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MAGYAR AGRÁR- ÉS
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THE RENEWAL OF HISTORICAL ZOOS WITH CONTEMPORARY LANDSCAPE ARCHITECTURAL SOLUTIONS

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1. BACKGROUND AND OBJECTIVES

The World Association of Zoos and Aquariums (WAZA) has included in its World Conservation Strategy for Zoos the vision of zoologist Dr. George Rabb that zoos can **respond to the ecological crisis, habitat destruction, and global biodiversity loss if they are redeveloped as conservation centers, strengthening their role in conservation and education.** The next stage in the evolution of zoos is of course not only relevant to historical zoos, but the fact that they have evolved from menageries and precocious zoos into recognized scientific institutions should be a lesson for all zoos. **The aim of my dissertation is, therefore, to explore the landscape architectural aspects of zoos' past and present strategies for renewal, with the aim of suggesting landscape architectural solutions that assist the holistic development of the zoo.**

In order to assess each open space composition, it is necessary to understand the characteristics and achievements of each period of zoo design. The aim of my work is to **investigate the relationship between the innovative zoo design solutions of each period and the garden art period styles of that period, to identify the zoo design styles of each period,** and to examine the strategies by which each zoo design style can be harmonized with contemporary zoo design.

The **long-term development** of a zoo can be adequately justified by reviewing the park as a single entity. When assessing the **development of the spatial structure**, the outstanding compositions of the different periods should be interpreted in conjunction with the spirit of the age, as they were shaped by the social, scientific, and economic forces of the time, using the tools of the actual architectural and garden style periods.

The conservation message of zoos and the awareness-raising activities to protect biodiversity and the environment can only be truly effective if zoos set an example by reducing their environmental impact, and therefore **the research will also cover sustainable design aspects of zoo design.**

2. MATERIALS AND METHODS

The sources for the thesis fall into four categories: literature; archival images and maps; personal interviews; field research. The majority of still operating zoos are located in Europe and North America, therefore the research includes European (28) and North American (7) zoos recognized by international organizations.

The **aim of the literature research** in my dissertation is to distinguish, the animal collections periods (chapter 3.2) from an open space design point of view, and to identify the open space design aspects relevant for their renewal (chapter 3.1). The former was identified through historical and literature research integrated with the results of my fieldwork on the present design of 35 zoos; the latter was identified through the literature on animal husbandry, zoo biology, zoo design; national legislation regulations; personal interviews with veterinarians, curators, architect zoo designers, landscape architect zoo designers, art historians, and animal care professionals; and presentations at the EAZA-, and Zoo Design Conference.

The **analysis** is also divided into two chapters, in the first (chapter 4.1) I examine the influence of the garden art period style on the zoological collection periods (chapter 3.2), and on this basis, I define the **zoo design periods**. The introduction of each zoo design period is based on historical research as well as on my own field research (Table III). In Chapter 4.2, I examine **the compositional elements and the degree of their adjustment to the demands and aspects of the zoo's stakeholders** - animals, visitors, and animal care and enclosure management (Chapter 3.2).

The results of my field research in 35 zoos are presented in four chapters of **case studies**, on three different scales and at different levels of detailedness. In each of the zoos studied, I examined the outstanding **contemporary open space design compositions, the sustainability design considerations**, and **the prominent composition of each zoo design style period**, as well as **the zoo's location and external connections**. The results of the case studies are presented in this thesis with examples of the most relevant zoos according to each of the study criteria.

