

The seedling landscape: A new challenge for a better conservation of biodiversity in the city

Hanen Ferjani^{1,*} and Saida Hammami^{1,**}

¹Higher Agronomic Institute of Chott Mariem Sousse, Tunisia

L.R. Agrobiodiversité & Ecotoxicologie LR21AGR02

Abstract: The vegetation in urban areas plays several important roles. Our objective with this manuscript is not to talk about urban ecology but rather to discuss the role that cities can play in biodiversity conservation through the concept of seed-based landscaping. Biodiversity conservation by studying the reintroduction of spontaneous species in urban landscaping projects promotes a more sustainable use and management of local ornamental species. In this paper we will discuss the principles of the 'seedling landscape' concept and its benefits in biodiversity conservation. Our findings suggest that incorporating the notion of urban ecosystem services can have a crucial impact on restoring the connection between cities and the natural environment. This approach can effectively decrease the ecological impact and environmental burden of urban areas, while simultaneously promoting resilience, well-being, and the overall quality of life for city dwellers.

Introduction

Trees in cities are an important asset for the creation of sustainable infrastructures, economic attractiveness, adaptation to climate change, and the health and well-being of city dwellers.

Biodiversity, sustainable development, ecology, environmental protection, nature in the city... concepts that can be found everywhere today, either disseminated by the media or relayed by local authorities, are adapted and transcribed in landscape projects. In this current ecological movement, the use of local plants and species is seen as a step towards a more sustainable commitment.

1. Roles of trees in urban environments

The improvement of the living environment is a wish always expressed by the population. This has led to an increased need for nature in the city, of which the tree is often the symbol. This favoring of trees is an understandable phenomenon if one appreciates the multiple functions and benefits of which the tree is responsible. Indeed, trees improve the soil by enriching it and protect it by reducing the risks of erosion. It preserves the quality of water, regulates volumes and reduces the risk of flooding. The tree strongly participates in the reduction of carbon dioxide and other

* Hanan Ferjani: ghanen375@gmail.com

**Saida Hammami: saidahammami29@gmail.com

atmospheric pollutants such as ozone or sulfur dioxide... Moreover, it produces the inevitable oxygen.

The tree in urban environment also plays the role of bioclimatizer by regulating the temperatures and the humidity of the air. The tree plays an important role on the comfort and the health of the city dwellers.

In addition, the tree is a protector of biodiversity, many species of insects, birds, plants, mammals, because it fulfills the role of habitat and feeding. The wide-ranging effects of plant diversity in gardens extend to animal biodiversity, species interactions, and ecosystem functions. These effects include safeguarding wild pollinators and supporting essential pollination services [1]. The tree is thus an element of great value in the service of sustainable development. It helps to shape the urban landscape and thus contributes to the quality of life in the city. The tree over time allows the creation of a landscape and a local identity. Thus, the tree is an essential component of the urban ecosystem [2].

2. Problematic

In 1992, at the Rio Summit, the CBD (Convention on Biological Diversity) set three objectives: "the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic

resources". For the first time, the issue of non-native species is raised, and the signatory countries commit themselves "to prevent the introduction, to control and to eradicate alien species that threaten ecosystems, habitats or species" [3].

The decline of biodiversity on the planet, whose role of human impact is indisputable, combined with the great demographic growth and the urbanization of most of the world's population, particularly in recent decades, are forcing us to rethink the place of biodiversity in the urban environment. The IUCN claims that 75% of terrestrial environments and 40% of marine ecosystems are severely degraded, resulting in a significant erosion of biodiversity: the IUCN predicts that 50% of wild species could disappear by 2050, given that the rate of extinction is 50 to 1000 times higher than the natural rate of extinction [4].

The disappearance of many animal and plant species associated with the appearance of new exotic species, sometimes invasive, as well as the actions of humans on the environment lead to a homogenization and impoverishment of landscapes [5], as well as an increase in the number of formalized environments[6].

In its latest update, the IUCN states that one third of conifer species are threatened with global extinction.

Due to their contribution to the overall depletion of biodiversity, cities have been recognized as key actors in implementing the Convention on Biological Diversity (CBD).

Can cities participate in biodiversity conservation?

3.Methodes:

Through this manuscript, we aim to explore different experiences around the world that have successfully reintroduced biodiversity in their cities through native plants.

Faced with the expansion of urbanized land on a planetary scale, scientific literature has, over the past few decades, reinforced the observation that the city must participate in the conservation of biodiversity. Since then, several studies, attached to ecology and

conservation biology, have invested in studying urban spaces as favorable habitats for animal and plant species.

It is now a question of ensuring that all living tissues have a satisfactory ecological functioning and a high potential for diversification and adaptation, by preserving, enhancing and reinforcing its biodiversity.

This requires a particular attention to the species and habitats already present on the ground. This biodiversity, called by some "ordinary", is the foundation of life on our planet. The flora and fauna communities that exist reflect the nature of the subsoil, the history of the site, the management practices and the processes of evolution of the vegetation [7].

Preserving ordinary flora may seem complex for some trades, but overall, the issues as well as the ecosystem services will be better guaranteed by the existing species. Developing a public space with an ecological design, is a landscape project that will highlight the ordinary biodiversity of the site, and will allow it to be unique.

