



Vulnerability of urban trees towards storm events as a risk for infrastructure – Berlin case study

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In cities, trees are an important factor for quality of life. They have positive effects on air quality, the city's climate as well as the city's appearance. Thus they increase the city's attractiveness. But during storm events, these trees become a danger, because they may topple or their branches may hurtle. Often pedestrians get hurt, cars are damaged and especially infrastructure is affected or destroyed.

Studies have shown that many factors control the vulnerability of trees towards storms. Stressing factors are larger for trees in cities than compared to trees in forests. Heat, low water availability, air pollution, bad soil quality, and missing space for rooting mean stress for these trees. Thus they are more prone to insect attacks weakening the trees or storm events itself. In general, the danger of uprooting or breaking of branches increases with the tree's age, height, size of crown and degree of foliation. Special characteristics of species like hardness of wood, type of rooting and branches are also essential for the resistance towards storm events.

Infrastructures are an important component of modern societies, for example the electricity supply or possibilities of mobility. But during storm events, vulnerable trees often threaten these tasks of infrastructures.

In risk analyses for infrastructures, location of trees is important: the closer they are located to streets, buildings or power lines, the larger the risk.

For Berlin case study, vulnerability of trees towards storm events had been investigated focusing on elected factors. Results were combined with infrastructure elements in a geographical information system. This combination allows a risk mapping, which may be helpful for relevant authorities. It can be used to plan preventive measures like observation of high risk areas, tree cutting, and selection of more resistant species, or optimization of operation planning in storm event cases.