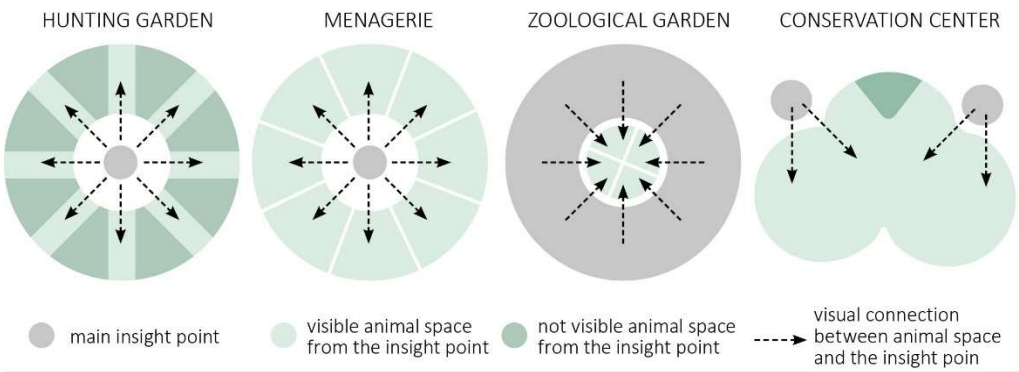
3. THESES, NEW SCIENTIFIC RESULTS

1. Periods of animal collections

Based on the zoo history-related publications, I have defined the periods of animal collections according to their purpose, classification, and accessibility. Hunting gardens can be distinguished from menageries primarily based on of their function. The purposes of hunting gardens were recreation and food supply, while the exotic animals of menageries were considered symbols of power, they were created to amuse and entertain the viewers. Menageries were for the exclusive enjoyment of the ruling families and their guests, while zoos were scientific and educational institutions open to the public. As their role in species conservation and nature protection is developing, as they provide a link between ex-situ and in-situ conservation and play, and as they are developing their role in environmental education zoos are becoming conservation centers. In terms of the purpose of animal collections and their accessibility, there is an overlap between the different periods. **The transitional periods are characterized by a long process of development and the different eras of zoological collections cannot be claimed solely to the innovation of a single zoo designer or director. The evolution between the periods was triggered by the mutual influence of the compositional principles of each architectural and landscape architectural period styles, the spirit of the age, the scientific achievements of the era, and the achievements of technology.**

2. The relationship between the purpose of the zoo and its spatial structure

Based on the literature research and field analysis of zoos, I conclude that there is a close relationship between the purpose of animal collections and the way animals are presented; the spatial structure of collections is adapted to the purpose and the way they are presented, but not independent of the period style and the spirit of the time. The radial symmetry of the Baroque menageries (and to some extent the hunting gardens), allowed a few privileged people to see as many animals as possible without movement. In the menageries,



Schematic diagram of the relationship between visitor spaces and animal spaces in the different periods of the zoological collection

animals were always visible, but in the hunting gardens, the sighting of an animal was less predictable and not only revealed by a radial symmetrical vue system. The proportion of animal spaces and visitor areas was changing as the zoos became open to the public and the audience grew. Animals were housed in small enclosures, preferably with a longitudinal view along their entire perimeter. The taxonomic grouping of enclosures that represented the zoo's scientific purpose, promoted two different types of space structure: the enclosure arrangement fostered animal comparison and resulted in an orthogonal composition of cage rows; while the emphasis on special animals located in busy intersections of roads, formed an island-like structure. In conservation centers, fewer animal species are visible in larger enclosures, longitudinal insights are replaced by point- or island-like insights, and schematic visitor spaces are replaced by a thematic environment designed to correspond to the habitat or using the same open-space elements (5. Chapter 3.3); conservation centers present not only animals but also habitats, so their design unit are not just enclosures but the sub-area that belongs to a coherent theme. The sub-areas can be effectively organized by a hierarchical path system.

To achieve the objectives of conservation centers, the zoological institutions need to be designed in a manner different from the display methods and spatial structure typical of a zoo, therefore zoos can become conservation centers through the renewal of the whole space structure and the enclosures at the same time.

