



Urban and roadside trees in times of climate change

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Cities benefit from urban trees in various ways. They improve amenity values, e.g. by regulating the microclimate, providing shade or upgrading streets, places, promenades and courtyards. Urban trees, particularly roadside trees, are exposed to deleterious conditions which differ substantially from those of their natural habitats. Often they have to cope with drought stress, dust and air pollution, road salt, compact subsoil and many other stressors. As a consequence their life expectancy is on average at most half of that of trees situated in the surrounding countryside. Climate change will deteriorate these already unfavourable conditions in the upcoming decades. It is already apparent now that some of the well-established species in European cities have difficulty coping with the changing climate conditions. Drought and heat stress have a very direct impact whereas increasing pathogenic risks are rather indirect consequences of climate change.

In this context the authors have developed a concept to enable municipalities to adapt their urban tree population to changing climate conditions also taking into account site specific urban patterns. The pilot project 'Urban and roadside trees in times of climate change' is carried out in close cooperation with the Department of Urban Development and the Environment of the City of Jena, Germany.

Future, site-specific conditions of the urban tree population, i.e. for the period 2071 - 2100, are determined by means of cluster analysis. Clustering of inner-city locations is based on anthropogenic parameters, e.g. road salt, traffic emissions and soil sealing, as well as climate parameters, e.g. temperature, drought, wind speed, microclimate, and other influencing factors, e.g. slope and soil. As the decision to plant a particular tree species at a specific site is also influenced by various other aspects, e.g. aesthetic or cultural demands, these also have to be considered when developing recommendations to facilitate a climate (change) sensitive selection of tree species in urban planning projects.

The project delivers site-specific suggestions on the level of single streets, avenues, parks or promenades for suitable tree species comprehensively taking into account the local context, i.e. local impact of climate change as well as various design-related aspects.