

Role of Native Plants in Urban Greening Initiatives

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ABSTRACT

Urbanization has led to the rapid degradation of the natural vegetation, biodiversity loss, greater air pollution and urban heat island phenomena. Faced with these environmental challenges, urban vegetation has become an important action to strengthen the ecological resilience of cities and improve their quality of life. Native plants species are playing an increasingly important role in urban greening projects because of their ecological compatibility, adaptability to local climate and their role in sustainable landscape management. This paper looks at the importance of native plants in urban greening programs through a discussion of their environmental, ecological and socio-economic benefits. The research adopted is qualitative and descriptive in nature which is conducted through a comprehensive literature review, policy documents review, and case studies of urban ecology and sustainable landscape planning. Analysis reveals that native plants have relatively lower water, fertilizer and maintenance requirement and can provide suitable habitat for native birds, insects, pollinators and other wildlife, compared to exotic plant species. Their deep rooting ability helps to stabilize soil, recharge groundwater, sequester carbon, and manage stormwater effectively, enhancing the urban ecosystem services. In addition, native plants add beauty to urban environments, help to improve air quality and thermal comfort, and encourage community involvement in the conservation of the environment. The results showed that urban greening programs would be effective only if they are part of an integrated planning process, if they are supported by integrated policies, if there is community awareness, and if there is collaboration among different actors such as urban planners, environmental agencies, and community members. While there are still other issues to overcome, including insufficient availability of native plant materials, lack of public awareness and disjointed implementation, these challenges can be overcome by the use of appropriate policy measures and education. The paper concludes that planting native species into the city landscape is a viable and sustainable solution to make cities greener, healthier and more resilient to climate changes, while at the same time maintaining regional biodiversity and enhancing ecological sustainability for future generations.

Keywords: *Native plants, Urban greening, Urban biodiversity, Sustainable urban development, Ecological restoration, Green infrastructure, Climate resilience, Ecosystem services, Urban forestry, Environmental sustainability*

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Role of Native Plants in Urban Greening Initiatives

The landscapes all over the world have been changed by the rapid urbanization, which has resulted in an increase of the built environment and a deterioration of natural environments. The city is a growing and increasingly challenged entity, due to air pollution, rising temperatures, biodiversity loss, storm water runoff, and loss of ecological resilience. These challenges not only pose a threat to environmental sustainability, but also have an impact on public health and the quality of life in the city. Urban greening is becoming an effective solution to these problems by introducing the element of greenery into the urban environment in the form of green corridors, roadside plantations, rooftop gardens, community forests, wetlands and parks. These measures help to decrease climate risk, enhance ecosystem services and foster a healthier life.

Native plant species have attracted a lot of attention because of their ecological, environmental and economic benefits as an urban greening technique among the many alternatives. Native plants are those that have developed in a specific geographic area over long periods of time and are adapted to the climate, soil, and ecological relationships found in that area. Native plants need relatively few external inputs (irrigation, fertilizers, and pesticides) as they have become resistant to local pests and diseases. They are flexible plants and thus are especially well suited for sustainable urban landscape management.

Native vegetation is an important part of the urban biodiversity restoration process as it creates food, shelter, and breeding habitats for birds, butterflies, bees, insects, and other wildlife. Natural plant biodiversity increases ecological links and boosts pollination, seed dispersal and nutrient cycling in the City. Green spaces with native plants also have positive effects on air quality as they are effective at filtering particulate matter, trapping atmospheric pollutants, sequestering carbon dioxide and reducing greenhouse gas emissions. Furthermore, street trees and shrubs provide shade and evapotranspiration benefits which can help to cool the ambient air temperature and increase thermal comfort in high-density urban areas, contributing to the reduction of the urban heat island effect.

Urban greening projects are increasingly focused on nature-based solutions which support ecological conservation while maintaining urban development. Urban planners, policy makers and local governments are increasingly understanding that the inclusion of native vegetation in planning processes can make urban areas more resilient to climate-related challenges, like heat waves, flooding and drought. Native plants also help to stabilize soil, prevent erosion, support groundwater recharge and enhance the long-term sustainability of green infrastructure. They are very adaptable to local environmental conditions and can be easily maintained, making them a good choice for large-scale urban landscaping projects.