3. The relationship between the organization of the zoo and its spatial structure

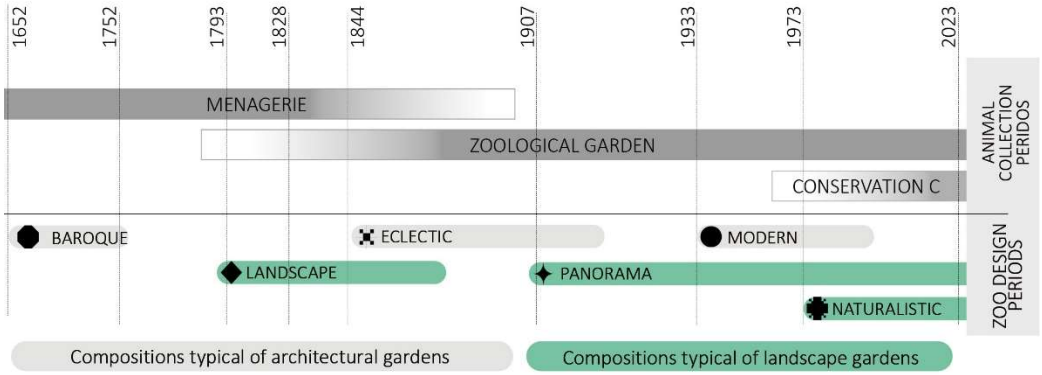
The way zoos are organized can be divided into two main categories, taxonomic and ecological. The former encouraged the development of a taxonomically complete collection, while the presentation of the relationship between the animal and its habitat led to themes based on the continent of origin, biozones, or vegetation types. The first zoo that pioneered a new organization concept, where animals were first presented as part of a habitat, was Tierpark Hagenbeck, which opened in 1907 on the outskirts of Hamburg.

The shift between the two main types of organization has also led to significant changes, as how zoos are organized affects the grouping of the runs, the thematic units of the zoo, the infrastructure, and thus the space structure of the zoo.

The new zoological organization introduced in 1907 led to the creation of new zoos and the reorganization of existing ones along different themes based on ecological principles. In other words, zoos established before 1907 have already been, or will be, realizing a major change in their spatial structure in the course of their reorganization into conservation centers.

4. Zoo design periods

I examined which compositional principles of the garden art period styles can be observed in different animal collection periods in the zoos, which are outstanding in terms of open space design and innovative in terms of animal husbandry. **I have found that the open space compositions of animal collection periods cannot be identified entirely with a single garden art period style and that certain garden art period styles influenced several animal collection periods with different compositional principles in terms of animal displays and husbandry. I have distinguished the following six zoo design period styles: baroque, landscape, eclectic, panoramic zoo, modern, and contemporary naturalistic.**



The chronological relationship between animal collections and the zoo design period styles

5. The renewal of historical zoos

By analyzing the current function of the enclosures characterized by different zoo design periods, **I have found that the renewal of historical zoos is not primarily determined by the historical heritage of the zoo design period, but mainly by the specificity of the given composition. All zoo design periods, but not all compositions, are compatible with contemporary zoo design.**

Designed by Antony Armstrong-Jones (Lord Snowdon) and Cedric Price, the Snowdon Reptile still functions as it originally did and fits sensitively into the Regent's Canal panorama in 2014

After examining the enclosures with compositional features of the same zoo design periods, the results show that those animal houses and enclosures that treat the visitor spaces as a coherent part of the composition in addition to the zoo and the enclosure (London - Snowdon's aviary, Lion Terrace; Schönbrunn - Baroque part) are more compatible with contemporary zoo design.

