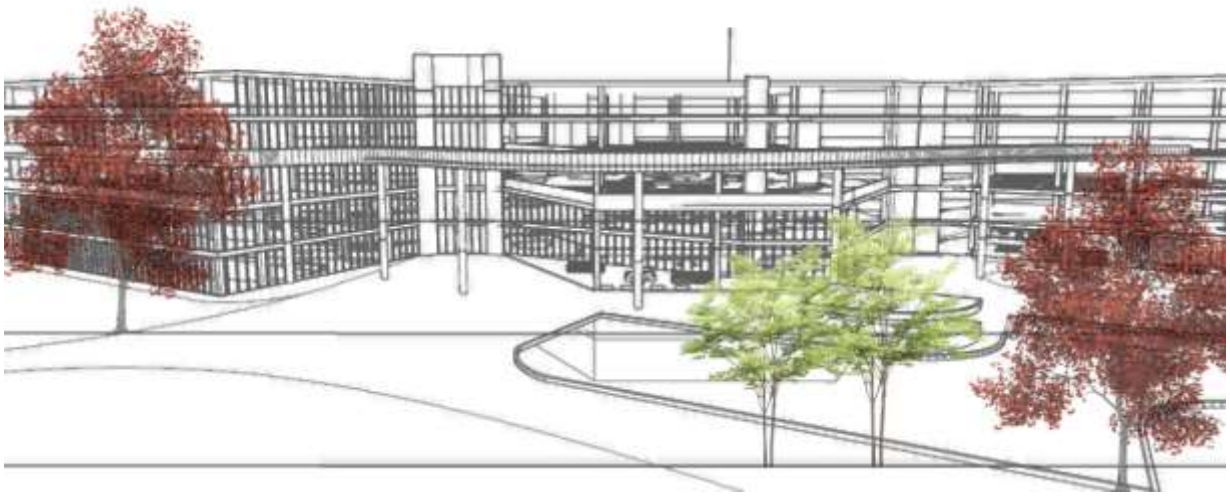
BIOPHILIC HOTEL ON THE OHRID LAKE SIDE

– Nature's Hotel –

A STUDY OF BIOPHILIC DESIGN AND ITS IMPLEMENTATION INTO THE BUILT ENVIRONMENT



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Master Thesis Course in Architecture and construction city

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Until not so long ago, the concept of biophilic design was unknown to me. Never have I used it in any of my other projects or have been familiar with it. Nonetheless, after hard work and long studies, I have progressed to develop this concept into my thesis. And for this, I want to express my utmost gratitude to my tutor, over and above my mentor, professor Michele Bonino for his dedication, availability and support of my work. His guidance and support for my ideas have given me the leeway to experiment and develop as a researcher and designer. Likewise, I want to express my dearest thanks to the person that laid the basis for this work and was essential to its progress, my co-supervisor Francesco Carota.

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Abstract

The rapid urbanization of today's cities has led to many drawbacks in our everyday life. Densely populated, crowded, and jammed, the urban environment has had negative effects on people's health conditions. In order to improve people's well-being and enhance the quality of today's urban life, designers should attempt to include biophilic design more and more often into their projects. Biophilia, which is the innate urge in humans to connect with nature, can be interpreted in practice by using biophilic design. Biophilic design means bringing nature into the built environment, and in the same time bringing people closer to nature. After a number of studies carried out, it has been proven how beneficial the presence of nature can be for a person, enhancing the psychological, physiological, and cognitive function.

The way I tried to incorporate biophilic design is showed in the project, explained in the last chapters of this study. The project is located in Ohrid, a beautiful Macedonian city lying on the east shore of the wonderful lake of Ohrid. Ohrid, been acknowledged by UNESCO as natural and cultural heritage site, in the last few years has been neglected and its treasures have not been properly appreciated and taken care of. The development of the tourism sector has also contributed to destruction of the natural beauty and heritage of the site. That is why, my goal with this project is to both, improve the development of tourism with attracting more visitors into the city and keeping it alive, and also, to bring back the grace of the place, to bring people closer to nature in the same time enhancing their mood, health and well-being. My aim is to reveal the reasons why Ohrid is on the list of UNESCO.

1 œIntroduction

1.1 Project Background

Ohrid is the cultural and historic capital of Macedonia. It is a city with an ample of content and beauty. A huge number of visitors have come to Ohrid, from the other parts of Macedonia, but also from other parts of the world, and nobody seizes to resist its magnificence. It is a city that people fall in love with at first sight. No one would remain indifferent, walking on the streets on which several millennium of history has been written, or the soft petting of the glittering reflection of the sun from the waters of the Ohrid Lake.

Being the eight by size city in Macedonia, it is the largest one on the Lake Ohrid. Located on the southwest of Skopje, the capital of Macedonia, Ohrid has the perfect climate conditions for maintaining satisfactory level of tourism. Warm enough in the summer, to enjoy the transparent water of the lake, and cold enough in the winter periods, to involve into skiing winter activities. It is a city that lives all year round.

Ohrid used to have 365 churches, a church per each day of the year, which is why it was called ‘The Jerusalem of the Balkan’. Caught between the mountains, the lake and the wonderful landscape, Ohrid proved its worth, and in 1980 it was accepted as Cultural and Natural World Heritage Sites by UNESCO [1][2][3].

Many localities and buildings attract people’s attention and awaken their desire to learn about the history and the course of development of the city. Staring from the main square, marked with the monument of the patron and protector St. Climent of Ohrid, moving through Tsar Samuil street, passing the House of Robevi, the amazing church of St. Sofia, the antique theatre, Samuil’s Fortress, the church of St. Pantelejmon and many other monumental localities, Ohrid makes the perfect spot for developing tourism, for enjoyment, as well as learning [4].

The beaches laying on the coast side of the lake are perfect for relaxation, recreating, and for avoiding the noise of urban spaces.

Speaking about urban spaces, what needs to be noted here, is the rapid urbanization of cities today. With the quick and progressive development of technology and fabrication, and the enhancement and practicality of living in urban environments,

started to detach people from the natural world and surroundings. There are assumptions that up to 70 percent of world's population is going to reside in cities within the next few decades [5][6].

Due to the busy work-devoted urban life, people often forget about the terrifying negative impact that urbanization and separation from the living world, can bring to mankind.

The lack of natural world in our environment can harm people's health, well-being, performance, productivity and mood. Studies from the US show that 10% of employee absence can be attributed to architecture with no connection to nature [5].

This is why today's designers, planners and architects need to focus toward bringing the natural world into the built environment also known as 'biophilic design'.

Biophilic design derives from the roots of biophilia, which is the innate tendency of humans to connect with living creatures, elements and forms of life. The meaning of biophilia is 'love of life' or 'love of living systems' [7]. Humans in the past, developed and evolved in natural environments which explains our innate urge, preference and desire for nature. Biophilic design represents the implementation of the biophilia hypothesis. This implementation of biophilic design into the built environment can have limitless number of benefits for people, in physical, social and psychological sense. Some of those benefits include: decrease of blood pressure, heart rate and stress hormones, increase of self-esteem, positive sociological mood, cognitive function, concentration, memory and restoration, reduced level of crime and aggression, increased healing rates in patients in hospitals and social cohesion influencing on a wider level [5].

As all other cities develop and urbanize, also Ohrid is changing its structure, especially in the province areas lying on the lakeside. Taking into consideration the tourism as an addition to urbanization, lots of new hotels are being built. As all this is destroying the previously mentioned natural beauty and landscape of the city, something needs to be done on this account. Wanting to both increase tourism level, but also prevent from losing more and more green and natural spaces, I decided to design a hotel in the proximity of the city center and on the lakeshore, one of those urbanizing spaces losing its nature. The way I am siding with nature here, is that I am including biophilic design into my project. My aim is to contribute to bringing back and establishing the reason why Ohrid was cherished, appreciated, and accepted by the UNESCO. The combination of the epithets old, historic, beautiful, educational, recreating and green, make up the perfect description for a city.

The entire thesis explaining my ways and approaches to research and practice of the project will be divided into several stages including:

- **Description of biophilia and biophilic design -** Definition of the term, its appearance, development and aims. Benefits from biophilic design and ways and guidelines for including and implementing it in the design projects.
- **Description of the city of Ohrid -** General information, geographical and historical facts, its development from the appearance until today.
- **Description of the biophilic environment within buildings -** Showing examples through case studies of how biophilic design is incorporated into buildings, explanation of the relationship and the importance of biophilic design in hospitality, and exemplification through a case study of a biophilic hotel.
- **Description of my design project -** Analysis of the site, and the design of my practical implementation.

1.2 Chapter References

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2 œBiophilia and Biophilic Design

2.1 General Description of Biophilia and Biophilic Design

Biophilia, or biophilia hypothesis, proposes that people possess an innate urge to connect with nature and other forms of life. The meaning of the term “biophilia” is “love of life or living systems” [1]. Erich Fromm was the person to first use it in the 1960s, in order to describe a “psychological orientation” of the attraction to everything that is alive and vital [2]. After several years (precisely 1984), Edward O. Wilson introduced it and popularized in with his book “Biophilia and conservation ethic”, where he characterizes biophilia as “the urge to affiliate with other forms of life"[3]. He suggests that the reason why people have affiliations with other life forms and nature derives from our biology. In the history of human evolution people have lived in natural environments which contributed to the psychological and physical preference of people’s connection with nature [3] [1].

The implementation of biophilia is known as “biophilic design”. Its aim is to restore natural stimuli to the built environment and to enhance the cognitive, psychological and physiological well-being in urban inhabitants. [4]

Biophilic design has economic, health, cultural and environmental value and ecological benefits. It doesn’t have to be big or expensive and it should not be exclusive. Biophilic design is not a luxury, it’s a necessity for our health and well-being. [4]

Figure1 Biopilic views. [https://i.pinimg.com/originals/5a/31/a7/5a31a75242c25cee5373fc2095a2f930.jpg]

2.1.1 The need of biophilic environments.

Figure 2 Biophilic office. [3https://www.designboom.com/architecture/airmas-asri-architects-expanded-office-jakarta-11-27-2015/]

Proximity to green spaces influences health outcomes opposite to spaces with lower level or access to green space. Increased urbanization is leading to loss of green space. We spend 90% of our time indoors. Stress is one of the biggest cause of sickness [4].

Studies from the US show that 10% of employee absence can be attributed to architecture with no connection to nature. Trough implementing biophilic design in our work and living spaces, we can help ourselves be happier and healthier [4].

2.1.2 Behind a good biophilic design

According to the “14 patterns of biophilic design” [4] published by “Terrapin bright green” in 2014, this is the definition for a good biophilic design:

“*Biophilic design is the designing for people as a biological organism, respecting the mind-body systems as indicators of health and well-being in the context of what is locally appropriate and responsive. Good biophilic design draws from influential perspectives – health conditions, socio-cultural norms and expectations, past experiences, frequency and duration of the user experience, the many speeds at which it may be encountered, and user perception and processing of the experience – to create spaces that are inspirational, restorative, healthy, as well as integrative with the functionality of the place and the (urban) ecosystem to which it is applied. Above all, biophilic design must nurture a love of place*” [4].

2.2 Dimensions Elements and Attributes

Biophilic design is the inherent human affinity to affiliate with natural systems and processes into the design of the built environment [5]. This tendency was proved to enhance the human body in emotional, physical and intellectual way during the long period of human evolution. People evolved in a natural, non-constructed environment, which is why their dependence on contact with nature was developed. In other words,

the development of the human mind and body was influenced by environmental features like light, odor, wind, sound, weather, water, animals and vegetation.

The modernization of the city, the development of technology, fabrication and industrial production is imposing a wrong illusion that human progress and civilization is measured by human separation from nature, but, humans' urge to connect with nature remains fastened in their physical and mental well-being. These human urges are boosted by our satisfaction related to health, well-being and productivity. This issue is discussed elsewhere, but the following findings are worth mentioning [5]:

- Contact with nature enhances recovery from illnesses by direct contact (natural light, vegetation) and artificial representations of nature (pictures).
- Proximity to open spaces contributes to fewer health and social problems (even from limited amounts of vegetation, for example grass or a few trees).
- Office spaces where natural environmental features are present, such as natural lighting and natural ventilation, contribute to improved worker performance, lower stress and higher motivation.
- Contact with nature has been proved to improve concentration and memory whilst working.
- Contact with nature has been linked to healthy maturation and development in children.
- The impact of high quality environment on communities (quality of life, greater neighborliness, stronger sense of place) versus lower quality environment in either poor urban or more affluent and suburban neighborhoods.

These studies are the scientific evidence of the ancient assumptions of nature's influence on human functioning, health and well-being [5].

Figure 4 High building density. [https://www.the-possible.com/spaces/]

Unfortunately, the contemporary way of design of the modern urban built environment has incited great transformation and degradation of natural systems and imposed human separation from nature. This process has resulted in unsustainable energy and resource consumption, biodiversity loss, chemical pollution, atmospheric degradation and climate change and human alienation from nature. What needs to be highlighted is, that this is not an inevitable by-product of modern urban life, but a flaw, a mistake in design approaches. We have the power to change this, but only by adopting an entirely different paradigm for the modern built environment that leads towards harmonization with nature. This new paradigm is an approach that minimizes the negative impacts on natural environment and represents the biophilic design that inspires beneficial contact between people and nature in modern buildings.

Figure 5 [https://i.pinimg.com/originals/1d/06/63/1d0663029f7ce4d5575c7a00efc3f48a.jpg]

The drawback of sustainable design is its focus on low-environmental-impact objectives of minimizing harm to natural systems but neglecting the importance of achieving long-term sustainability of enhancing the positive relationship between people and nature. Sustainability thrives for new designs rather than keeping buildings in existence. Positive benefits and attachment to buildings and places are crucial for

keeping them alive over the long run. Therefore, biophilic design is the missing link in the approaches to sustainable design, so low-environmental-impact and biophilic design must work together in order to achieve lasting sustainability.

The main tools of low-environmental-impact design are: energy and resource efficiency, sustainable products and materials, safe waste generation and disposal, biodiversity protection, pollution abatement and indoor environmental quality, which strategies can be found in the certification systems such as the U.S. Green Building Council's LEED rating approach. Opposite to this, a thorough understanding of biophilic design remains meager. Therefore, dimensions, elements and attributes of biophilic design need to be presented, so it could help designers in implementing biophilic design in the built environment [5]:

- Organic or naturalistic dimension – direct (daylight, plants, animals, natural habitats, ecosystems) and indirect [requires human input] (potted plant, water fountain, aquarium) reflection on the inherent human affinity for nature through shapes and forms.
- Place-based or vernacular dimension – buildings and landscapes that correspond to the cultural and ecological features of a locality.

These two dimensions of biophilic design are followed by six biophilic design elements:

1. Environmental features
2. Natural shapes and forms
3. Natural patterns and processes
4. Light and space
5. Place-based relationships
6. Evolved human-nature relationships

These six elements are further revealed in 70 or more biophilic design attributes.