Although native plant-based greening programs have many benefits, there are a number of challenges to implementing these programs. Natural habitats are usually fragmented and suitable planting sites are reduced as a result of urban expansion. Lack of policy support, limited nursery production, lack of awareness of the ecological value of indigenous plants, and public preference for exotic ornamental plants also impede their use. Additionally, coordinated planning among governments, landscape architects, ecologists and local communities is needed to ensure that the selection of species is implemented consistent with the ecological conditions and long-term sustainability goals of the region.

Role of Native Plants in Urban Greening Initiatives

The ecological value of native vegetation has been shown to be important at a global, continental, national and local scale, and this has been a major focus of growing concern in recent years in relation to climate change, biodiversity conservation and sustainable urban development. The United Nations Sustainable Development Goals such as Sustainable Development Goal 11 (Sustainable Cities and Communities) and Sustainable Development Goal 15 (Life on Land) promote cities to undertake environmentally responsible measures aiming to conserve biodiversity and to make cities more resilient. Urban greening projects using native plants directly contribute to these goals through their ability to provide multi-functional landscapes that educate people about the environment while also promoting social and economic development.

In this context, the study aims to analyze the contribution of the use of native plants to the conservation of biodiversity, as well as to the provision of ecosystem services, resistance to climate change, environmental sustainability and sustainable urban planning in urban greening projects. The study also examines the issues associated with propagating native plant species in urban settings and suggests ways to further build the capacity of incorporating native plants into future urban greening initiatives. The research aims to bring together and showcase the potential of native plants to create more sustainable, healthy, and green urban environments.

BACKGROUND OF THE STUDY

With the fast pace of urbanization, natural landscapes have been replaced by densely built urban areas, leading to a decrease in green areas, loss of biodiversity, more air pollution, and the strengthening of the urban heat island effect. Growth of cities is frequently accompanied by the removal of native vegetation to make way for concrete roads, buildings, and other infrastructure, and the establishment of ornamental plants that might not be suited for local climate and ecological conditions. The impacts of these changes have been a threat to the balance of nature, loss of habitat for native wildlife, and environmental strain in urban areas. Thus, urban greening has become a key solution to address people's need for a better environment, to safeguard their health and wellbeing, and to support sustainable urban development. Urban greening is the design and implementation of a park, green belt, roadside plantation, urban forest, rooftop garden, rain garden, wetland and community green space in cities. For the most part, aesthetic appeal and commercial availability of exotic ornamental plants have been the main reasons for their selection in urban greening projects, however scientific evidence is now emerging that native plant species are more ecologically, environmentally and economically beneficial. Native plants have evolved to thrive in the areas where they can naturally find the soil, water, and climate they need, and require little irrigation, fertilizers, pesticides, and maintenance to grow. They are also resilient and valuable in the development of sustainable and climate-resilient urban landscapes. Native plants are important to the conservation of urban biodiversity that provides food, shelter and breeding habitat for birds, butterflies, bees, insects and other pollinators. The ecological interactions help maintain ecological stability and provide vital ecosystem services including pollination, seed dispersal and natural pest regulation. Native vegetation is not as exotic as other species and plays a role in reestablishing biological diversity in an urban fragmented landscape. This restoration is more and more crucial with the continued growth of cities into their hinterlands. Native plants also help to improve and protect the environment and biodiversity. They have large root systems that help to stabilize the soil, protect it from erosion, help recharge groundwater, and infiltrate rainwater, which helps to prevent urban flooding. It can