The development of ecological management of green spaces has led to the gradual return of spontaneous vegetation in urban areas. This approach is linked to several trends, such as the evolution of regulations, the reduction of budgets allocated to the management of public space, and the growing interest of the inhabitants for spontaneous nature, considered from now on as an essential component of the living environment.

In this context, the demand for local and adapted plants is increasing, especially for ecological compensation. As a result, native flora is taking an increasingly important place in the plant palette of urban design professionals [7].

This approach develops a landscape involving seedlings and not just plantings. This choice will allow to bring a new aspect to the landscaping by integrating in the plant palettes native species which have an important faculty of adaptation to the local conditions. Thus, they guarantee the success of the development. At a time when the concepts of sustainable development and biodiversity preservation are becoming more widespread, the use of our local flora

has become an environmentally friendly practice [7]. Indeed, although rare or invasive species are often highlighted, it is important to pay attention to ordinary biodiversity [8].

Tools exist to monitor the evolution of species diversity, particularly plant diversity. For example, the IUCN lists the so-called "red-listed" species by country. This international inventory is considered to be the most complete to provide information on the conservation status of species in the world.

Indeed, local plants are destined to occupy a predominant place in the world of landscaping.

If the use of local plant palettes in landscaping projects were to become widespread, it would not only help conserve the abused biodiversity in our landscapes, but it would also give a very different look to rural and urban landscapes.

The return of biodiversity to the city can be promoted through various structures such as ecological corridors, wildlife crossings, green roofs and climbing plants [9].

In Canada, cities like Toronto have implemented programs to promote the use of native plant species in urban landscaping. The city's "Toronto Green Standard" encourages the incorporation of indigenous plants in green infrastructure projects, storm water management systems, and public spaces. These initiatives contribute to biodiversity conservation and ecological restoration.

In the Faculty of Mont-Royal, a 'biodiversity' landscaping project has been created; it consists of proposing alternatives to grass that are prized for aesthetic reasons. This project improves biodiversity and reduces maintenance costs by replacing lawn areas with native species.

"It is especially important to choose native plants that are already adapted to the environment and that also increase local biodiversity". An urban planner at the City of Montreal's greening project adds...

As part of its ecosystem restoration project, the

Sherbrooke campus has planned planting projects that primarily utilize native species found in the ecosystem of Mont-Bellevue Park [10].

Singapore is well-known for its impressive greening initiatives. This city is considered the most sustainable in Southeast Asia. The country has a comprehensive urban greening strategy that includes the introduction of indigenous plant species in parks, streets capes, and buildings. They have created nature reserves, green corridors, and rooftop gardens that promote biodiversity and enhance the urban environment. Trees of the World is the annual charitable event organized by the Singapore Botanic Gardens, showcasing native trees that will be subsequently planted throughout the city in June 2023.

Australian cities have embraced the concept of using indigenous plants in urban landscapes. For example, Melbourne has a "Living Victoria" initiative that encourages the use of native vegetation in public spaces and private gardens

Africa who has one of the highest urban growth rates in the world, try to promotes the conservation of biodiversity in its cities through various measures.

Tunisia, a small country in north Africa, is strongly committed to the protection of its natural ecosystems and has signed the three Rio conventions. To ensure effective and sustainable protection of its biodiversity, several programs have been launched in the country. As part of its National Biodiversity Strategy and Action Plan, the Directorate General of Environment and Quality of Life has established a list of objectives to preserve and sustainably use biodiversity. These goals include reducing the causes of biodiversity loss and promoting biodiversity research to enhance the gains made [11].

The very rare species and threatened species are recorded in the national register of wild species (REGNES).

In the flora of Tunisia [12], thirty-two (32) taxa are in danger of extinction by severe rarefaction. Among these taxa, there are five species of orchids and two tulips and other ornamental spontaneous species. The *cyclamen persicum* has totally disappeared from two habitats (Ghar Meleh and Cebala) and exists only in Boukornine (6th national report on biodiversity).

The Atlas cedar (*Cedrus atlantica*) and the Numidian

fir (*Cupressus sempervirens numidica*) are in the process of regressing. The stands of holm oak are threatened with disappearance under the axe of the coalman (6th national report on biodiversity).

These species can be saved if they are introduced into the city through landscaping. For example, the indigenous cedars (*Tetraclinis articulata*), with their great ecological flexibility (from the sea shore to 700 m altitude) can replace the introduced cedars. Makthar cypress (*Cupressus sempervirens* form *numidica*) is another alternative for imported conifers.

Cyclamen persicum has completely disappeared from two habitats (Ghar Meleh and Cebala) and now exists only in Boukornine.

In Tunisia, there are initiatives underway to encourage ecological practices. One notable example is the Baron D'erlanger Palace, a historic site located in the town of Sidi Bousaid in the north of the country. In the palace garden, instead of maintaining traditional lawns, spontaneous annual plants are allowed to grow freely, with surprising results.

(photos 1).



Photo 1: Installation of annual plants on the abandoned lawn (Top), detail of installed species (dominance of *Bellis annua* (annual daisy))(Bottom).

Conclusion

The incorporation of spontaneous ornamental species in the city via urban landscaping is a good alternative to overcome the degradation of biodiversity. Through this exploration, we

acknowledge that there is a strong satisfaction regarding the rehabilitation of biodiversity in the studied cases, thanks to the return of native flora in cities.

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