<u>Environmental features</u>

The usage of obvious natural characteristics in the built environment. This category includes eleven attributes such as [5]:

1. Color
2. Water
3. Air
4. Sunlight
5. Plants
6. Animals
7. Natural materials
8. Views and vistas
9. Façade greening
10. Habitats and ecosystems
11. Fire

Figure 6 Biophilia [https://bit.ly/2Ebk3rb]

Natural shapes and forms

Elements and features of the natural world represented or simulated on building facades or in the building interior. This category includes eleven attributes such as [5]:

- Botanical motifs
- Tree and columnar supports
- Animal (mainly vertebrate) motifs
- Shells and spirals
- Egg, oval and tubular forms
- Arches, vaults, domes
- Shapes resisting straight lines and right angles
- Simulation of natural features
- Biomorphy
- Geomorphology
- Biomimicry

Figure 7 Natural shapes and forms [https://www.behance.net/gallery/22719093/3d-visualization-La-vie]

Natural patterns and processes

Embodiment of properties found in nature into the built surroundings, instead of portrayal of shapes and forms. This category includes fourteen attributes such as [5]:

1. Sensory variability
2. Information richness
3. Age, change and the patina of time
4. Growth and efflorescence
5. Central focal point
6. Patterned wholes
7. Bounded spaces
8. Transitional spaces
9. Linked series and chains
10. Integration of parts to wholes
11. Complementary contrasts
12. Dynamic balance and tension
13. Fractals
14. Hierarchically organized ratios and scales

Figure 8 [https://www.easygardenplants.com/cottage-garden-suggestions-to-help-make-your-garden-more-beautiful/]

Light and space

This category includes twelve attributes, seven directed at qualities of light and five directed at spatial relationships [5]:

1. Natural light
2. Filtered and diffused light
3. Light and shadow
4. Reflected light
5. Light pools
6. Warm light
7. Light as shape and form
8. Spaciousness
9. Spatial variability
10. Space as shape and form
11. Spatial harmony
12. Inside-outside spaces

Figure 9 Light in space [https://www.pinterest.com/pin/568016571739217767/]

Place based relationships

Strong connection between the culture and the ecology of the geographical context. Locational familiarity is a need for some people. This category includes eleven attributes [5]:

1. Geographic connection to place
2. Historic connection to place
3. Ecological connection to place
4. Cultural connection to place
5. Indigenous materials

6. Landscape orientation
7. Landscape features that define building form
8. Landscape ecology
9. Integration of culture and ecology
10. Spirit of place
11. Avoiding placelessness

Figure 10 [https://www.gounesco.com/vernacular-architecture-macedonia-finest/]

Evolved human-nature relationships

Critical aspects of the inherent human relationship to nature. This category includes twelve attributes [5]:

1. Prospect and refuge
2. Order and complexity
3. Curiosity and enticement
4. Change and metamorphosis
5. Security and protection
6. Mastery and control
7. Affection and attachment
8. Attraction and beauty
9. Exploration and discovery
10. Information and cognition
11. Fear and awe
12. Reverence and spirituality

Figure 11 Natural shapes and forms [https://homesecurity.press/quotes/organic-forms-in-nature.html

These concepts work towards adopting nature, reshaping nature to satisfy human needs but in a safe way that it keeps the integrity and utility of the natural world. Human intervention can avoid environmental disruption if practiced the right way. With consideration and perception, biophilic design can result in benefitting both nature and humanity [5].

Figure 12 Biophilic forms [https://www.pinterest.co.uk/mortonken/art/?lp=true]

2.3 Biomimicry and The Architectural Inspiration from Nature

Figure 13 Biommimicry [https://www.mesym.com/en/posts/5-design-approaches-to-a-biophilic-home/]

Something that is common in people's nature is the appreciation of good design. The beauty of something is made up from several aspects, for example, how good It works, how well it fits its purpose, and how finely, with minimal effort it was made. Acknowledgement of good design dates back for millions of years, as the first object of admiration was not found in a museum, but in our natural environment. Everywhere around there were amazing natural designs. This admiration transitioned into a desire for it to be implemented in today's world of art and production. Taking design cues from nature is returning to a practice in a discipline called *biomimicry.* Biomimicry is the act of learning from nature, overtaking designs and strategies that have been working for billions of years. Recently, these strategies are being neglected, and people are focused on evolving the latest fashion. Biomimicry became recognized as something long lost. People should go back to drawing inspiration and ideas from nature. It is time for buildings to become more lifelike than ever [5].

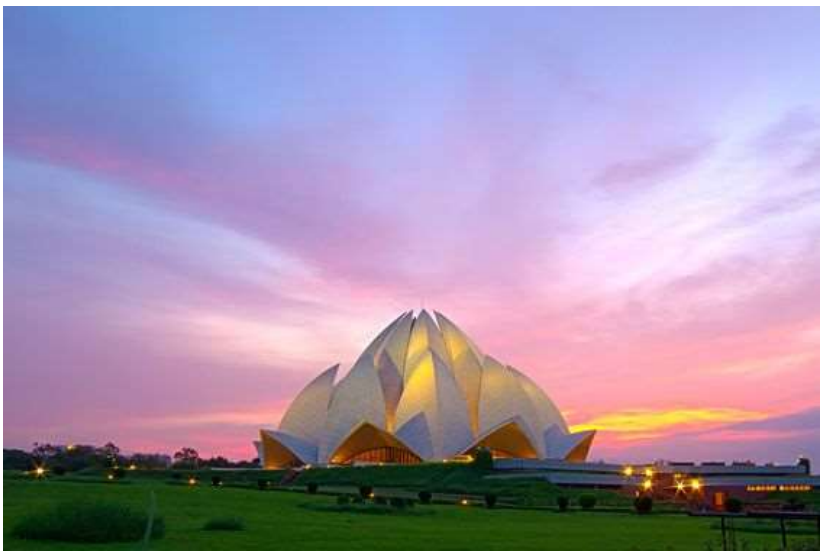

Figure 14 Inspired by nature [https://www.nationalgeographic.com/travel/lists/biomimetic-buildings-inspired-by-nature/]

2.3.1 The Focus on Functionality

Biomimicry is a design process, a functional way of finding solutions, by searching for the best object for a certain function and trying to imitate it in the built environment. The design outcome may not visually resemble the original natural source. For example, a solar cell derived from the natural method that leaves photosynthesize, but it looks nothing like a leaf. This example emphasizes the difference between buildings that mimic nature in order to look like it for decorative purposes, or to do as nature does for functional purposes. Biomimicry is certainly more focused on function.

Today's biomimics seek to create more life-like buildings, and architects try to adopt nature's wisdom into building strategies. Biomimics are determined to study nature's design principles aiming to construct an architecture that works the way life works [5].

Figure 15 Solar cells function inspiration [http://pop1.us/solar-panel-layout-tool.html/solar-panel-layout-tool-ipefi-com]

2.3.2 Design elements inspired by nature

Other than *forms and structures*, *daylight* is another design element inspired by nature. We are not the first organism seek for sunlight in a dark environment. For instance, the Venus's flower basket, a sea sponge in the darkness of the ocean floor, has specially shaped filaments that channel light. Windows and skylights can be bio-inspired. There are several techniques of window production in the process of development, that can help a building be biophilic. For example, the windows that can crystalize from water solutions at the building site using a silicate technique that is inspired from diatoms and sponges and researched from the University of California – Santa Barbara. Energy might also be gathered thanks to the technology inspired by photosynthesizes. Opposite to photovoltaic cells, dye-sensitized solar cells work the way leaves work, grasping sun's energy with dye. This technology is not yet as competent as PVs, but has other better qualities like being less toxic, cheaper, and can be used in different objects (windows, walls, roofs). There are other techniques for designing windows, all inspired by nature, that can contribute to biophilic design like the ability for the window to darken or lighten the same way that cuttlefish can change colors [5].

An amazing phenomenon is the mound of the termites. Possible to rise from 1 to even 5 meters above ground, it has no termites living in it. Its city is underground, including a farm where fungus is kept for food. In order to maintain the right temperature for cultivation, the termites construct tunnels that pipe air from the surface directly to the mud chambers.

This same principle was used by architect Mick Pearce and two other engineers when they wanted to construct a building with *natural ventilation* in Harari, Zimbabwe. It's a seven-story office complex that has no air conditioner and uses 35% less energy than six conventional buildings from this same city combined. The cost of the ventilation system is approximately one tenth of an air-conditioned building, and it saved $3.5 million in energy costs during the first five years.

Figure 16 Inspiration from nature [https://io9.gizmodo.com/5646126/five-biomimetic-ideas-to-make-the-world-a-cooler-looking-place]

Noise is all around us. That whirring of fans in range hoods, computers and air-conditioning units produce noise pollution and rise of electrical bills. The PAX Scientific company of biomimic Jay Harman has mimicked nature's way of least resistance to make fans that are more efficient and quiet. In comparison with other, simple fan, there is reduction up to 80% of energy use, and 75% noise. The utopian idea of retrofitting every fan, could benefit with saving lots of fossil fuel and enough silence to hear the *natural sounds* [5].

Being impressed by the specter of *colors* omnipresent in the natural world, people are not satisfied from the monotony of their interiors. This could be changed if designers started to spec products that mimic nature's methods for making color without pigments. It is called structural color and this is what makes a lot of natural objects brilliant. Structural color is brighter than the pigmented one and it never fades.

Figure 18 Biophilic interior [http://www.knstrct.com/interior-design-blog/2014/4/24/nuon-headquarters-the-sustainable-utility-company-undergoes-a-workspace-transformation]

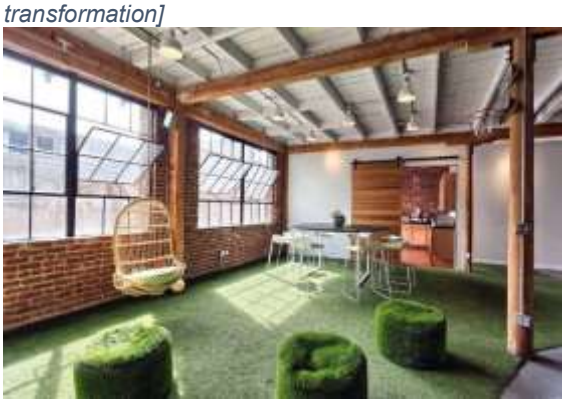

Figure 17 Colorful biophilic design [http://www.verhaleninc.com/biophillic-design-in-the-office/]

Figure 19 https://blog.enhancv.com/pros-cons-working-startup/

Nature and its inhabitants function as a team. Everything organisms do contributes to nature maintaining its own processes – breathing and breeding, feeding and dying – helps building soil, water, air. We might say, *life creates conditions conducive to life*. With *bringing working ecosystems inside* it can also create conducive conditions to our lives [5].

As being one of the areas where biophilic design can make a difference on a bigger scale, *landscape should be designed in a way that mimics and restores landscape function.* Mass number of animals and plants are shifting their ranges toward cooler climes, and people should try to make this encounter safer through the places that are not familiar to them. Also, we should try to bring back the salient features of working watersheds, as we've lost the role they had (water storage and release, purification of air and water, nutrient cycling etc.) so that our built landscapes can play their part in the larger whole.

It is a fact that the presence of *bio-inspirational gardens* can do great influence on one's performance. Putting a designer in a garden for a certain time can enhance the outcome of their work. People are hardwired to pay attention to habitat cues, and to act as other organisms act. This theory should be put

into action so that we could be encouraged not only to learn about organisms but to learn from organisms [5].

2.4 Benefits of Biophilic Design

It is scientifically proved that exposure to nature and sunlight in the built environment helps stress reduction. Such stress reduction contributes in improving other health aspects like enhanced immune function and reduced pain. Evolutionary theory and several medical theories can explain why exposure to nature can benefit the human being in the big scale it does. For example, how can nature ease pain in patients in a healthcare environment. Humans, as a genetic remnant of evolution, own the ability to gain healthful responses from certain nature features, but have no such capacity for built environments and materials. Not only nature exposure, but daylight and sun exposure are critical for the person's well-being and health. Biological and physiological relation can explain a person's emotional enhancement and well-being in well-lighted places instead of dark ones. Empirical studies have shown that even in non-patient groups, presence of nature causes fast physiological and psychological stress recovery. Some research pointed out that restoration can happen only by viewing nature. Other research has shown that children from different age groups, patient or non-patient, prefer art with natural motifs. Daylight as being a source of vitamin D, which plays a big role in regulating body processes, synchronizing sleep and awake cycles, has been proven to improve sleep, weight gain in preterm infants, and reduce disturbance. Exposure to light (bright artificial or daylight) can influence depression reduction and mood improvement. Studies undertaken in healthcare environments show that surgical patients assigned to bright rooms, opposite to those in rooms with shade, reported less pain and did not require as much analgesic medication [5].

Figure 20 Biophilic benefits [https://natureclassdesign.weebly.com/biophilic-design-in-education.html]

Biophilic design solutions in the healthcare department were proved being beneficial in health terms, but also in cost terms. In conclusion, besides all the benefits mentioned, a deeper and more thorough research needs to be done on this field, so that biophilic design can become more and more approachable and easy for designers to implement [5].

Figure 21 Biophilic hospital room [https://www.nacarchitecture.com/NACLab/naturescure.aspx]

Between 5 and 20 minutes in a biophilic environment is enough for a positive restorative response to occur [4].

Decrease of blood pressure, heart rate and stress hormones. Increase of self-esteem, positive sociological mood, cognitive function, concentration, memory and restoration are all positive outcomes from nature's proximity, all highly important for interior office environments and urban living. Not to let out, reduced level of crime and aggression, increased healing rates in patients in hospitals and social cohesion influencing on a wider level.

The restorative responses are rapid, automatic and unconscious, and are divided into 3 sub-categories [4]:

- Cognitive Functionality - Mental stability, memory, creativity and our ability to think and learn, fall into this category. Directional attentional capacity, needed for completing many tasks (mainly routine tasks such as paperwork, sending e-mails or reports), can be boosted by strong nature connections, especially since this kind of repetitive tasks can lead to mental fatigue.
- Psychological Health – This category represents our self-esteem, mood, emotion, concentration and perception. This includes response mechanisms that are influenced by past experiences, social norms and cultural constructs.
- Physiological Health – blood pressure, heart rate, hormone production and so on. The restoration of the physiological mind-body system can help individuals defend from environmental stress and prevent system damage. The body should remain resilient and adaptive to environmental stressors, so true design can help this become achievable.

2.5 Plans for Implementing Biophilic Design

Together with the rapid increase of dense urban environments and the increase of the land-value, increases the seriousness of the need for biophilic design. Each and every context holds the capability for a wide range of possibilities for implementation of biophilic design and for including the healthy building strategies for both the people and the environment. Here are some key aspects that might help focus the planning and the design process [4]:

Identifying desired responses and outcomes – It is of fundamental importance that the designer understands the design intent of the project - What are the priorities according to health or performance of the predetermined users? Project teams should have a complete understanding of the health conditions or the performance of the population in order to establish the design strategies or mediation that could enhance and reinforce well-being. Here are some approaches we should consider: What would be the most biophilic design we could create? How could the biophilic design metric that the client is already using be improved? Since many beneficial responses happen simultaneously and there are endless combinations of design patterns, understanding the priorities will help focus the design strategy.

Design strategies and interventions – Biophilic design patterns are adoptable and replicable strategies for improving user experience that can be applied under different conditions. Biophilic design interventions depend on the requirements of a particular populace in a specific space, and are highly probable to be created from a series of evidence-based design patterns, ideally with a level of assessment for adequacy.

Diversity of design strategies – A combination of different patterns can contribute to increasing health benefit chances. The combination of patterns can accommodate different types of user groups. For example, spaces with the presence of plants can enhance people's self-esteem and mood, and water features have relaxing effect. Diversity in the usage of patterns can be eminently beneficial, only in the case of incorporating integrative patterns with a unified purpose.

Quality vs. quantity of intervention – During the process of designing a good biophilic space, some hesitations occur, like how much is enough or what really makes a good design - good. A good intervention can be defined by different factors, in one case for example, by the richness of content or diversity of strategies, in other case, a single intervention can be much more effective than a solution of several interventions with a lower quality.

Duration of exposure and frequency of access – A difficult puzzle to be solved, is the exact duration of exposure to a pattern. There is no ideal exposure time since it depends on the user's preference, but as a general rule, empirical evidence show that between 5 and 20 minutes is the period of time when a positive occurrence can happen. If long duration is not possible in a certain situation, placing biophilic details along paths that endure high amount of pedestrian activity can enhance frequency of access. Another fact is, micro-restorative interventions are more easily implementable, replicable and very often accessible than larger interventions.