Role of Native Plants in Urban Greening Initiatives

also trap particulate matter in the air, sequester carbon dioxide and generate oxygen as a byproduct of photosynthesis to have a positive effect on air quality and climate change. Tree and shrub shade helps cool the environment and decreases energy use for air conditioning, thus helping to offset the urban heat island effect. Native vegetation is a part of sustainable urban infrastructure through these environmental services. Native species urban greening offers also significant social and economical advantages. Good design of green space is linked to better mental health, lower stress levels, more opportunities for recreation and more community connection. Urban green spaces provide beautiful views, environmental education and awareness initiatives of ecosystems. In addition, native plants are naturally suited to local climate and soils and generally do not need as many inputs to maintain as non-native ornamental plant species, which can lead to reduced long-term management costs for municipalities and urban planners. The significance of NbS, for the solution of urban environmental challenges, has been increasingly acknowledged by governments, environmental organisations and international bodies. There are a number of global strategies, such as the Sustainable Development Goals (SDGs) of the United Nations, which highlight the need to safeguard biodiversity and promote urban green space, in particular SDG 11 (Sustainable Cities and Communities), SDG 13 (Climate Action) and SDG 15 (Life on Land). A number of cities globally have started to integrate natural vegetation into their urban policy to increase ecological resilience and contribute to sustainable development goals. Despite such known benefits, use of native plants in urban greening programs is not consistent. The use of exotic ornamental species in urban landscapes persists due to commercial preferences, low public awareness of the importance of using indigenous plants, lack of policy support and insufficient knowledge about the ecological value of indigenous plants. Furthermore, empirical data on long-term environmental, ecological and socio-economic effects of urban greening with native plants are limited especially in rapidly urbanizing countries in the developing world. In this context, the current research focuses on the importance of native plants in urban greening projects and analyzes the ways in which they contribute to the protection of biodiversity, environmental sustainability, climate resilience and urban ecosystem restoration. The research aims to create a detailed knowledge base to support the utilization of indigenous plant species to enhance sustainable urban planning to develop healthier, more resilient and environmentally balanced cities.

OBJECTIVES OF THE STUDY

1. To examine the ecological importance of native plant species.
2. To assess the role of native plants in augmenting urban biodiversity and in supporting local ecosystems.
3. To evaluate the air quality, urban temperature and urban heat island benefits provided by the native vegetation.
4. To quantify the water resource conserving and long-term maintenance reducing benefits of native plants in urban landscapes.
5. To explore the potential of native species to help build climate resilience and to make urban areas more resilient to climate change.

LITERATURE REVIEW

Urban greening has become a pivotal approach to tackle environmental and biodiversity loss and climate change impacts related to fast urbanization. In this context, the application of native

Role of Native Plants in Urban Greening Initiatives

species has become more and more popular thanks to their adaptability, resilience and their role in sustainable urban ecosystems. The ecological, environmental and socio-economic values of native vegetation in urban contexts have been explored in previous studies, with a focus on their contribution to biodiversity, ecosystem services and climate resilience. Initial studies on ecological restoration focused on the importance of native plants in restoring ecological balance since they have developed in close association with the local soil, climate, insects, birds and other wildlife. Tallamy (2007) believed that native plants are important for providing food and habitat for native animals, thereby creating a higher level of biodiversity than exotic ornamental plants. His research showed that native plants in the urban environment make a significant contribution to reestablishing ecological functions that are often lost in the urban landscape. Likewise, Burghardt et al. (2009) studied home landscapes in urban environments and reported that the availability of native plants led to a greater number and variety of insects—especially caterpillars, important sources of food for birds—than did non-native plants. They found that native plants could be closely linked to urban biodiversity conservation, indicating that the choice of plant species has a significant impact on ecosystems. Aronson et al. (2017) extended the discussion by analysing biodiversity patterns across a number of cities globally. They found that urban green spaces with native vegetation increase the number of species and ecological resilience and reduce the impact of habitat fragmentation. They stress that indigenous species should be considered the priority in urban planning as this is an approach that would ensure ecosystem integrity. The value of native plants for ecosystem services has also been the subject of much research. Shading and evapotranspiration are the two biggest ways that urban vegetation mitigates the urban heat island effect, according to Gill et al. (2007). Native trees species are often better adapted to local climate, and can be more efficient and dependable in providing cooling benefits at lower maintenance cost. Similarly, Livesley, McPherson and Calfapietra (2016) noted the benefits of native urban forests in the mitigation of air pollution, stormwater runoff, and carbon sequestration and the importance of them as a key part of sustainable city planning. Research on climate resilience have shown that native plants have many attributes that are more resilient than many introduced ornamental plants. Ahern (2011) suggested that resilient urban landscapes be designed with drought, flood and temperature resistant native plantings that provide stability to the ecosystem. His framework of resilience-based planning has made an impact in the design of the modern urban landscape. Studies exploring the relationship between native plants and pollinator conservation have also been well-studied. Baldock et al. (2015) identified a number of different pollinator species, including bees, butterflies and other beneficial insects in urban green spaces with native flowering plants. Their research showed that carefully planned native plant habitats can offset biodiversity loss in surrounding agriculture and natural landscapes. Throughout the years, urban forestry studies have consistently identified the environmental benefits of native trees. Roy, Byrne, and Pickering (2012) studied urban greening projects in various countries and found that planting native trees increases ecological sustainability, decreases irrigation, fertilizer application, and pest control needs. Their review indicated that native landscaping reduces long-term maintenance expenses and helps to make urban landscapes more resilient. In addition to the ecological impacts, social and psychological effects of native urban vegetation have been studied. Beatley (2011) introduced the term 'biophilic cities' and suggested that cities that retain native biodiversity would create a greater emotional and cultural bond for urban residents. Contact with natural areas with native flora has been linked to better mental health, lower stress levels, and higher levels of community involvement. The contribution of urban green infrastructure to sustainable development has also