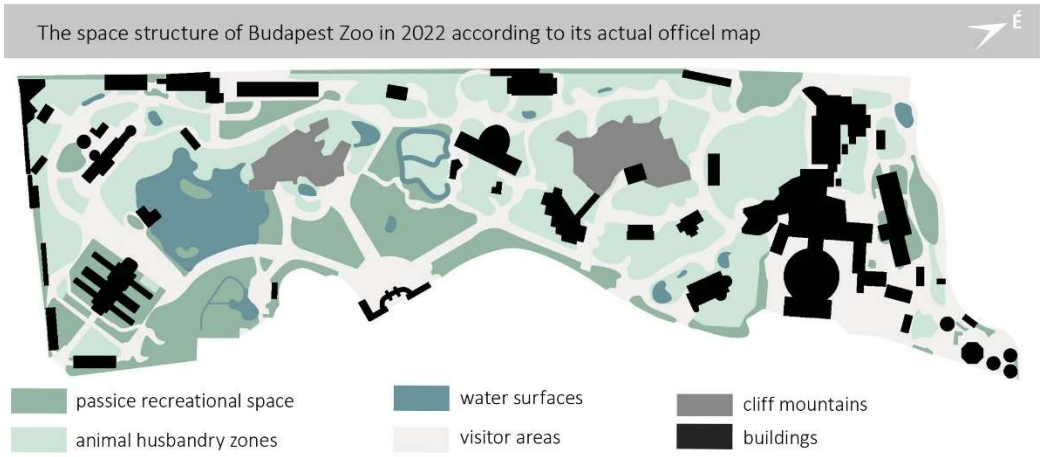
6. Compositional unit of contemporary zoo design

Searching for complex, stimulus-rich enclosures, I visited 35 zoos (Table III), from which I selected 14 enclosures that are progressive in terms of zoo design to analyze the impact of different open space design elements on the different stakeholder groups in the zoo. By the composition of animal space's space forms, the transparency of the demarcation, the position and nature of the visitor insights, and the combined composition of the open space elements of the three enclosure parts, the positive visual connections can be determined, the unfavorable views can be eliminated, and a holistic display can be realized without negative impact on animal welfare. **Therefore, a coherent composition of the open space elements is more important in harmonizing the needs of the zoo's stakeholders than the characteristics of the individual areas (animal space, demarcation space, and visitor spaces).** The requirements of the different stakeholders are met when **the three different functional areas associated with the enclosure, the animal space, the demarcation space, and the visitor insights, form a coherent open space composition.**

The objectives of contemporary zoo design can be supported by a composition that does not focus on a single enclosure but on the common composition of enclosures, animal houses, visitor insights, and animal spaces, shaped and defined according to unified open space design principles and coherent narrative.

7. The renewal of historical zoos

Based on the research of the spatial structures of zoos, concluded that the spatial layout of historical zoos, I concluded that the spatial layout of historical zoos, due to the mosaic arrangement of zoo areas preserving influences of different zoo design periods, can only be considered as a logical structure; a uniform spatial composition is typical for zoos that still fully preserve the spatial concept of a certain period (Rotterdam, Antwerp). The results of the case studies show that **if the buildings define their surroundings, rather than the open spaces composition organizes the built and natural elements, the space structure of historic zoos is heterogeneous and dense, which makes it more difficult to achieve the objectives of contemporary zoo design.**



8. Zoo renewal strategies **– the zoo as an open space design composition**

The reorganization of zoos into conservation centers requires a new spatial structure, which integrates the sub-areas that form the compositional units. **The spatial structure case studies have shown that the expansion of a zoo or the creation of a partner zoo (**which can significantly reduce the number of animals on display) **alone does not lead to spatial development; the spatial structure can only be improved if the renewal of the zoo is based on a coherent open space design composition,** either in a one phase comprehensive redevelopment (Antwerp 1861; Budapest 1912; Paris 2014) or in several phases based on a long-

term development concept (Seattle 1973, 2004; Amsterdam 2006). A logical organization of the zoo's layout has a positive impact on the orientation of visitors, it provides a structure for the spatial units of the long-term development concept, and the narrative that will determine the open space design composition. The key to the renewal is therefore to redefine the zoo's concept of organization and to conceive the zoo as a single open space design composition.

9. Zoo and its environment

As an urban open space and an urban green space, zoos are connected to their surroundings. Nineteen of the zoos I visited personally were relevant in terms of their relationship to their surroundings, I examined the nature of this relationship and the response of the zoo to the relationship. I identified that the different environments resulted in different spatial compositions, so in addition to international zoo design trends, the nature of the zoo's environment also influences the development of zoos. **The tendency that zoos to open up and strengthen their connections to their environment, therefore conveying value beyond their basic purpose, is detected in the case of zoos located within the urban fabric and those established as part of open space composition.** In the 19th and 20th centuries, zoos also represented a cultural scene in the city (Antwerp, Amsterdam, Budapest). Today, in the era of accelerated urbanisation, zoos are becoming precious as part of the green infrastructure system as well. The transitional zones between zoos and their environment, either by creating functional or just visual connections, are considered a new value from both the zoo and urban perspectives.