Figure 22 Biophilic elements [http://kidskunst.info/linked/landscape-products-interior-design-6c616e647363617065.htm]

2.5.1 Locally Appropriate Design

Every place is different from the other. This opens the door for designers to be creative in solving their challenges with many opportunities of biophilic design implementation. Here are some key aspects that might help and assist the decision making in the design process [4]:

Climate, ecology and the vernacular – In the past people used to build with locally accessible and available materials. The shape and function were depending on the topography and climate. These type of buildings are known as vernacular architecture, which means they are strongly connected to where they inhabit. Natural environment does not mean that it should be 'green' in color. Desert species and terrain are also essential in reinforcing the connection to a place.

Character and density: Rural, suburban and urban environments – Human-nature interaction depend on the environment and surroundings. In a rural environment there is an ample of presumed interactions, while in suburban habitats the biophilic elements

are applied, but still abundant. In urban environments the land is limited, and so are the biophilic features. Residential towers with green balconies are usually available only to high-paying tenants. In conclusion, biophilic design strategies differ according to the local political climate, zoning, geography and land availability. For example, in Vienna, restaurants rent parking spaces during the summer and use the place to provide outdoor dining in a biophilic space. Another approach is, the integration between natural systems and urban systems like in Singapore's project 'Skyrise Greenery'. Due to the high development levels over the last 3 decades, the county's population grew by 2 million people. In order to increase interaction with the natural world and avoid loss of habitat, the government offered a program called 'City within a Garden', which would cover up to 75% of the costs for installing green roofs and walls. What is essential in this kind of strategies is that the interventions are integrative and appropriate to the character of the place, reflecting the human biological relationship with nature.

Scale and feasibility – The scale of the design patterns should be defined by the surrounding environment and the user population of the space. Patterns can be applied at different scales such as micro-space, a room, a building, campus, district or a city. All of these spaces require different approaches according to their programming, dynamics, climate, culture, infrastructure and other parameters. But the two main factors of feasibility are size and availability, which depend on the experience a person gets in a certain amount of time of exposure to a particular pattern.

Culture and demographics – Current evolutionary speculations and hypotheses express that contemporary landscape inclinations are impacted by human evolution, reflecting the innate landscape characteristics that improved survival for humankind through time. Research has shown that there are common landscape preferences among people. Preferences have been modified by cultural aspect, experiences and socio-economic aspects. Therefore, changes in landscape preferences have appeared among immigrants, ethnic groups, subcultures, age groups and genders. Definitions for natural and beautiful vary depending on the cultural constructs or social inertia but there are some theories that can explain some perspectives that have evolved and how these differences can make an impact across countries, regions of even districts and neighborhoods in the same city. Different ethnic groups have different appreciation or gain different level of positive experience while in presence of nature, so the appropriate strategies need to be used in order to create a compatible environment according to people's preferences. Gender and age are other factors that influence biophilic responses. Men and women have distinct capacity of perception. For

instance, a forest walk boosts the immune function in men for a period of 30 days, whilst in women for only 7 days. Age also makes a difference in preference. If an urban woodland would be a fun place for a child or a teenager, it could be perceived as risky by elderly people. That is why it is crucial that the right and appropriate pattern in applied for various types of people.

2.5.2 Steps Toward a More Responsive Design

The subsequent, are some techniques that can help design be implemented in a more responsive and natural way [5]:

1. The smallest scale is made by microstructure of natural materials or by fine-grained ornament. The area that contains small detail should be easily approachable/achievable to a person's contact. There a universal rule which promotes that there should be many components on the smaller scale, several on the middle scale and just a few on the big scale. The smaller the scale, the number of elements is bigger.
2. Designs should have a definite scaling hierarchy. Elements on the next larger scale should be approximately 3 times larger than those on the immediately smaller scale. No scale should be missing.
3. Symmetry is crucial in design, not expressed as a whole, but rather a composition of sub-symmetries on smaller or intermediate scale. Their density and interaction inside a particular scale is what creates the visual coherence. This can also be achieved with a repetition of the same components or modules.
4. Using natural materials for construction. These natural surfaces should not be covered with plasterboard, as people cannot connect to them. Modern architects should use natural materials of which surface can be preserved, accessible to vision and touch.
5. Reuse of old materials is essential. The design process could be adopted to several technologies which include accommodating locally found components. Using unfinished materials is another useful technique. We should not try to overpower construction with cutting everything into precise modular size. In order to save the natural material, our design concept should be adjusted, so to not achieve minimal waste.
6. Concrete is not a natural material, but we should not neglect its pros like its plasticity. In order to not leave a simple flat panel, or the irritating surface of raw concrete, we can moderate it with a permanent surface or aggregate, added while he concrete is still wet.

7. Bringing biophilic design into the scale of a room. If possible, a garden should be put in the interior so that people can more easily connect with it.
8. Human interaction with nature is the priority, so it should not be limited to only visual satisfaction. Designers should think of a way to transform the urban environment so as to allow pedestrians to interact and enjoy the natural elements.
9. Garden spaces should be well-designed, creating natural geometry, and having internal complexity and variety [5].

Figure 23 Biophilia effect [https://www.picsunday.com/p/Biophilia-Effect.html]

2.6 Fourteen Patterns of Biophilic Design

For long periods of time theorists have been trying to define the natural elements and features that have the biggest influence on people's satisfaction in the built environment. "14 Patterns of Biophilic Design" establishes the relationships between human's nature and design in the built environment, aiming to include all the benefits of biophilia in our design applications [4].

There are three reasons why the term 'pattern' is used:

1. Clear/standardized terminology
2. Avoid confusion with other terms like attribute or characteristic, that have been used for explaining biophilic design
3. Using a term that is common between different disciplines in order to be more easily accessible

These 14 patterns of biophilic design were published by "Terrapin bright green" in 2014 and it included various applications, meant to be flexible and adaptive, applicable to

various sectors or scales. They are not supposed to form a rigid design process, but instead, should guide and inform in order that the designer finds the appropriate solution. The patterns should be treated as tools for designers that guide, inform and assist, and are not meant to be taken as rules.

Figure 24 Biophilic space [https://www.picturesboss.com/pictures/urban-biophilia-pattern-architecture-tranquilit-picturesque-c1.html]

The patterns are inspired from Alexander's '*Pattern Language' [4]*. While Alexander focuses on the psychological benefits, the "14 Patterns of Biophilic design" focuses not only on the psychological, but also the physiological and cognitive benefits. What can be achieved with these patterns is the will to connect people with nature, as a source of mental and physical nourishment. The patterns should help designers generate environment toward biophilic design and sustain human sensibilities. Although the attributes of biophilic design by prof. Stephen Kellert were already mentioned, the 14 patterns represent a more compact, and practical summary of all the guidelines that designers need in order to achieve and apply biophilic design in the built environment. The 14 patterns are divided into 3 categories [4]:

- Nature in the Space
- Natural Analogues
- Nature of the Space

2.6.1 Nature in The Space

This category represents the direct, physical presence of nature in the space. It includes plants, water, animals, sounds, scents and so on, which in realization they would be found as potted plants, butterfly gardens, fountains, aquariums, gardens, green walls and roofs etc. The best connection-experience could be achieved by the creation of direct connections through diversity, movement and multi-sensory interaction. Into this category seven biophilic design patterns are included [4]:

1. Visual Connection with Nature (open views to nature/natural elements) [P1]

Figure 25 Visual connection with nature. Source: [4]

2. Non-Visual Connection with Nature (presence of sounds, aromas, textures from nature) [P2]
3. Non-Rhythmic Sensory Stimuli (unpredictable, temporal, random occurrences, like the scent of eucalyptus, leaves rustling etc. Should happen every 20 minutes, for 20 seconds, visually for more than 6 meters away) [P3]

Figure 26 Non rhythmic sensory stimuli. Source: [4]

4. Thermal & Airflow Variability (ventilation, air, temperature, humidity regulation, materials, light) [P4]

Figure 27 Thermal & Airflow Variability. Source: [4]

5. Presence of Water (water elements inside and outside) [P5]

Figure 28 Presence of water. Source: [4]

6. Dynamic & Diffuse Light [P6]

Figure 29 Dynamic & Diffuse Light. Source [4]

7. Connection with Natural Systems (occurrences that might happen in the nature) [P7]

Figure 30 Connection with natural systems. Source: [4]

2.6.2 Natural Analogues

This category, opposite to 'Nature in the space' is established by non-living and indirect elements of nature. Objects, materials, colors and shapes found in nature are in realization presented as art, ornamentation, furniture with shapes inspired by nature, mimicry of shells and leaves or altered and processed natural materials. All of these provide indirect connection with nature, which can be best experienced by providing information richness in an organized way. Into this category three biophilic design patterns are included [4]:

8. Biomorphic Forms & Patterns (usually a decorative or constructive element in the shape or pattern of natural a motif) [P8]

Figure 31 Biomorphic forms & patterns. Source: [4]

9. Material Connection with Nature (using natural materials such as wood, stone, natural granite etc.) [P9]

Figure 32 Material connection with nature. Source: [4]

10. Complexity & Order [P10]

Figure 33 Complexity & Order. Source: [4]

2.6.3Nature of the space

This category includes spatial configurations in nature like our innate or learned desire to see beyond our surroundings, and our strange attraction to the unknown. It can be best experienced through the creation of deliberate and engaging spatial configurations commingled with patterns of Nature in the Space and Natural Analogues. Into this category four biophilic design patterns are included [4]:

11. Prospect (abstract pattern, enhances openness and freeing, promoting spatial spaces) [P11]

Figure 34 Prospect. Source [4]

12. Refuge (being part of the nature but feel safe and covered) [P12]

Figure 35 Refuge. Source: [4]

13. Mystery (promotes using curves, igniting curiousness in people, appreciation of the unknown) [P13]

Figure 36 Mystery. Source: [4]

14. Risk/Peril (as found in nature, danger can be challenging for people. Promotes using ‘risky’ elements like placing small stones that people should step over in order to pass) [P14]

Figure 37 Risk/Peril. Source: {4}

2.7 Chapter Summary

If we ask a person to describe their perfect place for a vacation, they will most probably think of some place outdoors. This term that we use so often – recreation – does not really make us realize that it actually means recreating, restoring. It was the last 250 years that the modern cities took over. The number of people living in the city is much higher than those in the countryside. As a matter of fact, there is an assumption that around 70 percent of the population would live in cities in the next few decades. This is why the need for design to reconnect with nature is so essential and should be practiced more and more. Biophilic design should become a tool used by every designer. Nature should be brought into the built environment, especially since we are now familiar with all the benefits it has on people’s health and well-being. Biophilic design is a necessity rather than a luxury [4].

2.8 Chapter References

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3 œThe City of Ohrid

3.1 Brief General Information

Figure 38 Source: https://www.express.co.uk/travel/shortbreaks/777881/macedonia-Ohrid-lake-beach-holiday-travel-city-small-break-medieval

Ohrid is the eight by size largest city in the Republic of Macedonia, and the largest one on Lake Ohrid. It is located southwest of the capital Skopje, west of Resen and Bitola. As of 2002, its population was 42,000 inhabitants. Ohrid used to have 365 churches, one church per each day of a year. Its nickname is “The Jerusalem of the Balkans” [1][3]. Snugged between mountains 2,100 m high, and the lake, it is full with picturesque landscapes, houses and monuments, which leads to it having highly developed tourism. Ohrid and Lake Ohrid were accepted as Cultural and Natural World Heritage Sites by UNESCO in 1980, as one of only twenty-eight sites that are cultural as well as natural sites [2].done more efficiently than performing each training step separately. The size of the batch depends only upon the hardware used and memory

available. Finally, when passing all training batches once it is considered that one training epoch has passed.

Figure 39 Source: https://www.express.co.uk/travel/shortbreaks/777881/macedonia-Ohrid-lake-beach-holiday-travel-city-small-break-medieval

3.2 Ohrid From Antique Times till Today

Ohrid lake began to live even before humans appeared. More precisely, it is approximately 4 million years old. It was created in the ancient geological erosion with tectonic shift of the soil. Today there are only a few lakes in the world which age could be compared to the Ohrid lake. It is with all rights called the Macedonian sweet sea, especially because of its size, which covers an area of 358 square kilometers. It is located as if thrown among mountains with an altitude of 695 m. Above it on the northern shore, the city of Ohrid is situated on a hill, where the highest point is about 800m above sea level. Numerous underwater springs that lie along the eastern and southern coasts are contributing to the water being transparent up to 22 meters in depth. In this lake there are many endemic and unknown plant and animal forms and in this respect, it is the only natural museum. That is why Lake Ohrid is one of the natural reserves on our planet, and that is why it is especially important for science that it remains geologically unchanged for a very long time. It

Figure 40 Source: https://www.thenational.ae/lifestyle/travel/cooling-off-in-macedonia-s-lake-ohrid-1.622682

makes this lake an ideal laboratory for revealing many secrets about the origin and development of the life on the planet.

Under the influence of the Adriatic Sea, the Ohrid region has variable Mediterranean climate. The entire zone of the mountains surrounding Ohrid Lake, is located in a basin in which the Adriatic, Continental and High Mountain climates collide. The relatively low atmospheric pressure, the large number of sunny days, the favorable airflow, mild temperature changes from one season to another and many other climate benefits on the Ohrid coast, are a real treasure according to people's health.

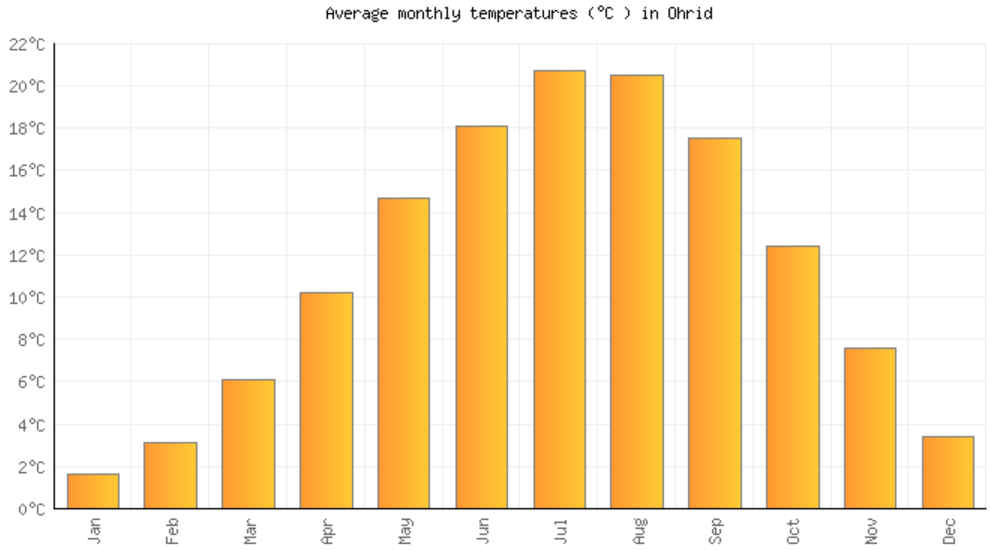

Figure 41 Source: https://www.weather2visit.com/europe/macedonia/ohrid.htm

Due to the special natural beauty and the characteristic flora and fauna of the forests of Mount Galicica, a large part of it, an area of 22750 hectares, in 1958 was declared a national park. The main geological base of Galicica is mostly from limestones 500 to 550 meters thick. The geological base and the morphology of the mountain have great influence on the increase of the landscape and the aesthetic values of the diversity and characteristics of the wildlife. So, the temperature characteristics both in the summer and in the winter are favorable. This provides good conditions for walking or

skiing activities during winter periods. The “Galicica National Park” is particularly prominent with great floristic richness.

Figure 42 Source: https://www.wanderlust.co.uk/content/short-break-in-lake-ohrid/

The flora represented by over 600 species. Such diversity can not be noticed on other mountains in Macedonia. On Mount Galicica there are plant species that existed in other conditions which means they exist as relict species, as well as species that have endemic significance. Unlike the flora, the fauna in the national park is much less studied [4]. Worth mentioning is the presence of lynx and bear. Of the fauna, 26 endemic species have been recorded. The number of butterflies is particularly interesting. There are about 1644 species, which represents a huge number for such a small area. The climate values in Galicica National Park are different. They differ in the valley area opposite to the mountainous part, but basically, the climate determining factors are almost the same.