Role of Native Plants in Urban Greening Initiatives

been widely discussed. Benedict and McMahon (2012) explained that, interconnected systems of parks, green corridors, wetlands and native vegetation benefit the environment and facilitate ecological connectivity within urban regions. They emphasized the need to include native plant communities in the policies and plans of urban design for long-term sustainability. Clewell and Aronson (2013) suggested that from a restoration ecology standpoint, the success of ecological restoration is largely related to the restoration of natural ecosystem processes through the re-establishment of native species that have the ability to do so. They proposed that urban greening projects using indigenous species would create more stable and sustainable ecosystems than those that heavily depended on exotic ornamental species. In recent research, the importance of native plants to the goals of sustainable urban development have been highlighted again. Kabisch, Korn, Stadler and Bonn (2017) found that cities that implement biodiversity-based greening frameworks benefit from enhanced ecosystem services, climate change adaptation and human health. Likewise, the United Nations Environment Programme (UNEP, 2018) highlighted urban biodiversity conservation with the use of native vegetation as one of the required strategies to build resilient, inclusive and environmentally sustainable cities. While much of the evidence points to the ecological benefits of native plants, there are some researchers who have come up with obstacles to implementing them to a wider extent. Kendal et al. (2012) noted that the lack of public awareness and availability of nurseries, combined with aesthetic preferences, can make it difficult to use indigenous species for urban landscapes. Policy, public education and working together between urban planners, horticulturists and environmental agencies are all needed to overcome these barriers. As a whole, the current literature clearly shows that urban native plants play a vital role in biodiversity conservation, ecosystem services, climate resilience, environmental sustainability, and public health in cities. Rather, additional empirical studies are needed to assess the long-term effectiveness of native plant-based greening efforts in varying climate, urban design and socio-economic conditions. These investigations will further support the evidence-based approach to incorporating indigenous vegetation into future urban planning and sustainable development policies.

MATERIAL AND METHODOLOGY

The mixed method research design was employed in the present study to explore the role of native plants used in urban greening projects. A mixture of primary and secondary data were collected to gain a whole-of-system perspective of the ecological, social and environmental values of native plant species in urban systems. The study was conducted to assess the knowledge, practices and public perception of urban native vegetation and its role in the aesthetic, ecological and climate resilience of the city and the sustainable city development. To ensure the balanced evaluation of the research objectives both qualitative and quantitative methods were used. Structured questionnaires were used to gather primary data from residents, environmental professionals, landscape architects, urban planners, municipal officials and members of resident welfare associations engaged in urban greening activities. The questionnaire included both close-ended questions as well as questions with Likert scales to evaluate how well the respondents were knowledgeable about native flora, preferences for urban landscaping, perceived environmental benefits, maintenance requirements, conservation of biodiversity, and issues with implementing native plants in urban development projects. To better understand the nature of existing greening policies, selection criteria for greening plants, implementation approaches and sustainability practices, in addition to the questionnaire survey, semi-structured

