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THE ROLE OF BOTANIC GARDENS IN BIODIVERSITY CONSERVATION

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Abstract: *The paper reviews plant biodiversity is under pressure from various factors, which requires active efforts to preserve it. Botanic gardens play a key role in this effort through preservation, study, and education programs. Deforestation, habitat degradation, habitat fragmentation, overexploitation, invasive species, pollution, global climate change, and the synergies between them have had a major impact on biodiversity. This review paper provides a brief, yet comprehensive and broad, overview of the main threats to plant biodiversity and how they differ from threats in temperate regions.*

Keywords: *Botanical Garden, Biodiversity, Plant protection*

INTRODUCTION

Biodiversity, despite its incredible complexity, is the foundation of life on Earth. It encompasses a variety of living organisms, including plants, animals and microorganisms that make up ecosystems. This diversity is key to maintaining the balance and health of nature.

Plants, as a major component of biodiversity, play a crucial role in ecosystems, providing food, oxygen, aiding water and soil cycling. They are the basis for the life of many species of animals and microorganisms, thus creating a wealth of ecosystems that support life in all its manifestations.

The Global Strategy for Plant Conservation, an international program with 16 global targets set for 2020 aimed at understanding, conserving, and using sustainably the world's plant biodiversity, is then used as a framework to explore efforts in assessing and managing plant conservation in a changing world. (*Angelino Carta, 2020*). Within each target, current challenges in assessing and managing plant biodiversity, identify key questions that should be addressed, and suggest ways for how these challenges might be overcome.

In this context, botanic gardens play a critical role in the conservation of plant diversity. They are not only places of beauty and recreation, but also institutions that provide valuable opportunities for the study, preservation and propagation of plants. They represent a wealth of diversity, where rare and unique plant species from all over the world are collected and preserved.

Botanical gardens are an integral part of the fight to preserve biodiversity. Their plant collections are a valuable resource for science, education and the conservation of many plant species that can be critical to ecosystems and the future of our planet's biodiversity stock.

EXPOSITION

Botanic gardens play an important role in the preservation of plants and research on their genetics and ecology. They function as key storage centers for diverse plant collections, including rare, endangered and endemic species from around the world.

Botanical gardens take care of collections of plants in specially created conditions, providing them with optimal conditions for growth and development. This process involves detailed catalogues

and records of each plant, including information about their characteristics, places of origin and specific care requirements.

Botanical gardens also conduct scientific research on plants. They focus on the genetic makeup of plants, their ecological interactions in different environments, and their role in ecosystems. These studies help to understand how plants function and how they can be conserved and conserved more effectively.

Botanical gardens run programs to conserve endangered plant species. These include activities such as conserving seeds and plants, restoring natural habitats where they need reintroduction or helping populations recover. The programs target plants that are threatened with extinction due to a variety of factors such as habitat loss, climate change and human activity.

These endangered species conservation programs run by botanic gardens are essential to protecting biodiversity and provide an opportunity for the continued existence of many rare and valuable plant species.

The educational and outreach programs run in botanic gardens have a significant impact on society, playing a key role in raising awareness of biodiversity.

The botanical gardens offer educational field trips and tours where schoolchildren, students, and visitors can learn about different types of plants, their characteristics, and their importance to ecosystems.

Lectures and seminars are held by experienced botanists and experts who provide additional knowledge about plants, practical tips for growing and their importance to life on Earth (Fig. 4).

Practical training programs are included, such as workshops on planting plants, growing plants in different conditions, etc. (Fig. 1)

Botanical gardens often offer interactive exhibits where visitors can learn about different aspects of the plant world through models, demonstrations, and interactive activities. Information panels, brochures and materials are provided which explain the importance of biodiversity, the role of plants in ecosystems and ways to conserve plant diversity (Fig. 2).

Educational and outreach programs in botanic gardens are essential to raising public awareness of the role and importance of plants and biodiversity. They help visitors understand the relationship between plants and ecosystems, and how they can play an active role in preserving natural resources and the environment.

These programs support the formation of a responsible attitude towards nature and biodiversity, which is essential for the preservation of our planet and the future of life on it.

The scientific research that takes place in botanic gardens plays an important role in expanding our knowledge of plants and ecosystems, providing valuable data and new perspectives.

Botanical gardens collect, analyse and preserve the genetic wealth of the plant world. These studies help to understand the genetic structure of different plant species, their evolutionary development and their interaction with the environment.