Figure 43 National Park of Galichica. Source: [https://bit.ly/2RLmlBh]

“Bay of the Bones” is a water museum, one of the few museums of its kind in Europe, therefore it is a striking tourist destination that tells about life in Macedonia and Ohrid in ancient times. The time journey begins with the prehistoric pile settlement Mitchok, in the “Bay of the bones”. It is a reconstruction of prehistoric pile settlement, from the Copper, Bronze and Iron Age, flourishing at the end of the Bronze and Early Iron Age, that is, from 1900 to the 600 BCE. The remains of the settlement are located at the bottom of the lake. A total of 3346 wooden piles in the lake have been hung, and a total of 24 prehistoric houses have been built above the lake. Among these, 21 houses are with a rectangular plan, while 3 are with a round plan.

Figure 44 Source: Bay of the bones [https://off-road.mk/bay-of-the-bones-on-ohrid-lake-photo-gallery/]

On the basis of the surveying activities of the overall area of the settlement, it was found that it extended to an area of about 8500 square meters, and remains of 6000 wooden piles were documented. Within the movable archeological material, circular ceramic plates with different diameters are present, which have two, three or four small circular openings. It is assumed that these items were used as fishing equipment by the inhabitants of the settlement. There are also various types of cones, as well as objects for ritual needs, altars. Based on the analyzes, it can be said with certainty that this pile settlement belonged to the late Bronze Age and the beginnings of the Iron Age, that is, from 1500 to 700 BCE [4].

Figure 45 Bay of the bones Source: [https://bit.ly/2RQlnnn]

Previous experiences have shown that people enjoy visiting this pile-dwelling settlement, but mostly because of its remarkable reconstruction, authentically arranged in detail. During this period, the Brigits, Enchelians and Engels lived in this area, up until around the 5th century BCE. The oldest reach of Ohrid is not the hill and the old part of the city, but the lowland, the southeast part. It is the area of the complex “Letnici”, and the square next to the residential complex “Ohridati”, and the sports center “Biljanini springs”, today densely populated with modern architectural buildings, streets and yards. This area beside the lake in ancient times was certainly only a marshy terrain overgrown with cane and other vegetation.

In the period around the end of the Bronze Age and the beginning of the Iron Age, some of the inhabitants of this settlement moved to the hill, and since then began to

function the settlement that is a proto-history of the city of Lychnidos (12th century BCE to the 7th century BCE). This was the oldest settlement in the city, on the hill, under the Samoil fortress, near Plaoshnik. Of all the settlements that existed, only Lychnidos had his own long history, and it would move from a prehistoric settlement to a proto-urban phase, and finally to its urban phase. Ohrid is one of the oldest cities in this region, and even on the Balkan, as one of the cities with a long continuum of life [4].

The very early settlement of the naturally protected Ohrid hill, proved to be a great choice for the oldest settlement. The early-ancient settlement, especially the one from the 3rd - 1st century BC developed on the most dominant rise on the high hill, and especially on the plateau of Plaoshnik. The residential complexes with paved streets between them, covered with small embroidered stone, are proof of a gradual urbanization that in the ancient city will especially dominate in the Roman Era. This early urban phase covering the area of Plaosnik until the 2nd century BCE, to the east is also defined with a raised monumental tomb of a Macedonian type, as it was the trend to build this type of eternal resting places in the coastal part of ancient Macedonia and around the seats of the Macedonian rulers.

Figure 46 Source: https://journeymacedonia.com/archaeological/ohrid-plaosnik-baptistery/

In about 1918, archeological discoveries such as the five rich tombs were discovered, and then examined with the help of foreign experts from Bulgaria. Two more tombs were then found, and the total number of all the gravestones found was 258, out of which the two golden masks are better known. Around the 1930s, new archaeological excavations were organized by Serbian experts, when other 6 tombs were discovered, in which other object were found, from the noble and base materials that probably belonged to the tribal aristocracy of the Enchelians or Engels. More recent archaeological research was carried out in 1972, when 23 other graves were discovered that did not offer very rich material but were very significant in archaeological sense as part of the Trebeniska necropolis [4].

Figure 47 Source: https://eandbonthecamino.wordpress.com/2015/05/11/sofia-bulgaria-to-ohrid-macedonia/

In 358 BCE, when the Macedonian King Philip II passed through this region, he certainly noticed the strategic positions of the two hills north of the lake, and ordered powerful fortresses to be built on that location, beside the Kandevski road, later via Egnatia. The remains of the oldest Ohrid Fortress were discovered in 2001 on the territory of today's Samuil's Fortress. On one of the hills to this day, there are visible remnants of stone walls built of megalithic - cyclone stone blocks, that once were a powerful capital of Engelana and later of other Macedonian kings.

Figure 48 Plaoshnik archeological finds Source: [http://muzejohrid.mk/en/plaoshnik-ohrid]

Back in the first century BCE in Lychnidos the theater is built according to the norms of Hellenic architecture. The antique theater is situated on the eastern slope of the western hill. Architects use the sloping terrain without raising subtractions to set up the theater seating. In this way, the theater resembles most of the buildings built for the same purpose in the southern parts of the Balkan before the Roman construction norms, common to this type of public buildings, were brought to this area. The theater is first situated outside the city, which shows to where the early-ancient settlement was extended, which by size was still only polism or a small town. That probably happened during the last centuries of the first millennium. With more intense urbanization, the settlement expended on both banks of the Ohrid Lake, which in the late antique will receive a

fortification, on which base other buildings will be built in the early medieval period. Lihnid's Theater in its evolution followed all the novelties that the Roman culture brought into the field ofentertainment, with a military spirit that nourishes it throughout its history and imposes it throughout the Mediterranean. Besides the drama performances in the theater, which probably did not cease to be performed later in the imperial period, amphitheatrical games and games with wild animals also took place. Due to the novelties in entertainment that were being introduced in the city, there was a need to rearrange the orchestra and the stage. Cages are stored for storing wild animals, and with the expansion of the arena formed on an ellipsoidal basis, an appropriate space is created for the fights between gladiators and wild animals. Major archaeological investigations were carried out in 1977 and a large part of the theater has been discovered. The largest archaeological researches are conservation and restoration work that occurred in 2000 and 2001 when the theater was completely discovered. During the excavations, the remains of 3 medieval churches were discovered, in the vicinity of which 280 medieval graves and ruined structures were found, and a tomb of a Macedonian type was located about ten meters to the west of the northern part of the theater, located here at the end of the 4th century or the beginning of the 3rd century BCE. This building in the heart of the old part of the city of Ohrid functioned until the end of antiquity, that is, until the emergence of the first Christian communities in the city of Lychnidos. Today, this facility is equipped to function for various types of drama, concerts and performances [4].

Figure 49: Antique theater Source: [https://bit.ly/2rtAA26]

Chronologically, the Macedonian - Hellenic period is coming, which was one of the richest periods of Lychnidos, since there are a number of treasures, gold, silver, bronze found in the places that have been discovered, which is why this period is known as the golden period of Lychnidos.

On 30 September 2002 a tomb with a female golden mask with a golden glove and a golden ring was discovered at the upper gate in the old part of Ohrid on the north side of the city walls of Samuil's fortress. There were also grave articles from various materials - ceramics, amber, glass paste, iron, bronze, silver and gold. The temporal belonging to this tomb and the findings in it, date from the 5th century BCE which was the oldest known burial in the Lychnidos mecropolis in the hilly part of ancient Ohrid.

The city needed to forge coins. This status of the city with monetary activity takes place at the time of Philip V in the late 3rd and early 2nd century BCE. In this way Lihnid does not lag behind in overall development and cultural life. Literacy, which in particular will be dominant in the Roman era, was confirmed by numerous articles of profane and cult character, written in their language, which was the norm for the entire Eastern Mediterranean. They told about the organization of the city administration and about the respected people of Lychnidos, who had their statues erected in their honor. On the tombstones of the dearest, there were dedicated memories in verses with lyrical content.

The gradual penetration of the Roman invaders beginning at the end of the 3rd century BCE did not disturb the continuity of life in the city. The city persisted, evolved and urbanized even more and engaged in political cultural change. All that had been achieved in early antiquity was only a base for further upgrading and inclusion in civilizational flows. Strong confirmations of the new-time novelties were material remnants, especially of the luxurious goods that came from Italian workshops during the Emperor Augustus at the turn of the 1st century BCE in the 1st century CE. A very high quality production of ceramic production from Campania was discovered in the settlement of Plaosnik. From this time, the mosaic floors of Plaoshnik originated. This was the time of the Basilica. Lihnid, as well as the Hellenic era, was now rich in luxurious architectural buildings. Only on Plaoshnik, in relatively small areas, remains of three monumental early Christian buildings were discovered - an atrium and a baptistery church, a triple basilica with narthex, an atrium and a spacious baptistery with extremely valuable floor mosaics and another building still being explored. At the end of the 3rd century, the influence of the new religion against paganism will begin to be felt in the Ohrid region. In the time of Diocletian in Lychnidos,

Figure 50 Plaoshnik Source: [https://www.flickr.com/photos/robert_zahariev/25518956270]

St Erasmus arrived, who was the first that preached in this region the new teaching – Christianity

Figure 51: Mosaic Source [https://www.ohridnews.com/ohrid-izobiluva-so-vredni-mozaitsi-do-sega-otkrieni-21/]

Based on archaeological excavations in Ohrid and the Ohrid area, as well as on the basis of the widespread folk tradition and cult of the saint, it is considered that the ancient Lychnidus was the city in which Erasmus extended his missionary activity for a long time. He stayed there for many years as a missionary. After a while, Christianity was accepted and in the 4th century paganism was abandoned and forbidden, and by the end of the 4th century, the Christian religion was dominated by many early Christian basilicas. It was a time of a tremendous construction activity that is shown by discovered church buildings, first on Plaoshnik in the area of the oldest urban core, and then expanding throughout the fortified city, wider beyond the walls and in the whole Ohrid region. So far, there are 10 basilicas in the city with two more buildings from that time, covered with mosaics with Christian symbolism, while in the wider Ohrid-Struga region, 6 basilicas were excavated, all decorated with figural mosaics with Christian iconography. At this stage of exploration, as one of the oldest early Christian churches, a travertine basilica was erected at the Deboy location within the late Roman fortified city. This basilica, later in the early 6th century, will be restored and covered with a new mosaic rug [4].

The most dominant position on Plaoshnik occupies the tetrakhonos or poly-conchal church due to the large number of cones with which the structure resembles a double shell. As an architectural idea, very bold and inventive, it is a very rare occurrence in the Mediterranean area. The church is a complex monument with a spacious naos, with a luxuriously decorated interior. The church had a martial character. The beautiful mosaics illustrate Bible messages, and topics related to the Old Testament.

The family tomb of Roman times, with vaulted construction, with chamber and subcamp. A total of 10 graves were placed in the chamber. The tomb was partially robbed, and in the other gravestones, a rich archeological material of gold, precious stones, bronze, glass and ceramics was discovered. The characteristics of the terrain and accidental findings also speak of other buildings in the immediate vicinity of this

building - Villa Rustika. A palace placed outside the city center, for rich people to live a more peaceful life.

In the Roman Empire, the city had its own administration that followed its old laws for organized cities that were valid for all cities in Ancient Macedonia. The Roman authorities accepted and respected every kind of organized city administration that did not oppose their laws in the provinces of the Balkan. Lihnid from the 1st century until the end of the 3rd century entered the province of Macedonia which stretched from the Adriatic coast to the river Mesta to the east. All these construction activities in the arrangement of the city in the late antiquity were accompanied by the complex historical events that encompass the Roman Empire. This was the time of the first beginnings of the settlement of the nations imposed by the various tribes who captured the northern border of the kingdom and descended to the Balkan. In the 6th century, when Justinian ruled in the kingdom and when the Emperor's construction works are known, despite the great earthquakes, Lychnid lives with the already built structures deeply entrenched in the spirituality of Christianity. With the arrival of the Slavs at the end of the 6th century the city left leaving the gradually large buildings in ruins and oblivion that will not last long. As a phoenix in the early Middle Ages, it will revive again.

In the 6th century, Lychnidus was within the Byzantine Empire. The Ohrid region was exposed to mass Slavic colonization at the end of the 7th century [4].

The Ohrid region in the 30s of the 7th century was completely colonized by the Slavic tribe Berziti or Brsjaci. For the first time, the name Ohrid was mentioned in the protocol of the city council in 879. The city received this name from the Slavic words vo hrid - on a hill, since the old part of Ohrid was on a hill. At the time of St. Clement, a church was erected in his honor, and also churches were built by he himself. Also, St. Naum had raised a monastery and churches, among which the most important is the church of Sts. Naum, where his tomb is located.

In the second half of the 10th century under the leadership of the Brcko prince Nicholas and his sons David, Aaron, Moses, and Samuel, an armed uprising broke out, first against Bulgaria and then against Byzantium (976). At the head of the Macedonian medieval state stood Tsar Samuil, after whom it received the name. For about four decades of Samuel's rule were filled with battles with Byzantium and conquests. Tsar Samuil extended the boundaries of his state to the Danube and Sava rivers, to the Corinthian Gulf and to the Adriatic Sea. He built his so-called. Samuel's Patriarch.

In 1018, King Samuel was subdued, and Tsar Vasilij II seized Ohrid and destroyed the city walls. The Ohrid Patriarchate was reduced to archbishopric.

One of the most famous and most important churches in Ohrid is the church of Sts. Sofia, located at the foot of the hilly part of Ohrid near the Ohrid Lake. One of the rare galleries where wall paintings, reliefs and architecture have been preserved, spanning for 4 centuries, from 11 until 14th. Today's appearance of the church is a three-nave basilica built by brick and stone. It changed its purpose several times. It was a church and converted to a mosque in the second half of the 15th century, and then the biggest changes were made. Then it became a warehouse from the mosque, and in 1912, it became a church again.

During the 13th and 14th centuries, new temples were erected which give a special feature of today's Ohrid (egg. St. John Kaneo, Holy Virgin Perileptite on Plaoshnik, etc.). In the Middle Ages there are also cave churches and dwellings. At the end of the 14th century rules the Sultan Bayazid I [4].

After a military campaign that ran from 1382 to 1384 in which they managed to establish control over eastern Macedonia, the Ottomans launched a new campaign directed west of the river Vardar to the territories of King Marko. The campaign, which began in 1385, in the wars that followed in 1391-1392, almost all major cities in western and southwestern Macedonia were conquered. The presence of the Ottomans in Ohrid was also proved by one record in the church of Sts. Elijah. Over time, the Muslim population was growing. There were also changes in the city's appearance, when two large churches (Panteleimon and St. Sophia) were converted into mosques. A Saraj was built, but this does not change the overall image of the city. The old city (the upper city) retains its core and here the Christians are dominant, but there is also the lower city in which Muslims live. It was in the area between these two urban areas, that the Ohrid bazaar was extended, dominated by the Muslim population and where the Islamic sacred and profane buildings were more numerous, making this part in contrast with the old city [5].

One of the most important features of Ohrid is the fortress, an ancient building with a pentagonal shape, built of carved stone. It is a rugged turret and a large shelter that covers 4400 steps, built in the 4th century BCE. There are quite a lot of mosques like Aja Sophia.

Coins began to be forged, and Ohrid became one of the most important craft and shopping centers through which the important road route via Egnatia passed. The Archbishopric continues to function.

Two neighborhoods were built in Ohrid and the number of inhabitants increased, due to the developed craft and trade activity. At the end of the 18th and the beginning of

the 19th century, the Ottoman Empire was in a crisis and the central government lost control of the provinces, and other wealthy feudal lords (Jedladin Bey) began to rule here. In 1830 when the central government began to regain control over the cities and provinces, Xheladin Bey was forced to escape. Although Ohrid is still under Ottoman rule, the Christian population gets its rights. In the late 19th century, Muslims and Catholics became equal [5].