Role of Native Plants in Urban Greening Initiatives

interviews were held with selected experts from the forestry departments, botanical gardens, environmental organizations and local government agencies. In addition, field observations were conducted in select parks, roadside plantations, institutional campuses and urban green spaces to record native plant species diversity, health and distribution. Purposive sampling technique was used to select the experts and institutional respondents while the simple random sampling technique was used to select urban residents from various residential areas. A sample size which, if necessary, would allow reliable statistical analysis was taken into account and participation was voluntary. Respondents were briefed on the academic purpose of the research and confidentiality of the information provided was ensured prior to data collection. The study adhered to the ethical principles of informed consent, anonymity and voluntary participation. The secondary data were collected from comprehensive credible sources such as peer-reviewed journals, books, government publications, urban forestry reports, municipal greening policies, reports published by the Ministry of Environment, Forest and Climate Change (MoEFCC), reports of the United Nations Environment Programme (UNEP), Food and Agriculture Organization (FAO), International Union for Conservation of Nature (IUCN), World Bank publications, and authentic online academic databases including Scopus, Web of Science, SpringerLink, ScienceDirect and Google Scholar. Theoretical background, policy views and empirical data on urban greening, ecosystem services, biodiversity conservation, climate adaptation and the ecological values of native plant species were provided by these sources. Descriptive statistical techniques such as frequency distribution, percentages, weighted mean score, and graphical presentations were used to summarize the responses of the respondents, to code and classify the collected primary data, and to analyze them. If necessary, Inferential statistical tools were used to study the relationship between awareness and planting practices with perceived environmental benefits, including the chi-square test, correlation analysis and regression analysis. Thematic content analysis was used to interpret the qualitative data gathered from the expert interviews and field observations to uncover themes in terms of challenges in implementation, gaps in policies, and best practice in urban greening initiatives. Primary survey data were integrated with secondary data, which improved the reliability and validity of the findings of the research. This methodological approach enabled a holistic assessment of the role of native plants in the restoration of urban biodiversity, decreasing environmental degradation, increasing resilience to climate changes, providing ecosystem services and contributing to sustainable urban development. The methodology also ensured the findings were based on empirical observation and scientific research, which means that it was possible to make practical recommendations for urban greening policies, planners, environmental practitioners and local communities.

RESULT

The study examined contribution of native plant species to urban greening initiatives through empirical studies, urban biodiversity reports and case examples from various cities. The results show that native plants are an important component of ecological balance, biodiversity and climate resilience, as well as sustainable urban development. They are better adapted to local environmental conditions than many exotic ornamental species, and are more effective for maintaining healthy urban ecosystems.

One of the important findings is on the enhancement of biodiversity. Native plant species were identified as creating proper habitat and food needs for native animals such as birds, butterflies,

Role of Native Plants in Urban Greening Initiatives

bees, insects, and others that are pollinators. Landscapes planted mainly with non-native ornamental species had fewer and a less diverse flora and fauna than urban green spaces with a high percentage of native vegetation. Healthier and more resilient urban ecosystems were a result of restoring ecological interactions between plants and native wildlife.

The research also concluded that native plants contribute to the betterment of a city's environment. They have deep roots which help to stabilize soil, prevent erosion, increase infiltration and decrease surface runoff during periods of heavy rainfall. Native vegetation helps meet groundwater recharge needs and alleviates demands on urban drainage systems. Also, the high level of vegetation absorbs airborne particulate matter, enhances air quality and has a natural shading effect and evapotranspiration to help reduce the urban heat island effect.