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4. CONCLUSIONS AND RECOMMENDATIONS

The dissertation's conclusions of the research results, in addition to a summary of the zoo renewal strategy, resulted in three design-related practical-, and one research proposal.

PRACTICAL PROPOSALS FOR THE DESIGN

1. The criteria for the zoo's open space design

Based on a literature search, personal interviews with zoo designers, zoologists, veterinarians, zoo curators, and animal keepers, recommendations of international zoo associations, and presentations at the International Zoo Design Conference, I identified the requirements and aspects of the zoo stakeholders - animals, visitors, and animal care and maintenance - that can be influenced by open space design. I have concluded that **the open space design responses provided to the different stakeholders' needs often have conflicting effects on the different stakeholders, which should be harmonized in the open space design concept. The review and classification of the criteria in such depth is a novelty and can form the basis of a design manual.**

2. Analytical methodology of enclosures

The legislation regulating animal husbandry defines the minimum environmental requirements for the construction of enclosures. The Internation Best Practice Manuals provide species-specific recommendations for the design of enclosures but do not provide a comprehensive design theory guide. The literature on zoo enclosure design approaches the task from different disciplines and design intentions but does not explain **the impact of the outdoor elements of the three enclosure-related spaces and the landscape architectural principles of their collective, systematic composition, as discussed in this thesis, and therefore**

the enclosure study criteria in this thesis not only assist analysis and evaluation of enclosures but also their design. The compositional principles of open space units and elements can be used to create enclosures that meet the needs of the three zoo participant groups.

The **typology of visitor insights** (Chapter 5.3.3), the possible effects of the form of the runway (Chapter 5.3.1), and the **combined compositional principles** of the enclosure and the open pace elements of the demarcation space (Chapter 5.3.2) are considered to be a comprehensive design guide not found in other zoo design literature.

3. Sustainable renewal

Applying energy- and climate-conscious landscape architectural, horticultural, and architectural means and materials, and the combined composition of architectural-, and outdoor elements can reduce the energy consumption of buildings and the water and resource demand of the zoo. By shaping spaces collaboratively, the visitor spaces will provide a more complex sense of space, making the zoo more adequate for both animals and visitors. Cooperation between designers and developers from both disciplines is also essential for the design and operation of sustainable zoos.

RESEARCH PROPOSAL

One of the main challenges of zoo enclosure design is to ensure that the design intent is understandable to the animal and that it is aware of its choices and has some freedom to choose between them. In landscape architectural design practice, the interrelationship between open spaces of different functional units is organized by the function scheme of the space. This framework is perceivable for the users the in the same way as the designer intended by the open space design elements and their arrangement. **The functions of the enclosures are determined by zoological and ethological knowledge, and the necessary environmental factors associated with the functions are determined by the ecological aspects of the natural habitat that are important to the animal. The functions and their environmental elements can be interpreted by the animal through a model of their natural territory structure.**

Little information is currently available on this, but in case zoological, ethological, or ecological studies could model the territory structures of different animal species, it could be valuable for zoo enclosure design.

5. THE AUTHOR'S PUBLICATIONS RELATED TO THE TOPIC

Journals (full paper)

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Other related works

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Bagdiné Fekete O., Geiszelhardtné Hutter D., Kétszeri Á. (2022): *Landscape architectural execution plans of the Fejes-valley's southwestern area of Veszprém Zoo, The felide complex*

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Balogh P. I., Fekete O. (2014): *Open space design plan of the Apartment House in Fürj Street, permission and execution plans*, Budapest XII. district, Fürj Street, Hungary

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