Figure 52 The house of Robes. Typical Ohrid house. Source: [http://publicitet.mk/tiker/item/3045-enterieno-se-ureduva-kukjata-na-robevci]

The path that the Macedonian people passed from its awakening, to full national affirmation, was so complex that it is very difficult to compare with the national awakening of any other nation on the Balkan. From the breakthrough of capitalism until the formation of the Macedonian nation, the Macedonian people went through several stages of transformation that lasted for half a century [6].

Figure 53: Typical Ohrid House. Source: [https://www.skyscrapercity.com/showthread.php?t=1652002]

Macedonia went through the Balkan Wars, the first and the second world war when Ohrid was in a period of poverty, when in the mid-20th century Macedonia was declared a state with a federal status within Yugoslavia. After that, it finally became an independent state in 1991.

In the transition around 1954 the mass eviction of the Turks from Ohrid begins.

Many schools started to be built but also many hotels. (examples and pictures). Tourism in Ohrid began to develop, especially in the 1970s, even people began to rent rooms in their own homes [6].

Culture and art also develop. Many theatric performances and other kinds of entertainment events (Ohrid Summer) are performed, which is even greater benefit in terms of tourism for then and for today.

Figure 54 Ohrid center. Source: [https://virily.com/culture/ohrid-city-divine-light/]]

Cinarot is one of the more famous attractions not only in Ohrid, but also in Macedonia. The tree is 11 centuries old and is said to have been planted by St. Clement of Ohrid personally. It is a symbol of Ohrid.

Figure 55 Cinarot Source: [https://www.flickr.com/photos/33750982@N08/3155504015]

Ohrid has favorable climatic conditions for the development of agriculture and tourism, which is why it is a magnet for many visitors.

Figure 56: Ohrid beach Source [http://english.republika.mk/ohrid-crowded-with-tourists-on-ilinden-weekend/]

Ohrid receives the epithet of the city of literacy, light and glory [6].

Figure 57 Ohrid at night Source: [https://ohridphotography.com/product/ohrid-night-drone-print/]

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4 œBiophilic Environment Within Buildings

4.1 Case Study of a biophilic building

Bosco verticale (The vertical forest), Boeri Studio/ Milan, Italy, 2014.

Figure 60 Bosco Verticale, Milan, Italy. Source: [4]

Figure 59 Bosco Verticale, Milan, Italy. Source: [4]

Figure 58 Biophilic balcony. Source: [4]

Located in Milan, in the Porta Nuova Isola area, the Vertical Forest was part of a bigger renovation project led by Hines Italia. It consists of two towers of 80 and 112 metres hight, containing a huge amount of trees and shrubs. There is a screen of vegetation that creates a suitable microclimate and filters sunlight. It increases biodiversity. It forms an urban

ecosystem with various types of vegetation able to be inhabited by birds and insects. In this way it is repopulating the city's flora and fauna.

Figure 61 Greenery for every apartment. Source: [4]

There is a separate private garden for every floor and every apartment. Using glass for open views, light and sun absorption.

Figure 62 Biophilic plan. Source: [4]

In plan we can notice the amount of greenery and the spaciousness which are all elements of biophilic design.

Figure 63 Biophilic systems used. Source: [4]

The buildings have a rainwater recycling system calculated by examining climatic characteristics and the abundance of vegetation dispersed throughout the whole building and on every floor, appropriately diversifies. All this results in the term ‘vertical forest’.

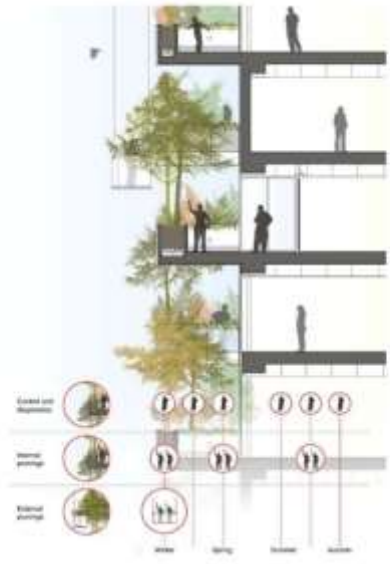

Figure 64 Maintainance. Source: [4]

Here is a diagram of the methods used for maintaining the vegetation. Diagnosing the current situation from the interior, pruning from the inside or if necessary from the outside.

The choice of species, how they are placed or oriented is a result of a three-year study carried out by a group of botanists and ethologists. The plants which are planted have first been pre-cultivated in a nursery so that they can be adopted to similar conditions to those that they will find on the balconies.

This project is one of the best epitomes of biophilic design which served as an example and inspiration for my own project.

4.2 Biophilic Design in Hospitality Spaces

With the gradual development of cities, evolving in urbanization and also tourism, the number of people willing to travel and visit interesting places is increasing. There are different groups of travelers with different tastes, desires and preferences, each of them ready to spend money on their trip. Hoteliers try to take advantage of this situation which results in rising hospitality economy, and hotels are becoming revolutionary more than they are recreational. A profound aspect of change in the hospitality industry today, is the biophilic design being encompassed into the project design. It is a manner of improvement which is actually beneficial to all the aspects: the hoteliers, guest, economy and nature. Designers and architects are aiming to include biophilic elements into their designs in large or small scale, with a goal to satisfy the needs, desires and expectations that guest have. There is evidence showing that incorporating biophilic design into the project contributes to the hotel's ability to keep guests coming back by creating an experience of joy and refuge.

Biophilic design has also an impact on the cost. For example, the difference in price between a room with a sea view and a room with non-sea view. On average this difference is about 18 percent in cost [1].

Hotels are looking for ways of implementing biophilic design into their properties other than placing views of gardens and ponds. They are including natural biophilic elements into their interiors. For instance, lobbies are the perfect space to withhold biophilic design. Observations have shown that 36 percent of guests spend more time in lobbies that have biophilic elements rather than other conventional lobbies [2].

The connection between indoor and outdoor spaces are becoming obscured, by planting trees, plants, green walls, roofs, natural lighting, natural materials, glass and so on. The space should prevail people with the feelings of wellness and relaxation [1].

Figure 65 Quotation. Source: [2]

Here are some ways in which biophilic design can be implemented into the hospitality space [3]:

- Using natural materials creates a strong connection to nature

Figure 66 Ways of implementing biophilic design. Source: [3]

- Using biophilic focal points

Figure 67 Source: [3]

- Hanging plants

Figure 68 Source: [3]

- Using reclaimed wood

Figure 69 Source: [3]

- Bringing nature into lobbies

Figure 70 Source: [3]

- Potted plants in seating areas

Figure 71 Source: [3]

- Clear sightlines to the nature outside

Figure 72 Source: [3]

- Different ways to implement greenery

Figure 73 Source: [3]

- Making a room an indoor garden

Figure 74 Source: [3]

- Experimenting with raw unfinished natural elements

Figure 75 Source: [3]

- Using wood in the rooms

Figure 76 Source: [3]

4.3 Chapter References

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5 œThe Site

5.1 Site location

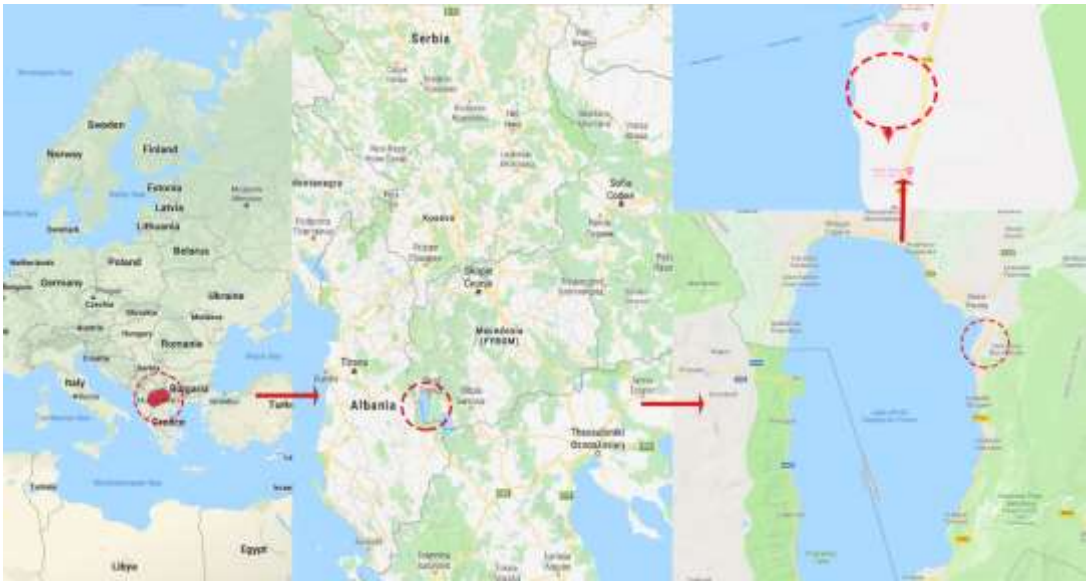


Figure 77 The position of the site

The site is located at around 6km distance from the center of Ohrid. Lying on the east shore of the lake. To the left surrounded by the Ohrid lake, and to the east encompassed by the mountain and National Park of Galicica. In its vicinity there are mostly hospitality buildings like hotels and villas, all of them not very big, expensive or luxurious.

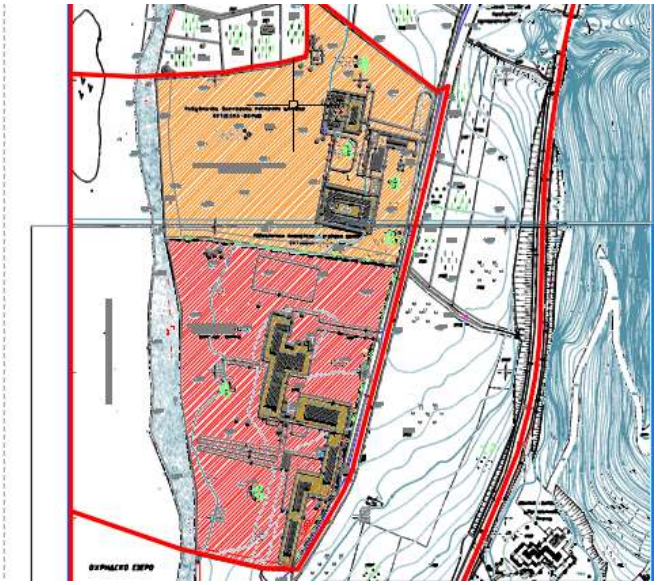


Figure 78 Current situation in the plan

This is the current situation of the site, on which there is a building of a non-hospitality purpose. This building is planned to be demolished and od its place there should be a hospitality building – a hotel.

5.2 The Project

When I first started thinking of the impact that the hotel will leave on people, I knew that I had to make biophilia noticeable at first sight. Taking into consideration the nature of the terrain, decreasing from the high mountain on one side, to the lake level on the other side, I decided to follow the natural fall, allowing good views toward the lake and the mountain from every point of the building.

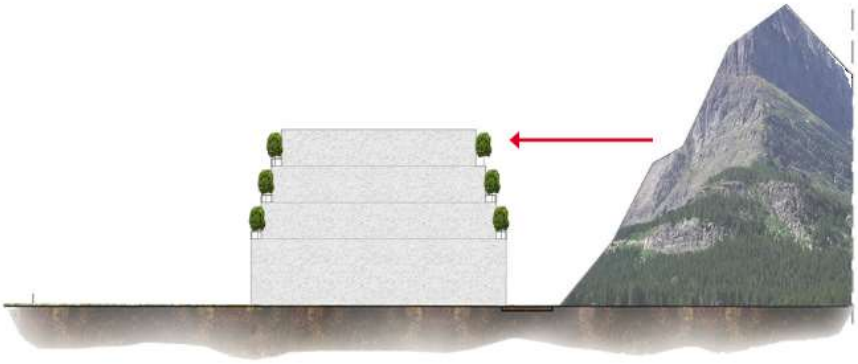


Figure 79 Following natural descend

After long and thorough analysis of how a hotel works, its rules, principles and methods, the main concept of the building appeared. Basically, the volume of the building is divided into several parts, depending on their purpose, connections and flows between them. The main distinction is, between the public, the semi-pubic and the private parts. All of them are appropriately connected without harsh borders, but in the same time well-distinguished so that different groups of people do not get mixed [1] [3].

The shape came out of the combination of several goals. Maintaining the relevant size of rooms, allowing views toward the outside, including biophilia into the design while respecting its preferences, and adopting the building to the conditions of the place and location. The final shape can be seen in the masterplan (M=1:1000)

It is an architectonic body consisting of two main bodies, one main structure and two secondary structures.

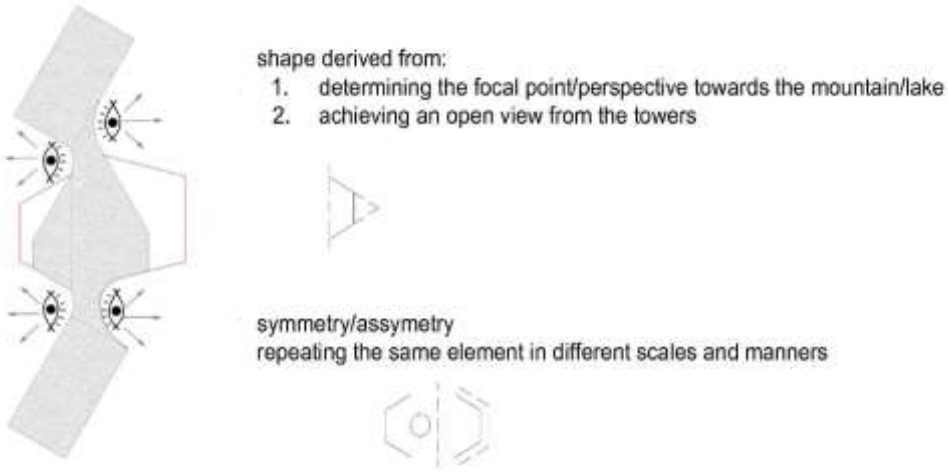


Figure 80 structure derivation

The three parts, each of them with different disposition and function are interactive with each other, which means they work as one connected body.