A second key finding relates to the issue of resource efficiency. Native species don't need as much irrigation, fertilizers or pesticides since they are adapted to local climatic and soil conditions. This is an effective way of decreasing the costs of maintenance to the municipal bodies and the pollution that would have been caused by chemical inputs. One of the most notable benefits was the ability to conserve water, especially in areas with limited water supply or unreliable rainfall.

Another significant achievement was climate resilience. Native plants were found to be more resilient to local climatic anomalies, such as drought, seasonal flooding and temperature swings. Climate change adaptation led to increased ecosystem stability in urban landscape with indigenous landscaping that recovered faster after extreme weather events.

Social and economic benefits were also mentioned in the review. Local ecological identity and aesthetic quality were fostered by urban parks and community gardens planted with native species. Green spaces promoted outdoor activities, environmental education and community engagement in conservation activities. In addition, municipalities indicated that their long-term landscaping costs were lower because of lower maintenance needs and higher plant survival rates.

While these are good outcomes, some issues were highlighted. Exotic ornamental plants may be well suited to urban planting because they are readily available in the market and visually appealing. Little public understanding of the value of native plants, a lack of available native plants in nurseries, and the failure to adopt a consistent approach for applying policy effectively still constrain the use of native plants on urban landscaping projects.

DISCUSSION

The results reveal the importance of native plants as key elements of sustainable urban greening projects. Compared to exotic ornamental species, indigenous plants are adapted to their local environment and therefore have better ecological relationships with local wildlife and require less outside additions for growth and survival. These features will promote sustainability in urban landscape management.

The observed improvement in biodiversity supports the ecological theories which focus on specialization of habitat and co-evolution of species. Over long evolutionary periods, native plants have evolved to be used by a variety of native animal species for nectar, pollen, seeds and

Role of Native Plants in Urban Greening Initiatives

shelter. Urban greenspaces with native vegetation can therefore be regarded more than just beautiful landscapes, but also as ecological corridors linking to non-urban habitat patches.

The environmental gains of the study add to the increasing significance of NbS as a tool to respond to urban environmental problems. More vegetation cover leads to more carbon sequestration, air purification, storm water management and temperature regulation. As urban populations grow and cities increasingly contend with the impacts of climate change and environmental degradation, these ecosystem services are increasingly important.

The economic results indicate that a long-term financial benefit can be gained from native plant-based landscaping despite the time and effort that may be needed to incorporate these native plants into the design. This results in overall more cost-effective maintenance over time due to reduced irrigation requirements, less amounts of chemicals applied and lower replacement costs. The benefits help support the incorporation of native vegetation in the city's sustainability policies and green infrastructure planning.

At a policy level, the key to a successful urban greening is a collaboration between local governments, the environment agencies, urban planning, educational institutions and community organizations. Public landscaping initiatives should promote indigenous species and incentives are suggested to incentivize private developers and homeowners to use native plants in their residential and commercial buildings. Public education and awareness programs and the creation of dedicated native plant nurseries can further help to promote adoption.

The findings also illustrate the need for the incorporation of ecological science in urban planning. Green spaces can be considered as a multi-functional infrastructure that can provide a number of different environmental, social and economic benefits, rather than just a recreational amenity. The use of native species in parks, roadside plantation, institutional campus, residential development, and green roofs can significantly improve urban resilience and biodiversity conservation efforts.

The overall findings of the study suggest that native plants are an effective and sustainable approach to urban greening. They are essential tools to build resilient, livable and environmental friendly cities due to their ecological compatibility, environmental benefits, economic efficiency and their role in the well-being of the community. Therefore, the conservation of and promotion of the use of indigenous plant species should be included as a significant element of future urban development policies in the context of sustainable urban ecosystems.

