.S. Forest Service's Pacific Northwest (PNW) and Southern Research Stations have published a new study that suggests that certain types of city trees may help lower property and violent crime rates.

"We wanted to find out whether trees, which provide a range of other benefits, could improve quality of life in Portland by reducing crime, and it was exciting to see that they did," said Geoffrey Donovan, research forester with the PNW Research Station who led the study. "Although a burglar alarm may deter criminals, it won't provide shade on a hot summer day, and it certainly isn't as nice to look at as a tree."

Donovan and his colleague Jeffrey Prestemon, with the Southern Research Station, obtained crime data from the Portland Police Bureau from 2005 to 2007 and grouped the incidents into seven categories. They examined only crimes for which a physical address was given and paired this information with additional data obtained from aerial photographs, onsite visits, and the Multnomah County Tax Assessor's Office. Their sample of 2,813 single-family homes experienced 394 property and 37 violent crimes.

The researchers then conducted statistical analyses to explore the relationships among crime and more than two dozen variables they compiled, including the number and size of trees on a lot and the size of trees on surrounding areas. Of the tree variables analyzed, canopy size of both street and yard trees and the number of trees growing on a lot had the most effect on crime occurrence -- large trees were associated with a reduction in crime, while numerous small trees were associated with an increase.

"We believe that large street trees can reduce crime by signaling to a potential criminal that a neighborhood is better cared for and, therefore, a criminal is more likely to be

caught," Donovan said. "Large yard trees also were associated with lower crime rates, most likely because they are less view-obstructing than smaller trees." In contrast, their analysis suggested that small yard trees might actually increase crime by blocking views and providing cover for criminals -- an effect that homeowners can mitigate by keeping trees pruned and carefully choosing the location of new trees.

Of the tree variables evaluated, the crown area of street trees fronting a house and the crown area of trees on a house's lot were associated with decreased crime occurrence (these two variables are uncorrelated: correlation coefficient is .016), whereas the number of trees on a lot was associated with increased crime occurrence. To interpret these results, consider the mechanisms by which trees could affect crime. The most obvious is that trees could increase crime occurrence by providing cover to criminals. However, the degree of cover provided by a tree depends on its size and location. In general, larger trees are less view obstructing than smaller trees, because it is primarily the crown of a tree that obstructs views, and larger trees have higher crowns.

Similarly, the farther a tree is from a house, the less view obstructing it will be for the resident of the house. Indeed, Brown and Altman (1983) found that burglary was less likely if a house could be seen from neighboring houses. The mechanisms by which trees reduce crime are less intuitive. It may be that trees encourage people to spend more time in public spaces, which increases the probability that criminals are observed. It is also possible that trees provide a signal to potential criminals: a house is more secure, for example. Given these mechanisms, it is not surprising that street trees, which are farther from a house than lot trees, decrease rather than increase crime.

As with any observational study, the regression results demonstrate correlation and not causation. However, for three reasons, the authors believe that their results strongly suggest causation. First, their choice of tree variables was guided by established theories of crime motivation. Second, they controlled for a wide range of other variables that may affect crime occurrence (our choice of covariates was guided by the crime literature and by consultations with local crime-prevention officers). Third, their results are consistent with Kuo and Sullivan (2001), who studied the effect of trees on crime occurrence in a very different residential environment using different statistical tools. However, it remains possible that their findings resulted from unmeasured third factors correlated with crime as well as the tree variables.

The effects of trees on crime the authors identified were relatively modest. However, trees have multiple benefits other than potential crime reduction (energy conservation, storm-water reduction, etc.), and the results of this study should be interpreted in this light. It is unlikely that anyone would choose to plant a tree solely for its crime-reduction benefits. However, in combination with the other benefits of trees, crime reduction may provide a spur to tree planting. In addition, this study provides guidance on how to minimize the crime-increasing effects of trees. Finally, the results provide some more general insights into crime reduction and criminal psychology. Specifically, some crime-prevention measures may not appear to have a direct link to crime occurrence, but, nonetheless, they may effectively reduce crime by giving signals to potential criminals.