Research in botanic gardens studies how plants interact with other organisms, soil, water, and climate. This includes the study of the biological and ecological relationships that form different ecosystems.

Research in botanic gardens focuses on the ways in which plants adapt to changing climate conditions and human activity. This research helps predict and manage the impacts of climate change on plant species and ecosystems.

Scientific research conducted in botanic gardens not only expands our knowledge base about plants and ecosystems, but also provides information that is critical to the conservation of biodiversity. They provide foundations for developing strategies for sustainable management of natural resources and protection of plant species. This research is the basis for future efforts to protect our planet and its ecosystems.

The University Botanical Garden at the University of Ruse offers interactive botany classes for children. The learning modules are developed according to the needs and age of the participants in the Summer Academy. The activities are aimed at stimulating the study of natural sciences in the formal and informal sphere of education, as well as activities adapted to the needs and interests of our visitors. The topics related to the plant world - from the role of plants in the existence of life on

Earth, through the protection of rare and endangered species, the place of different parts of plants on our table, as well as the interrelationship of the plant kingdom and man, preserved in traditions and customs. With the means of discovery learning, through games, observations and direct contact with nature, children get to know the role of the Botanical Gardens in protecting plants in our world, come into close contact with the work of scientists, and take on the role of researchers.

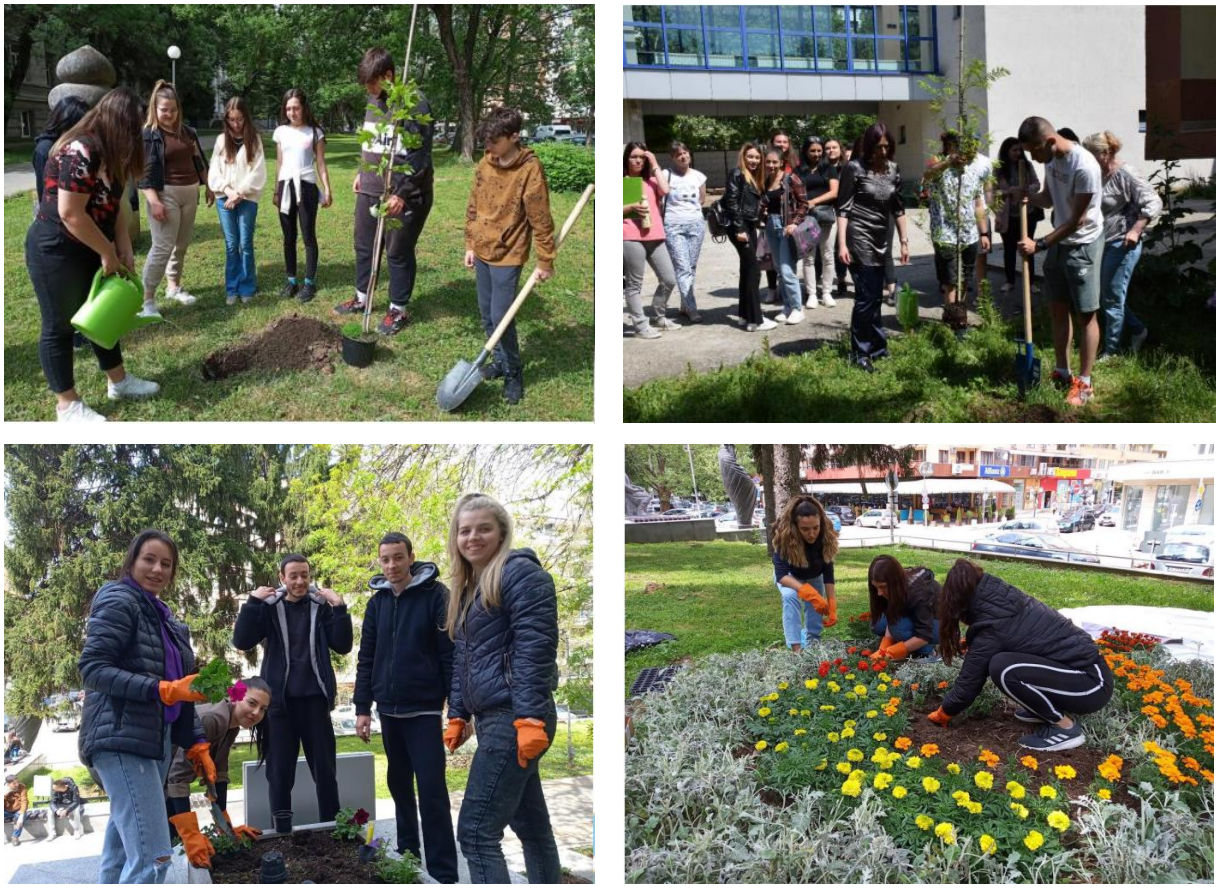

Fig. 1 Practical training

The learning modules aimed at children at the University Botanic Garden's Summer Academy sound like a great opportunity to enrich their knowledge of plants and nature. Interactive activities based on discovery learning are a wonderful way to stimulate the learning process through games, observations and direct contact with nature.

The topics, which cover different aspects of the plant world, are not only educational but also inspiring. From the role of plants in the life of the planet to their relationship with humans, customs and traditions, these study modules not only expand the knowledge of plants, but also place them in the context of society and culture.

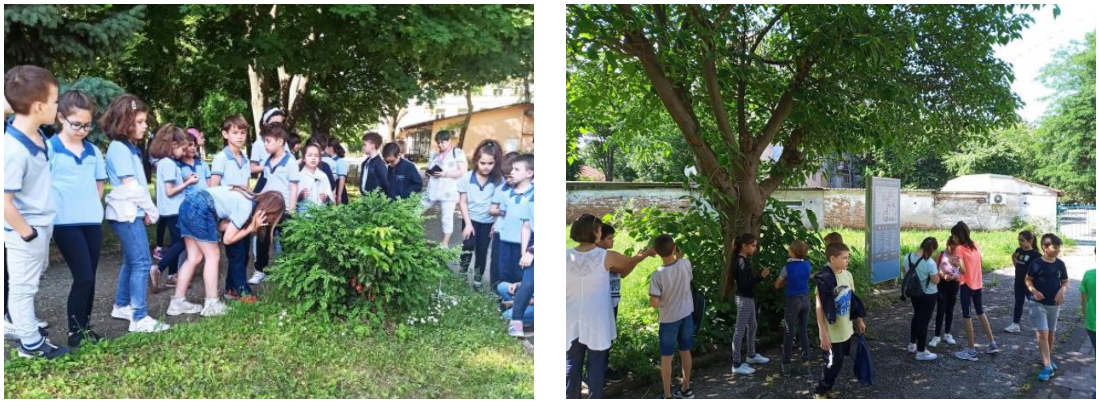

Fig. 2 Students learn to recognize different plants

Importantly, these activities not only provide knowledge, but also support children to become active researchers, experience the role of scientists and learn about the work of scientists at the Botanic Gardens. This type of educational experience has the potential to foster curiosity and respect for nature and support future generations in caring for the environment and biodiversity.

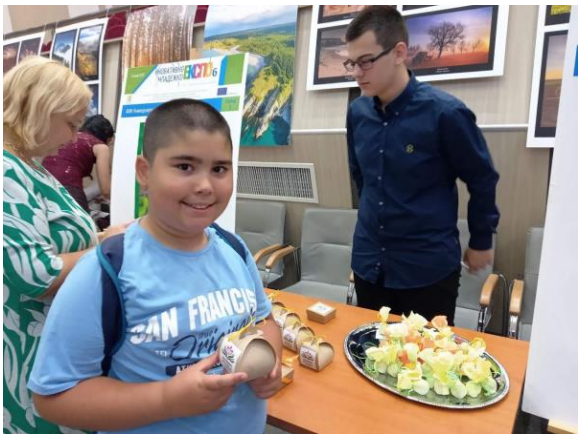


Fig.3. Participation in exhibitions

Habitat loss is a major threat, with deforestation and environmental changes such as drying up of wetlands or the encroachment of deserts playing a key role.

Human activities such as construction, industrialization and environmental pollution also have a huge impact on biodiversity. Global climate change, disruption of ecosystems through the introduction of alien species and overexploitation of natural resources are factors contributing to the loss of biological species.