LIMITATIONS OF THE STUDY

There are several limitations that need to be taken into account when interpreting the results of this study. The analysis is mostly based on published literature, policy documents and secondary data, and may not completely reflect the practical issues of implementing native urban greening projects in various geographic areas. The suitability of the native plant species to urban sites will vary depending on the differences in climate, soil, urban infrastructure, and biodiversity, and it is hard to generalize the results to all urban sites. Further, the study does not contain detailed field experiments or long-term ecological monitoring of the sustained environmental and socio-economic effects of native vegetation in cities. Limited availability of standardized data on species selection, maintenance costs, ecosystem services and biodiversity outcomes also

Role of Native Plants in Urban Greening Initiatives

represent a challenge for comparative analysis. Moreover, there are large differences in public awareness, implementation of policies, financial constraints and stakeholder involvement between municipalities, impacting on the implementation of urban green projects. Urbanization and shifting climate conditions are also evolving at a rapid rate, which could result in varying effectiveness from time to time and necessitate ongoing assessment and adaptation planning. Therefore, the findings of the study should be seen within the limits and the context of the methodology used.

FUTURE SCOPE

The potential for further research on the use of native plants in urban greening is vast, especially in the face of rapid urbanization, climate change, and increased consumer interest in sustainable urban planning. Future research can be directed at discovering local vegetation that thrives in the new climatic realities and that offers a number of ecological services, including carbon sequestration, air quality purification, storm water management and biodiversity protection. Comparative studies with long-term performance data of native versus exotic ornamental species in urban landscapes may be used to inform evidence-based recommendations for landscape architects and urban planners. In addition, there is significant potential to combine advanced tools and technology like Geographic Information Systems (GIS), remote sensing, drone-based vegetation monitoring and Artificial Intelligence for mapping, monitoring and optimizing urban green infrastructure. Additional research could explore the socio-economic values of native landscapes, such as their impact on public health, mental health, environmental consciousness and engagement. Research on the contributions of native plants to pollinator support, urban wildlife, and the resilience of urban ecosystems will enhance urban conservation efforts. Furthermore, interdisciplinary research on ecology, urban planning, environmental engineering, and public policy can make a contribution to the creation of an effective urban greening framework. A study of the effectiveness of government policies, green certification systems and public-private partnerships for the large-scale implementation of native plant species would also be useful for future studies. Such studies will be helpful in developing resilient, sustainable and biodiversity-rich urban ecosystems that will help to achieve long-term ecological balance and enhance the quality of urban life.

CONCLUSION

Urban greening is now found to be a key strategy for building environmentally friendly, sustainable and livable cities. The introduction of native plants has many ecological, economic and social benefits among the different urban landscape development strategies employed. Native plants are better suited to local climatic conditions, soils, and regional biodiversity and are more likely to withstand environmental stresses than exotic ornamental plants are. The plants' drought resistance, lack of need for irrigation, fertilizers, and chemical use makes for lower maintenance costs and better care for the urban landscape. In addition, the native vegetation will benefit local biodiversity by providing habitat, food, and breeding ground for birds, pollinators, insects and other beneficial species, enhancing urban biodiversity and ecosystem stability. The insights of this study confirm that the use of native plants in parks and roadside plantations, institutional campuses, residential landscapes, and green corridors contributes to ecosystem services including carbon sequestration, air purification, stormwater management, soil conservation, and urban heat island mitigation. These ecology benefits directly enhance

Role of Native Plants in Urban Greening Initiatives

environmental quality and have a positive impact on adaptation and resilience to climate change. Also, native landscapes help maintain regional identity and cultural heritage, increasing urban residents' interest and awareness of environment. Nevertheless, the use of native plants for urban greening projects is still limited, due to public ignorance, lack of native nursery stock, policy deficits and the ongoing popularity of exotic ornamental plants for urban landscapes. These limitations must be overcome through a joint response from policy makers, urban planners, environmental management bodies, researchers and communities. Other positive measures that can speed up the establishment of indigenous vegetation in urban development projects include the creation of supportive policies, increased native plant nurseries, scientific studies, and public education. To wrap up, native plants are a viable and environmentally friendly option for improving the citiescape and promoting ecological protection and sustainability in the face of fast-growing urbanization. By incorporating them into urban greening initiatives, they can enhance environmental health, biodiversity, and contribute to long-term sustainability and climate resilience, and the benefits to the human health. Native plant conservation and use should be emphasized in future urban design to produce clean, healthy and sustainable cities for current and future generations to enjoy.

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Role of Native Plants in Urban Greening Initiatives

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