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Xeriscaping: A Sustainable Solution for Water Scarcity in Urban Landscapes

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Due to growing populations, climate change and increasing infrastructure development, the urban environment is rapidly changing. One of the biggest impacts of this transformation is that we will need more and more water for landscaping, especially for outdoor landscaping. Water used for landscaping, particularly ornamental landscaping, such as flower beds, shrubs, etc., is a large component of water that municipalities supply of their communities. Water scarcity is no longer just an issue in arid area of our planet. Water scarcity is now a global issue that impacts developed and developing countries alike. The factors contributing to increased water scarcity include weather-related issues, i.e. erratic rainfall patterns; extended drought periods; and inefficient management of available water. As cities and urban populations continue to grow, there is no shortage of need for innovative and sustainable landscaping decisions. The introduction of xeriscaping as a way to effectively manage water usage while still providing aesthetically attractive landscape is both logical and sustainable. Xeriscaping was developed to deal with water shortages and focuses on the creation of landscape designs that require little or no irrigation for the maintenance and creation of an aesthetically pleasing landscape. Xeriscaping will provide long-term water conservation benefits and contribution to the long-term sustainability of the existing ecosystem by creating the most efficient and ecologically sustainable landscape designs based on the climate conditions in which the landscape exists (Srivastava *et al.*, 2023).

Xeriscaping is derived from the Greek word Xeros (dry) and is a combination of the words xeriscape + landscaping. Xeriscaping is a technique for designing, planning and using landscape that reduces the amount of water needed through better planning and management of natural resources. Many people may think of Xeriscaping as creating barren or desert landscapes. However, in reality, xeriscaping is the use of diverse and drought tolerant plant that can grow and live in the local environment. Xeriscape is based on how ecological systems work as well as how to design landscape. Xeriscaping tries to promote efficient use of water while still providing green space and a diversity of life (plants, trees, etc.). Xeriscaping also has a special place in urban areas where water is in high demand and where non-renewable natural resources are being depleted (Sezen *et al.*, 2018).

Need for Xeriscaping in Urban Areas

Rising demand for water and decreasing availability of freshwater resources has made water conservation an international priority. The Urbanization of the world has caused tremendous strain on our freshwater supply, while traditional landscape practices have created a tremendous amount of wasted water. Research indicates a significant amount of urban water use is for irrigation of outdoor spaces; most of which is done inefficiently. Climate change is contributing to this by changing rainfall patterns and increasing the number of droughts.

Xeriscaping can help by reducing reliance on supplemental irrigation and promoting efficient use of water resources. While xeriscaping directly applies to arid and semi-arid climates, the principles and practices can be utilized effectively in all climate zones, therefore providing a global method to manage urban water resources sustainably.



Red Butte Garden Utah, USA

Core principle of xeriscaping

Xeriscaping principles provide a framework for creating sustainable landscapes. Those principles include:

- Landscape planning and Design
- Improving soil
- Using water efficiently(irrigation)
- Selecting plants
- Use of mulch
- Maintaining landscapes

Collectively, these principles will provide a framework for designing and installing water – saving (or Xeriscaping) landscapes. (Prajapati *et al.*, 2023).

Role of plant selection in water conservation

The choice of plants has a major impact on how successfully xeriscaped areas function. By using local native species, as well as those that are drought tolerant, the amount of water needed is significantly decreased since these types of plants have been developed over time to thrive in the same climatic conditions as the area where the plant is located. Plants will usually exhibit drought-resistant traits, including deep root systems, decreased leaf areas (surface area), and reservoirs for storing water, allowing them to withstand very little irrigation over time. Also, grouping together plants with similar irrigation requirements (called hydrozoning) makes for a more efficient use of water because it eliminates over-watering. Xeriscaped areas have the ability to withstand dry spells and be attractive to the eye when appropriate plant selections have been used as opposed to traditional turf.



Neot Kedumim Biblical Landscape Reserve, Israel

Soil management and mulching techniques

An essential components of a sustainable landscape especially xeriscaping, healthy soil is essential. Soil improvement enhances water retention and support plant growth. In addition to being balanced, with sufficient organic matter, the soils ability to absorb the moisture and reduce runoff will increase. Another important aspect of soil management includes mulching the soil using organic or in organic materials; examples include Bark, Straw or Gravel. Mulching helps preserve moisture; suppress weed growth, and moderate temperature within soil. When combined, these strategies are effective at reducing evaporation losses and using available water efficiency, which is a major part of sustainable practices for the long term (prajapati *et al.*, 2023).



Denver Botanic Gardens Colorado, USA

Irrigation system in xeriscaping

Xeriscaping relies heavily on efficient irrigation because it helps deliver just the correct amount of water to plants at times when they need it most. Traditional irrigation methods can cause a large amount of water to be wasted through evaporation and runoff. On the other hand, xeriscaping uses advanced type of irrigation systems, including drip irrigation technologies which water only the roots of the plants to efficiently deliver water directly to the plant roots. Additionally, these systems can incorporate weather related controllers and sensors that measure soil moisture to further enhance efficiency of water usage. The efficient use of water by the irrigation system will significantly reduce overall amount of water utilized in urban areas.

Economic and environmental advantages of xeriscaping

Xeriscaping has many environmental and economic benefits. Environmentally, xeriscaping decreases the amount of water used, supports biodiversity through native plants, and eliminates the reliance on chemical fertilizers and pesticides. Furthermore, xeriscaping will help develop climate resilience by ensuring that there are green areas throughout California during droughts. Economically, xeriscaping lowers resident's water bills, decreases the maintenance required for lawns and gardens, and reduces the use of energy to operate irrigation systems and maintain lawns. Lastly, xeriscaping helps improve property values by providing residents with sustainable and aesthetically pleasing landscape designs. Because of these combined advantages, xeriscaping is a viable economic and environment-friendly option for cities (Yavuz, 2025).

Challenges and barriers to implementation

The adoption of xeriscaping encounters many challenges. A lack of awareness about xeriscaping, the preference for traditional grasses, limited access to native plant species, and an absence of adequate policies are some example of these challenges. Initial installation costs and technical knowledge needed may also serve as a deterrent in some situations. Societal views and reluctance to change can also impede the large scale implantation of xeriscaping. To overcome these issues we need to educate people about xeriscaping, develop incentive programs and provide demonstration project in diverse urban settings.

Conclusion

Xeriscaping is an effective and realistic answer to the problem of water shortages in developed areas. Xeriscaping is a holistic approach to landscaping that contains many components, including wise use of water, proper plant selection and sustainable landscape design practices, focusing on all aspects of managing your landscape. As our cities continue to expand experience additional environmental pressures, xeriscaping can play an important role in conserving water and creating sustainable environments. Promoting xeriscaping through education, policy, and community participation will be essential to building resilient and sustainable cities in the future.

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