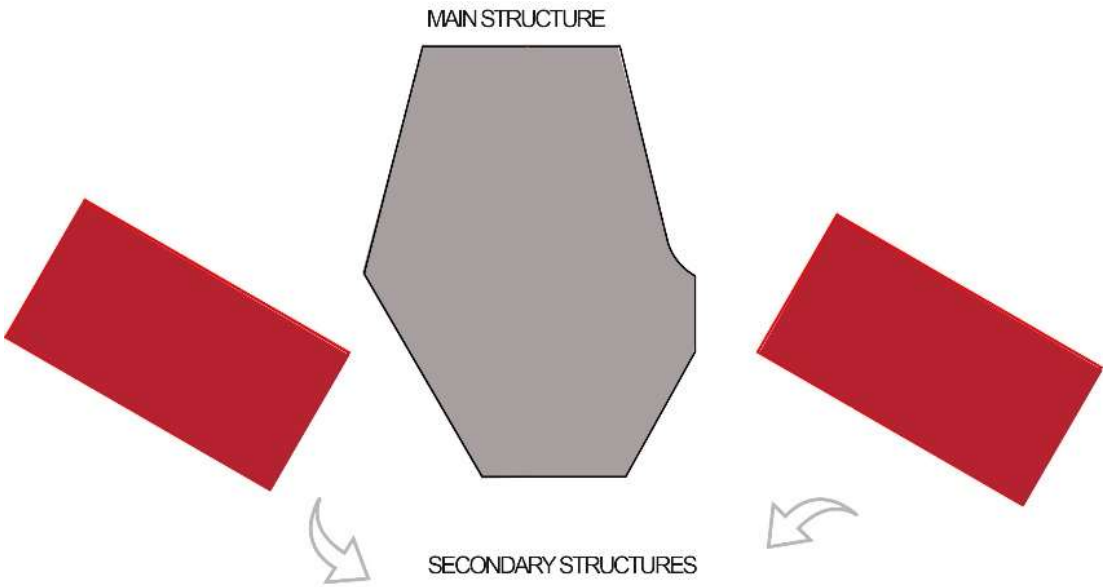


Figure 81 Structures

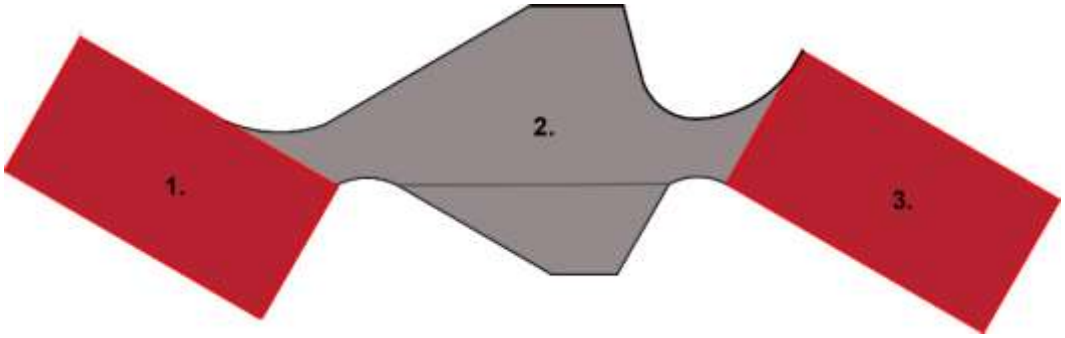


Figure 82 Different volumes

The body consists of one constant volume found on every level of the building, and another half-transparent volume which appears from the eighth level up.

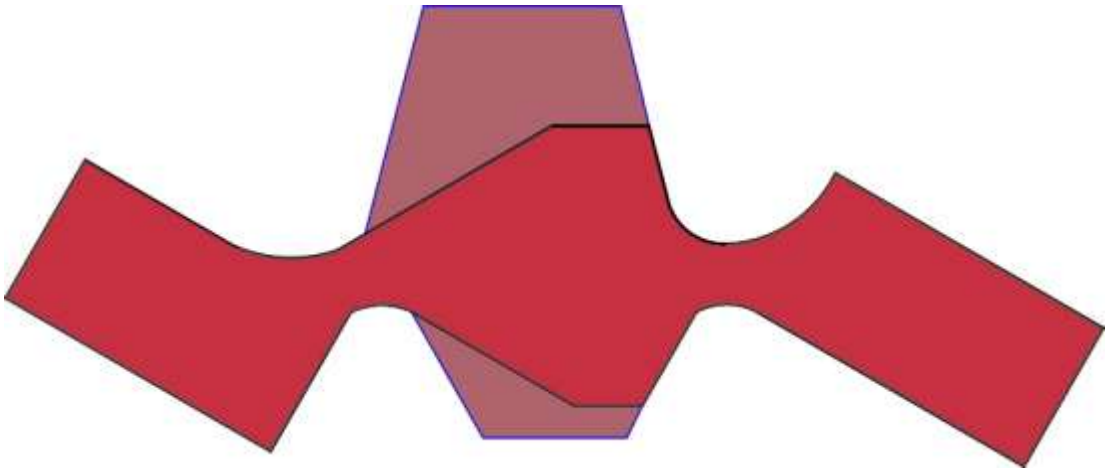


Figure 83 Transparent volumes

According to the placement of the building on the site, there were several factors that influenced every position of every element.

From the entrance gate there is a choice of paths, leading to the outside parking, the underground parking, or just a pass-through for leaving or picking up [2] [3].

The orientation of the building is chosen in order to favor the needs of every purpose. The exposure to the north is limited since it is quite cold and dark. The exposure to the south is either limited because of the heat, or used in advantage for placing photovoltaic glass, solar panels or greenery. The west and the east are the best orientation sides, for sun, light and also views [1] [2].

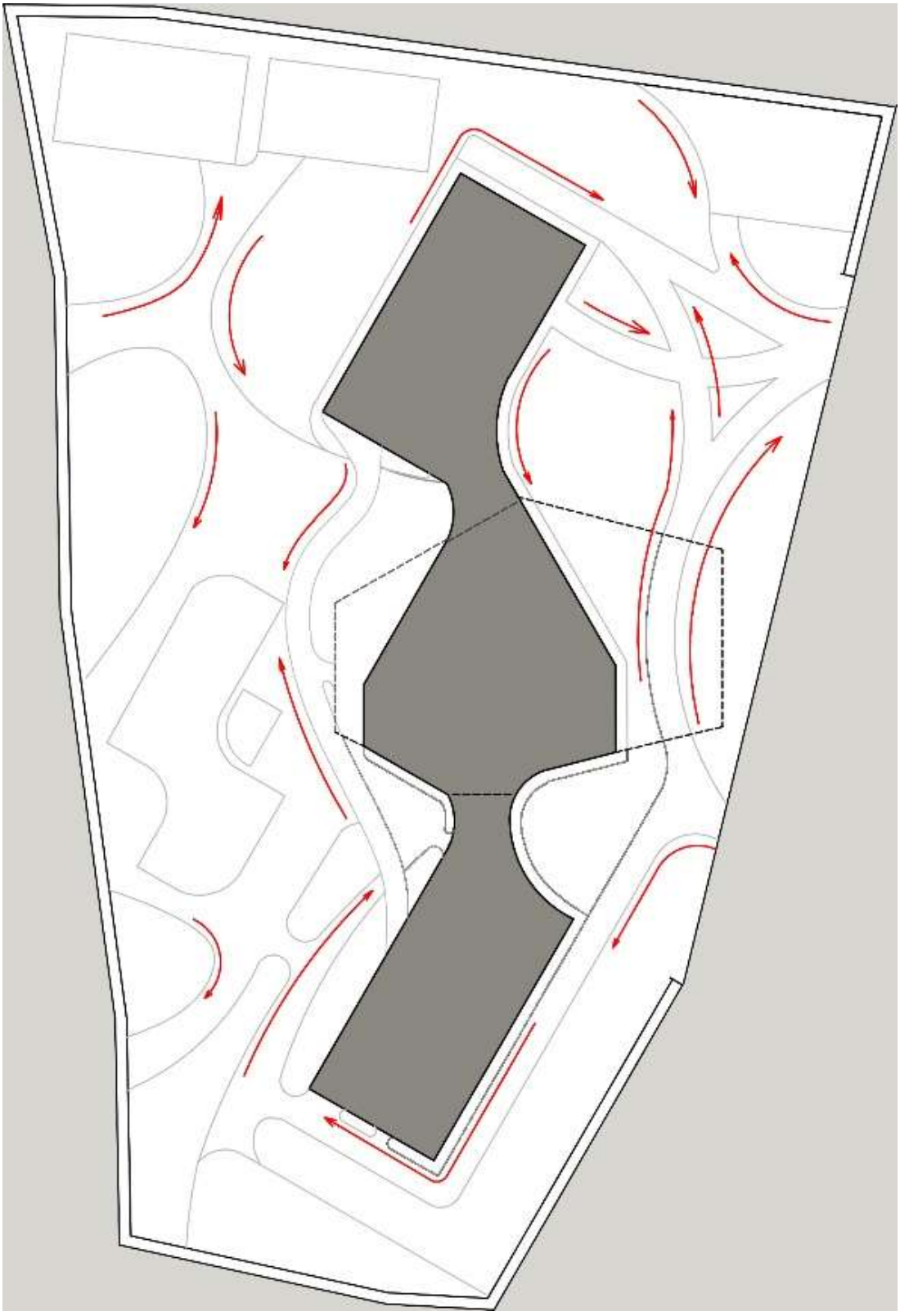


Figure 84 Movement on the site

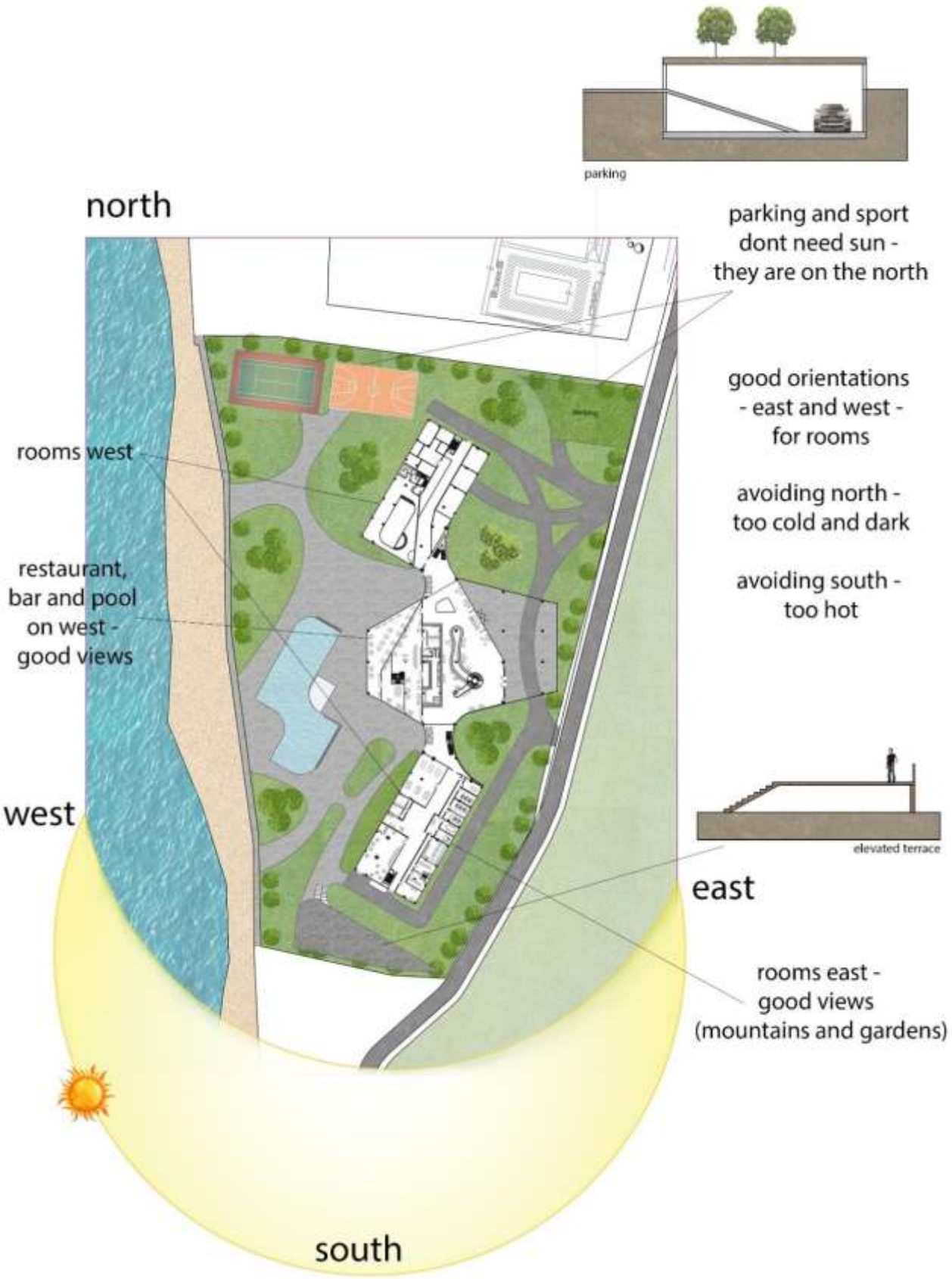


Figure 85 Orientation of different functions

These methods support my design concept, which includes placing the parking and the sports area on the north, which is appropriate since the sun in these situations is unwanted. Spreading the gardens and the greenery all around the south, west and east. Orienting the rooms toward the best orientational sides- the east and the west, with not too much, but abundant heat and light, and opening views. The restaurant, the bar and the pool overlook the west, allowing wonderful sunsets during dinner.

Getting inside the building this is the concept used for the program. The private parts are separated and isolated from the public, where the hustle of people happens, starting from the level eight and up. All the facilities for the hotel guests are within a reach, dispersed on the first and the second level, making them more easily accessible from the outside. The public section is an entirely different volume, which helps to avoid mixing between the hotel guests and the temporary visitors. This can be better understood from the plans containing legend-explanations of every room. From the same plan we can observe the biophilic elements and areas I have implemented and dispersed throughout the whole building [2].

LEVEL 00.00 (GROUND FLOOR PLAN)

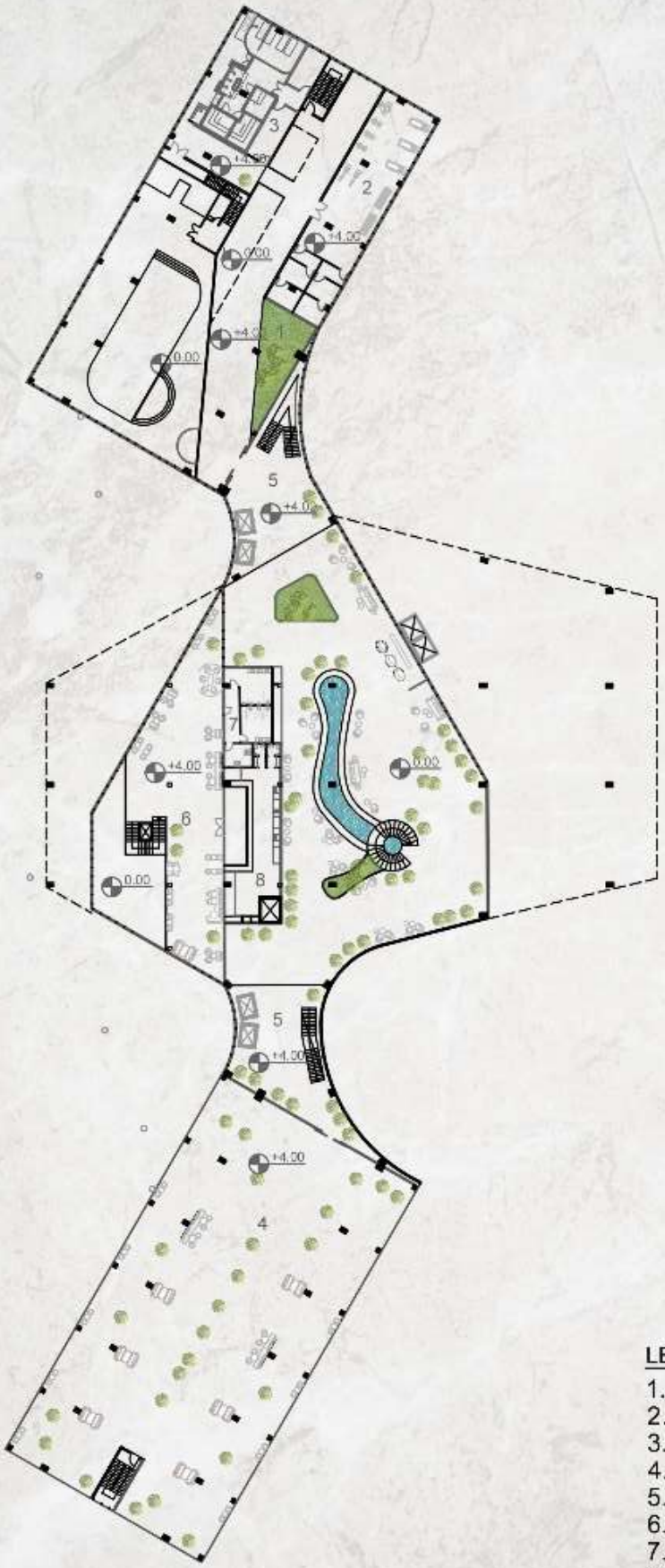
M=1:750

LEGEND

1... PORCH
2... ENTRANCE
3... LOBBY
4... RECEPTION
5... COMMUNICATION TOWER
6... GARDEN
7... INDOOR POOL
8... SHOPS
9... OFFICES
10... ROOMS FOR STAFF
11... DISCO CLUB
12... ENTERTAINMENT
13... TOILETS
14... SMALL KITCHEN
15... BAR
16... BAR TERRACE
17... GATHERING SPACE