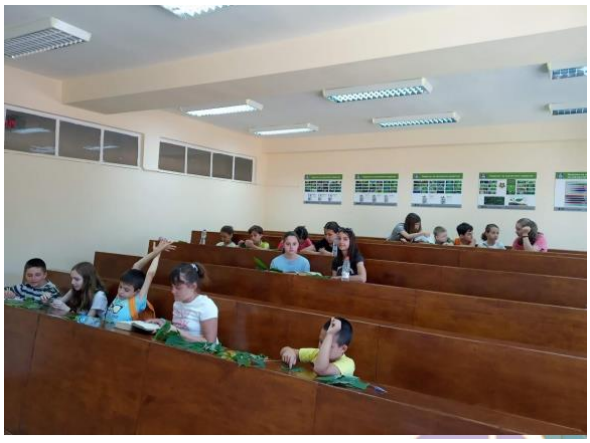
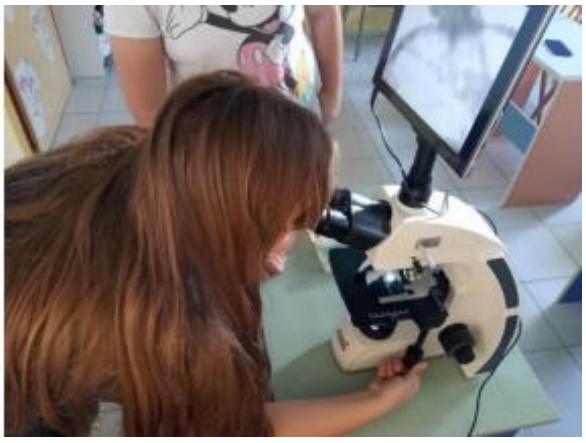

Fig. 4. Lectures and seminars

It is important to realize that these threats can increase their harmfulness if they act together or in combination. A combination of factors can lead to greater consequences for ecosystems and animals that are interconnected and dependent on each other. Biodiversity conservation work involves understanding and combating all these threats, seeking to balance human activity with nature to protect natural processes.

CONCLUSION

Botanical gardens are essential to biodiversity conservation through a variety of activities and programs that provide plant preservation, educational opportunities, and scientific research.

In conclusion, the role of botanic gardens in conserving biodiversity is critical to the future of our planet. Their programs and efforts are necessary to maintain the balance and preserve valuable plant species and ecosystems.

REFERENCES

Aguilar, R., M. Quesada, L. Ashworth, Y. Herrerias-Diego, and J. Lobo. 2018. *Genetic consequences of habitat fragmentation in plant populations: Susceptible signals in plant traits and methodological approaches*. Mol. Ecol. 17: 5177–5188.

Ahrends, A., C. Rahbek, M. T. Bulling, N. D. Burgess, P. J. Platts, J. C. Lovett, V. W. Kindemba, N. Owen, A. N. Sallu, A. R. Marshall, B. E. Mhoro, E. Fanning, and R. Marchant. 2011. *Conservation and the botanist effect. Biol. Conserv*. 144: 131–140.

Angelino Carta, Domenico Gargano, Graziano Rossi, Gianluigi Bacchetta, Giuseppe Fenu , Chiara Montagnani, Thomas Abeli, Lorenzo Peruzzi, Simone Orsenigo, *Phylogenetically informed spatial planning as a tool to prioritise areas for threatened plant conservation within a Mediterranean biodiversity hotspot, Science of The Total Environment, Volume 665, 2020, Pages 1046-1052*

Beaumont, L. J., and D. Duursma. 2012. *Global projections of 21st century land-use changes in regions adjacent to protected areas*. PLoS ONE 7: e43714.

Brudvig, L. A. 2011. The restoration of biodiversity: Where has research been and where does it need to go? Am. J. Bot. 98: 549–558.

Convention on Biological Diversity. 2010. *Global Strategy for Plant Conservation:* Technical rationale, Justification for Updating and Suggested Milestones and Indicators. UNEP/CBD/COP, Nagoya, Japan.

Dick, C. W., S. L. Lewis, M. Maslin, and E. Bermingham. 2013. *Neogene origins and implied warmth tolerance of Amazon tree species*. Ecol. Evol. 3: 162–169.

Diez, J. M., C. M. D'Antonio, J. S. Dukes, E. D. Grosholz, J. D. Olden, C. J. B. Sorte, D. M. Blumenthal, B. A. Bradley, R. Early, I. Ibáñez, S. J. Jones, J. J. Lawler, and L. P. Miller. 2012. *Will extreme climatic events facilitate biological invasions?* Front. Ecol. Environ. 10: 249–257.