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Review of Urban forest in Australia

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Abstract
The urban forest in Australia is embedded within a socially and physically complex space. Recently, these forest have received increased attention due to the critical ecosystem services they provide to human health and environmental quality, particularly as urbanization continues to grow. However, urban forests, through their mix of native and exotic trees, proximity to transportation hubs and presence of tree nurseries, can provide a pathway for invasive pathogens to establish and then migrate into natural ecosystems.

Keywords: Urban; Suburban; Forest; Decline

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1. Introduction

Over half of the world's population live in urban regions, and it is thought that the ratio will gradually increase[1]. with more than two-thirds expected by 2050[2], leading to more buildings and increased demands on green space. The higher temperatures experienced within urban areas compared to the neighboring rural areas is called the urban heat island (UHI) effect. The UHI is due to the increase in non-photosynthetic surfaces such as buildings, pavements, and roads, as a result of urbanization. The accumulation of these non-photosynthetic surfaces (1) absorb more radiation from the sun and reduce the level of evapotranspiration per unit area[3,4], and (2) reduce wind movement at the ground level which leads to the heated air not dissipating as quickly[3,4]. Urban forests and urban greenspaces help mitigate the UHI effect and also improve air quality within a city[5] through purification of the air[6]. They also store CO_2 which helps to reduce global warming[7]. Urban forests also have very important positive impacts on the physical and mental health of urban dwellers[8–10].

2. Urban forest

Urban forests also play a significant role in the maintenance of biodiversity[11–13]. A survey of 15 urban parks in Flanders, Belgium illustrates this; these parks contained approximately 30, 50, 40, and 60% of the total number of native trees and shrubs, birds, butterflies, and amphibians, respectively, that were found in the country[13]. Other key benefits of urban forests include an increase in people's feelings of happiness and comfort through urban greening[14,15], the provision of multiple ecosystem services[16,17], diminished energy consumption[16], mitigating flooding events [18], and reducing the number of airborne particulates and other pollutants [19,20].

3. Forest decline

Forest decline has been described as the gradual failure in the health of trees irrespective of the cause[21]. In general, forest decline is "an interaction of interchangeable, specifically ordered abiotic and biotic factors that produce a gradual general deterioration, often ending in the death of trees"*. Symptoms of decline include loss of foliar biomass, loss of feeder root biomass, and decreased annual growth (in height and diameter); the metabolic response to stress is the "breakdown and mobilization of nitrogenous compounds and translocation of nitrogen from stressed tissue" *. All of these symptoms result in a general loss of tree vigor. In fact, declines not only affect forest trees and shrubs but also affect other organisms that depend on the forest ecosystems for their survival (e.g., for shelter and food). Tree decline is not limited to one area of the world; decline has been documented on most continents *. The factors contributing to tree declines are numerous and there tend to be interactions between these factors. According to Manion[21], a common complex causal relationship between many factors such as climate conditions, pathogens, and human activities are responsible for forest decline. These factors are grouped into predisposing, inciting, and contributing factors *. The loss of forests due to agriculture, horticulture, forest plantation monocultures and urban development make it essential for the need to preserve and maintain healthy trees in urban landscapes. Unfortunately, while urban forests are obviously very important for the environment and biological conservation, they are under more stress than natural ecosystems as anthropogenic activities both biotic and abiotic add additional stresses to trees that are otherwise not present in natural ecosystems.

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4. Conclusion

The urban forest includes trees and shrubs in urban roads, parks, woodlots, abandoned sites and residential areas *, and "it is embedded within a socially and physically complex space"*. Recently, urban trees have received increased attention due to the critical ecosystem services they provide to human health and environmental quality, particularly as urbanization continues to grow *. However, the urban forest through their mix of native and exotic trees*, proximity to transport hubs * and the presence of tree nurseries * can provide a pathway for invasive pathogens to establish and then move into natural ecosystems *.

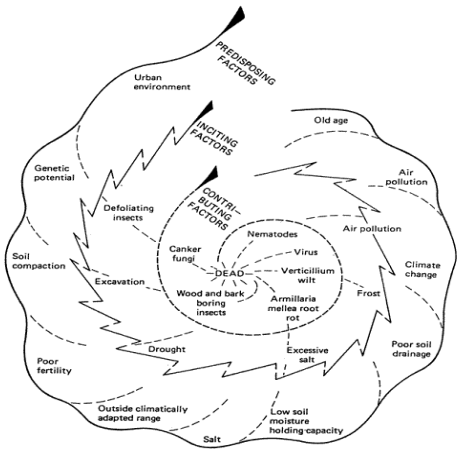

Fig 1: The disease decline spiral[21]

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