LEVEL +4.00

M=1:750



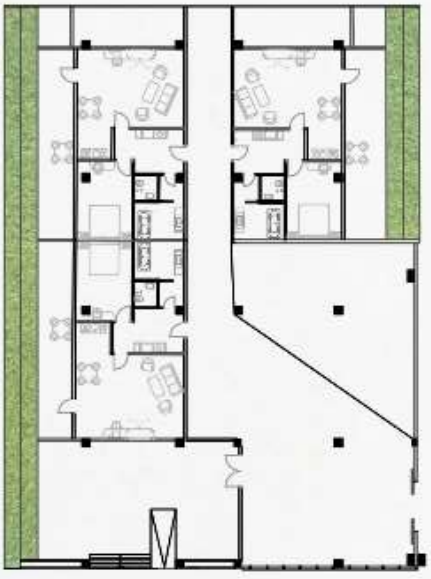
LEGEND

1... GARDEN
2... GYM
3... SPA AND MASSAGE CENTER
4... OPEN FLOOR/GARDEN
5... COMMUNICATION TOWER
6... BAR GALLERY
7... TOILETS
8... SMALL KITCHEN

LEVEL +8.00

M=1:750

A CLOSER LOOK INTO SOME OF THE ROOMS

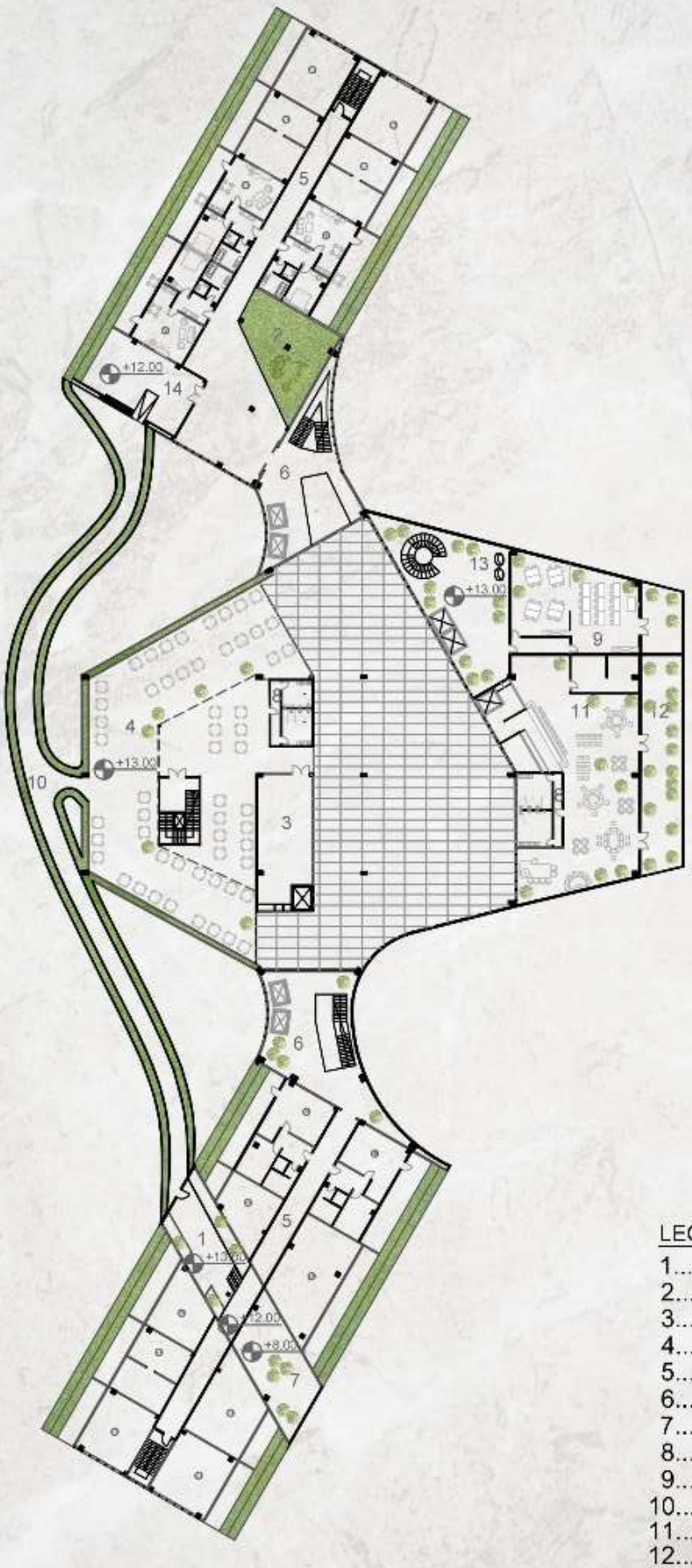


LEGEND

1... GATHERING SPACE/LOBBY
2... GARDENS
3... MAIN KITCHEN
4... RESTAURANT
5... ROOMS
6... COMMUNICATION TOWER
7... LIGHT SHAFT
8... RESTAURANT II
9... TOILETS
10... TERRACE
11... OPEN GARDEN

LEVEL +13.00

M=1:750



LEGEND

1... GATHERING SPACE/LOBBY
2... GARDENS
3... SMALL KITCHEN
4... RESTAURANT TERRACE
5... ROOMS
6... COMMUNICATION TOWER
7... LIGHT SHAFT
8... TOILETS
9... MEETING ROOMS
10... BRIIDGE
11... CASINO
12... TERRACE
13... RECEPTION
14... OPEN TERRACE

LEVEL +17.50

M=1:750

LEGEND

1... GATHERING SPACE/LOBBY
2... GARDENS
3... SMALL KITCHEN
4... RESTAURANT TERRACE
5... ROOMS
6... COMMUNICATION TOWER
7... LIGHT SHAFT
8... TOILETS
9... STORAGE
10... BRIGDE
11... BALLROOM
12... TERRACE
13... RECEPTION

LEVEL -3.10

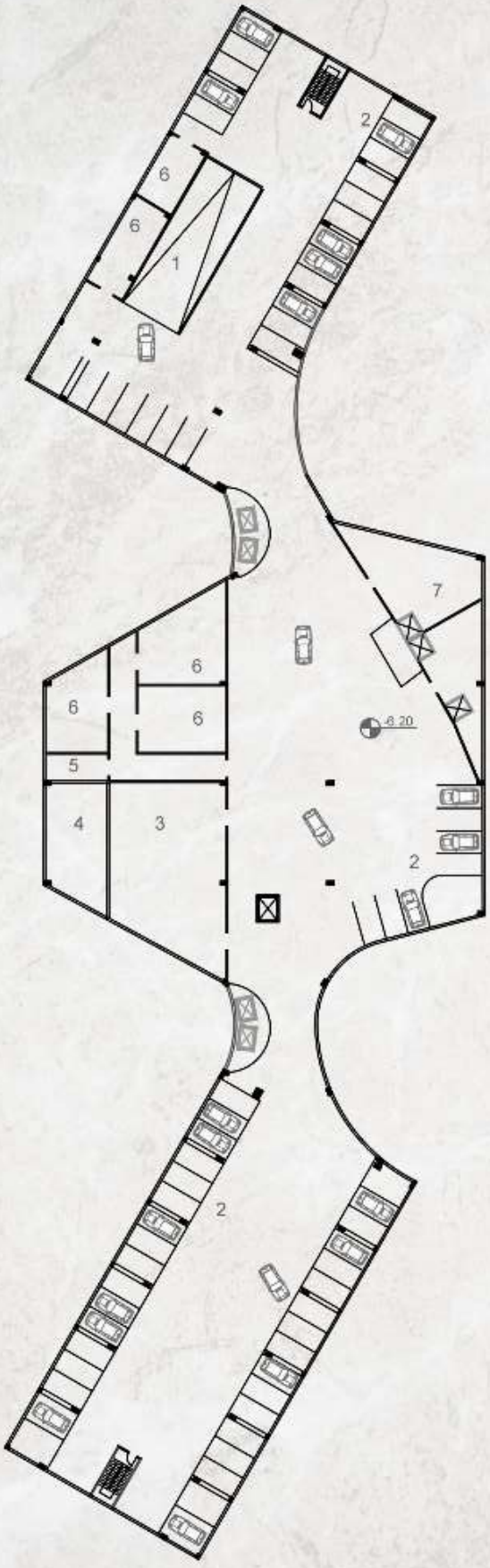
M=1:750

LEGEND

1... RAMP
2... PARKING
3... TECHNICAL ROOMS
4... KITCHEN STORAGE

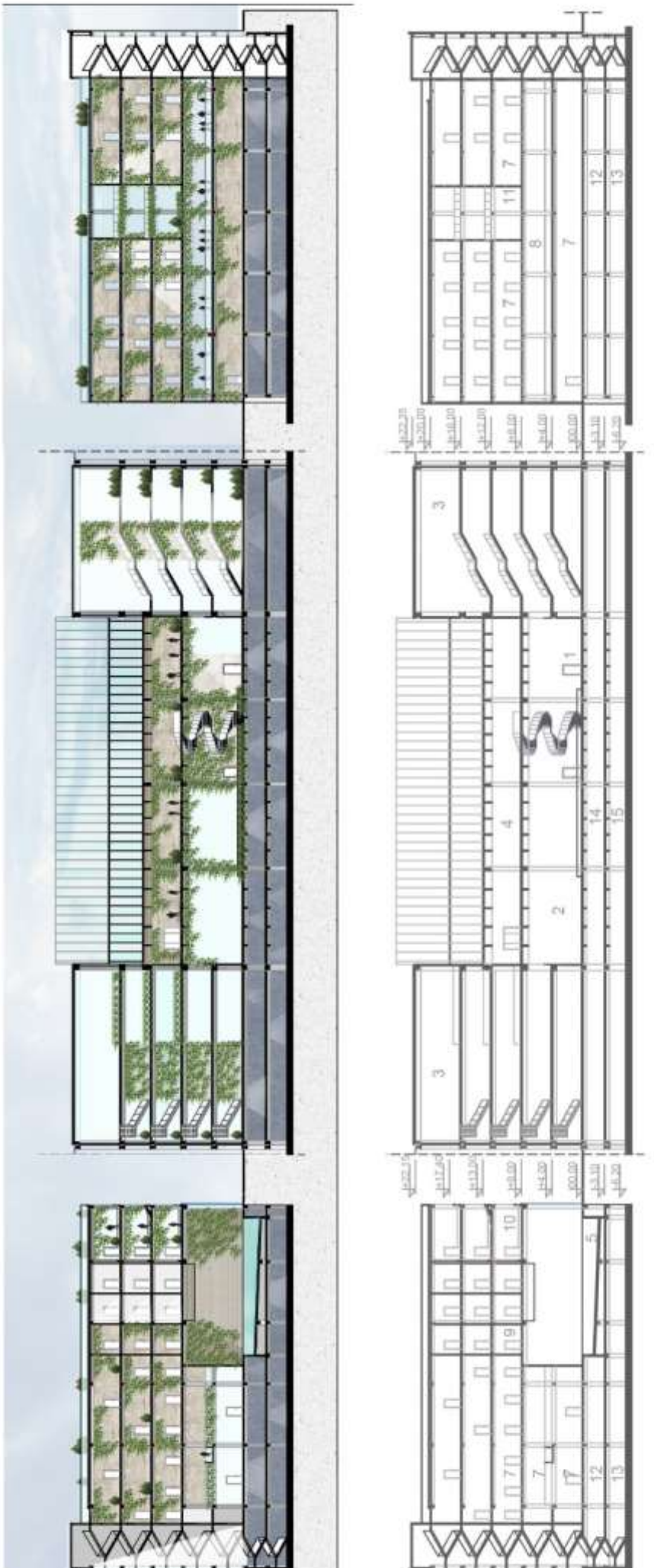
LEVEL -3.10

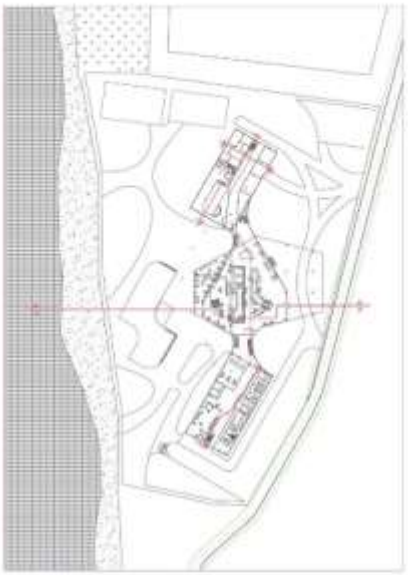
M=1:750



LEGEND

1... RAMP
2... PARKING
3... MACHINE ROOM
4... FIRE-WATER STORAGE
5... PUMP STATION
6... TECHNICAL ROOMS
7... STORAGE





SECTION 1-1

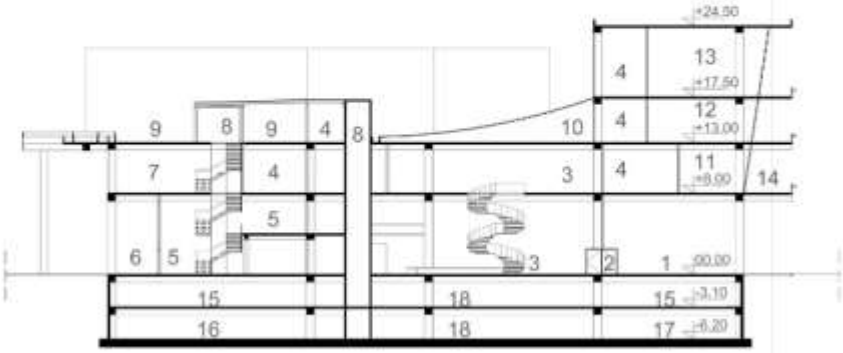
LEGEND

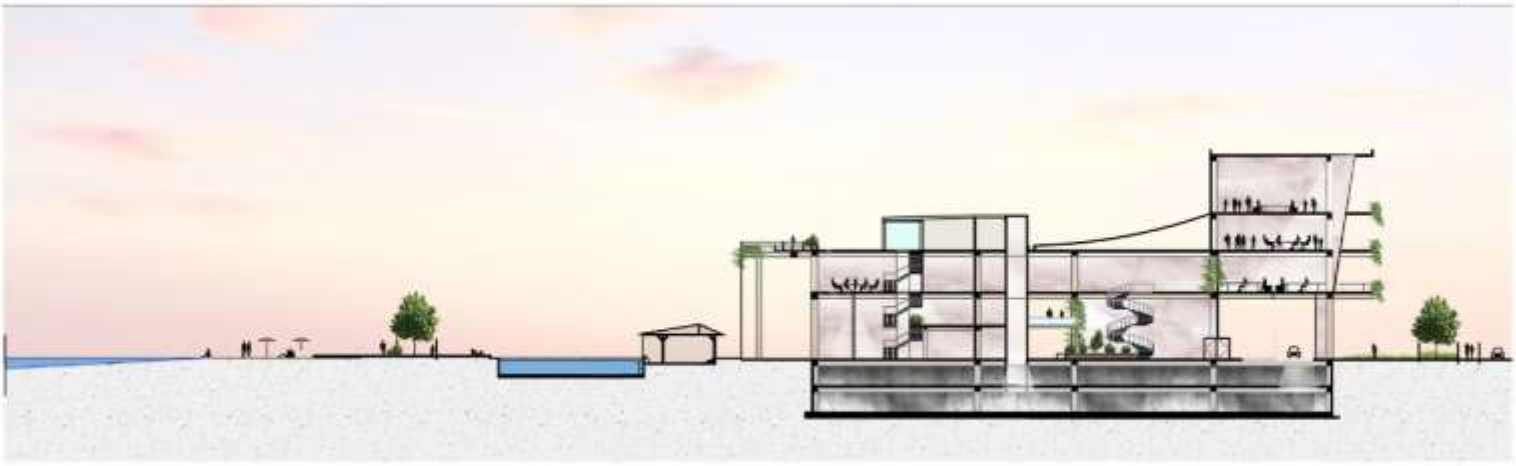
1... LOBBY
2... RECEPTION
3... COMMUNICATION TOWER
4... GATHERING SPACE/LOBBY
5... INDOOR POOL
6... SHOPS
7... HALL
8... OPEN FLOOR/GARDEN
9... ROOMS
10... GARDENS
11... LIGHT SHAFT
12... PARKING
13... TECHNICAL ROOMS
14... KITCHEN STORAGE
15... MACHINE ROOM

SECTION 2-2

LEGEND

1... PORCH
2... ENTRANCE
3... LOBBY/GATHERING SPACE
4... KITCHEN
5... BAR
6... BAR TERRACE
7... RESTAURANT
8... COMMUNICATIONS
9... RESTAURANT TERRACE
10... ROOF
11... RESTAURANT II
12... CASINO
13... BALLROOM
14... TERRACE
15... KITCHEN STORAGE
16... MACHINE ROOM
17... TECHNICAL ROOMS
18... PARKING





Every transition from a public, to a semi-public, to a private space, is regulated by the assured passage through a biophilic space. Many of the biophilic spaces are used as buffer zones between different-purposed spaces. The most relevant example is the biophilic communication tower.

There is an ample of spaces where the nature in brought inside. Exemplifying with the immense number of inside gardens, biophilic gathering spaces, trees, bushes, hanging and potted plants, green walls, glass walls introducing a lot of light, sun and views, water, stones, natural materials etc. The more abstract patterns cannot be seen but they can be felt in the space like the spaciousness of the entrance hall. Biophilia on the bigger scale can be noted by the big internal and external gardens and gathering spaces, and the abundance of greenery in both wings. In the first wing there is the garden outside and inside, and in the other wing there is the light shaft granting greenery, light, sun and natural ventilation. In this wing there is also an open floor, mostly used during the summer, not excluding the spring and autumn. It is a huge open biophilic gathering space, available to the whole building, and not just for the same wing, since it is placed lower on level four, where there is higher flow of people. This open space is also used as a buffer zone between the disco on the ground floor and the rooms of the upper floors.

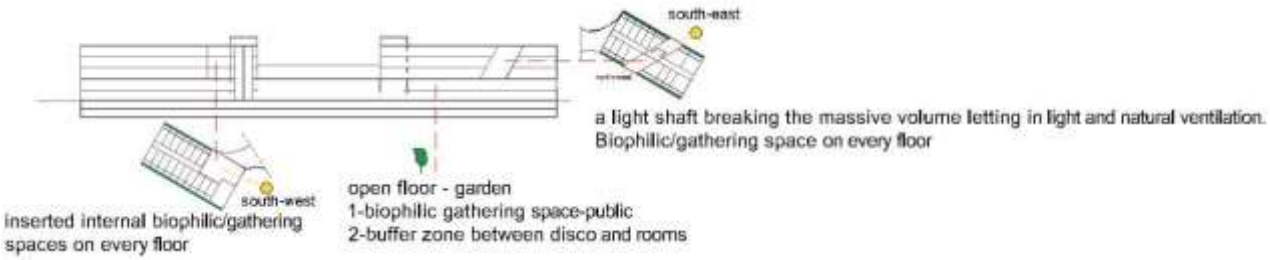


Figure 86

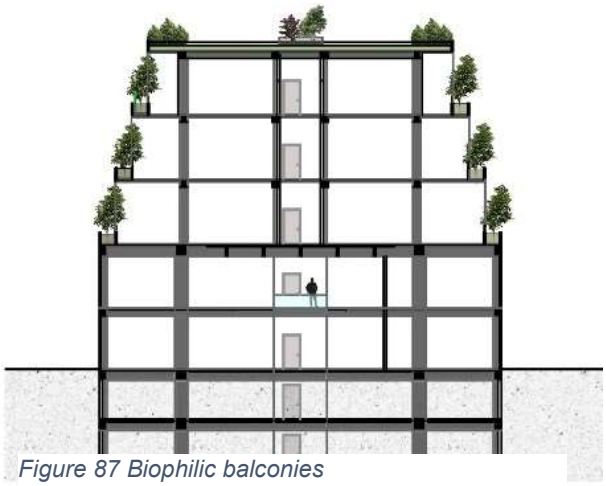


Figure 87 Biophilic balconies

Both wigs (where the rooms are) have their biophilic elements, on every floor, and within 1 minute of every room. Every room has its own terrace with its own portion of greenery benefiting the building in many ways.

Figure 88

Here is a diagram explaining all of the benefits of green balconies, used in the project of Bosco Verticale in Milan.

The communication towers are all biophilic, starting with the glass walls, to greenery, open sights, spaciousness, light and materials.

Also, in the main core we can recognize many of the biophilic patterns previously mentioned. The biophilic elements which make up the whole biophilic system, deriving from the patterns of biophilic design are these:

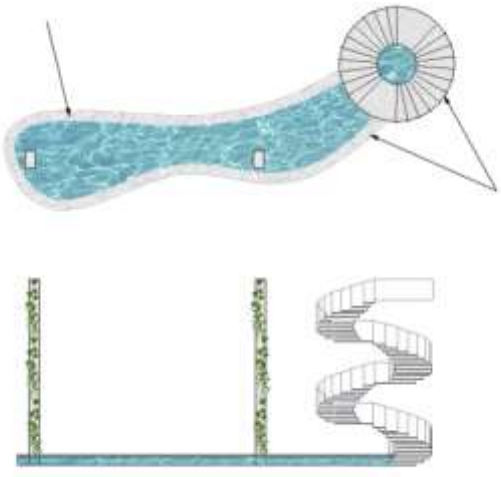


Figure 89 Presence of water

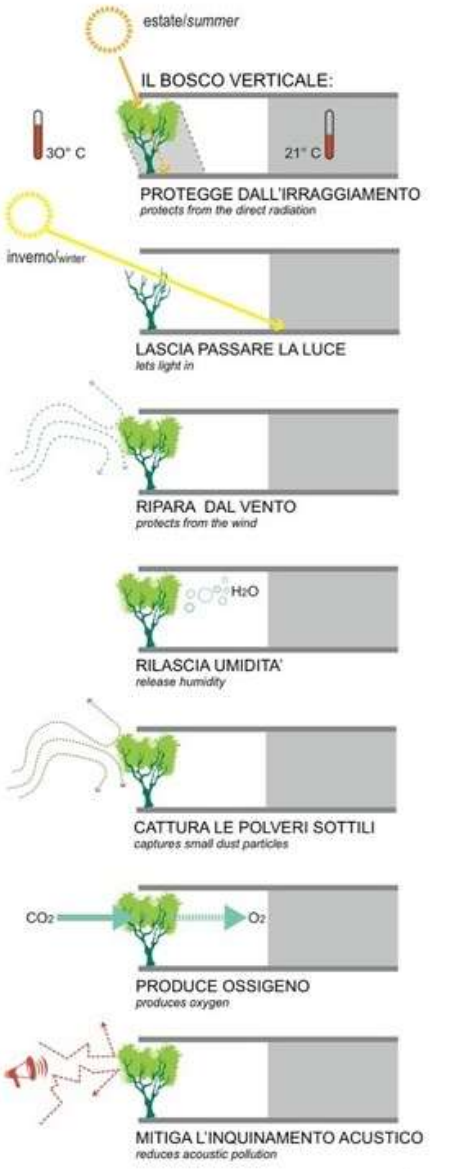


Figure 90 Benefit analysis from the Bosco Verticale, Milan. Source: [https://www.archdaily.com/777498/bosco-verticale-stefano-boeri-architetti]

Presence of water [P5] [P2]; Round shapes [P13]; Stones and sand [P1] [P9];

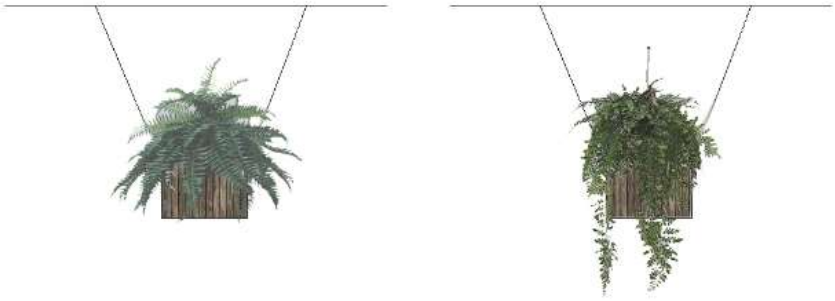


Figure 91 Potted plants

Hanging and potted plants [P1] [P2] [P4]

Figure 92 Internal gardens

Bringing gardens inside [P1] [P2] [P3] [P4]

Figure 93

Open views toward nature from inside and outside [P1] [P2] [P3] [P6] [P7] [P11] [P13]

Figure 94 Surrounding gardens

Gardens all around the hotel [P1] [P2] [P3] [P6] [P7]

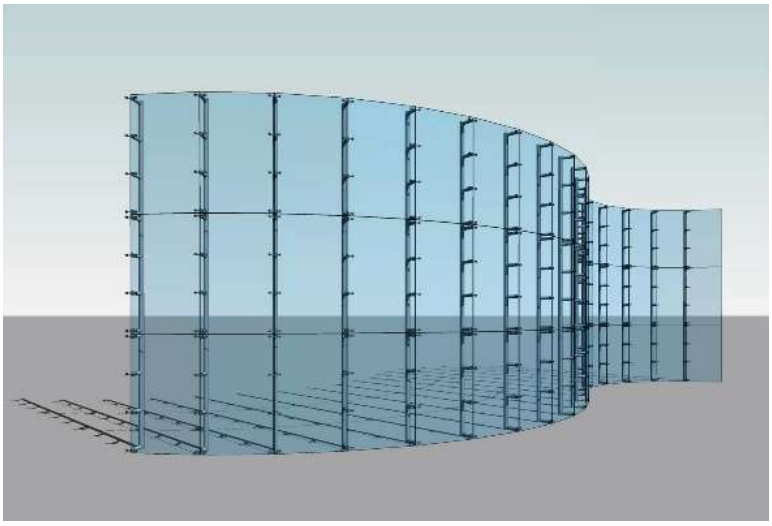


Figure 95 Glass walls

Using glass walls (curtain walls) [P1] [P4] [P6]

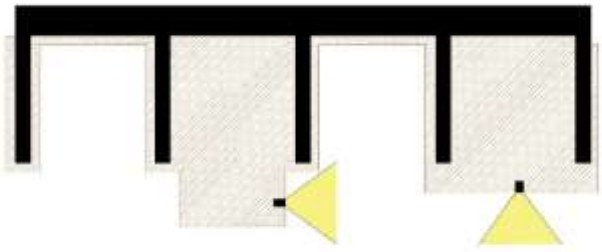


Figure 96 Wooden envelope

Natural materials – wooden envelope [P1] [P9]

Figure 97 Wall with greenery. Source: [httpswww.dwell.comarticleliving-green-walls-101-their-benefits-and-how-theyre-made-350955f3]

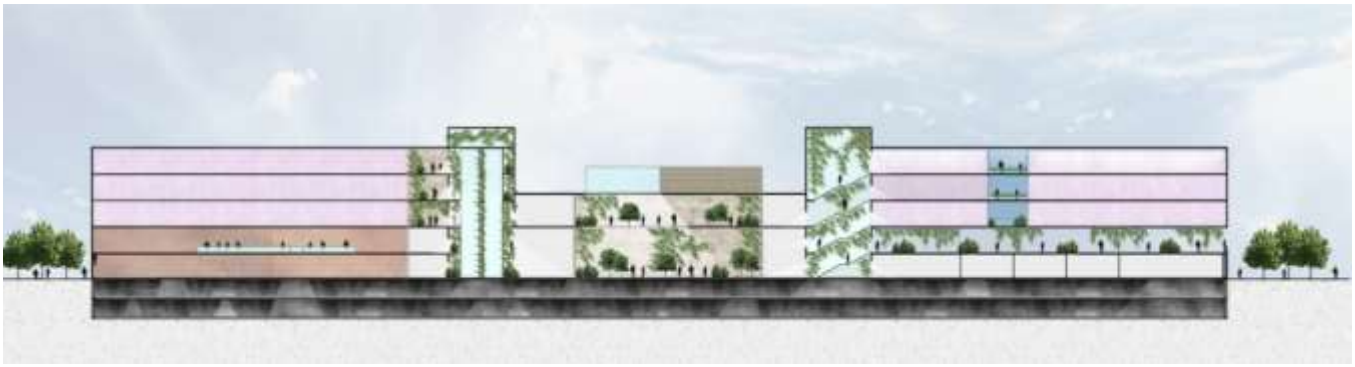
Using green walls or natural granite walls with planted greenery [P1] [P2] [P4] [P9]

Figure 98 Photovoltaic glass. Source: [httpsroswellgazette.com20181101global-pv-glass-solar-glass-solar-photovoltaic-glass-market-2018-by-product-pipeline-xinyi-solar-flat-csg-almaden-anci-hi-tech-irico-group-avic-sanxin]

Using photovoltaic glass for facades and roofs.

Figure 99 Solar panels. Source: [httpswww.euroscientist.comscientists-design-new-solar-cells-to-capture-energy-from-rain]

Placing solar panels on the green roofs.



Scheme:

Those were the small-scale and big-scale biophilic elements incorporated into the project, which contribute to satisfying the requirements needed for one building to be called biophilic. From all of the studies I have done about biophilia, biophilic design and biophilic buildings, I have used enough methods in improving and enhancing a person's health, mood, well-being, the look of the site, the shore, and spreading wider into the city and the area.

Figure 100 A picture meant to convey the general atmosphere of the environment.

5.3 Chapter references:

[1] Ronstedt, Manfred, and Tobias Frey. Hotel Buildings: Construction and Design Manual. DOM publishers, 2014.

[2] McDonough, Brian, et al. Building type basics for hospitality facilities. John Wiley & Sons, 2001.

[3] Penner, Richard H., Lawrence Adams, and Walter Rutes. Hotel design, planning and development. Routledge, 2013.

6 Conclusion

Designing a hospitality building can be tricky. Many rules, principles and methods used for creating the ’perfect’ building collide, so it is the designer’s responsibility to try and combine them in the most efficient way. Every person’s image of a vacation is usually outdoors, surrounded by nature. My goal with this practice is to try and incorporate a number of benefits of different aspects into one project.

Cities nowadays are rapidly urbanizing neglecting the importance of a good landscape. This fast industrialization, technological development and fabrication brings threatening consequences to our environment and quality of life. The scary number of people moving into the cities is growing, and the green surfaces are being abandoned. Knowing all of the benefits that nature imposes to our surroundings and to people themselves, it is in our hands to try and maintain a healthy environment.

The science supporting biophilic design is still emerging, but we cannot close our eyes to the obvious – people need nature.

My attempt with this project is to make the city of Ohrid more attractive to tourists and visitors, while bringing urbanization in collaboration with nature. Designing a space that would satisfy people’s expectations, providing an environment that would enhance their mood, health and overall, their whole experience.

Biophilic design is not a luxury. It is a necessity. It is a tool and a guide for creating a better place to work or live in.