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# The Impacts of Geographical Location on Landscape Design

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**ABSTRACT**

Landscape architecture is the connection between human and nature, which enhance human health and comfort. It contributes to water conservation and natural resource preservation since it is a part of the global ecosystem. The geographical location, which represents the climatic and terrestrial features, is one of the essential considerations of the landscape design due to its cruciality of design impacts. In this research, new landscape classification has been revealed that categorizes the landscape into two main categories: natural landscape and built landscape, and each category has been followed by subcategories which have demonstrated in this paper. One of the landscape architecture objectives is to optimize the design for human needs and comfort, thus how will the landscape design optimize in different climate conditions? There are many environmental design strategies that respond to any climate type conditions.

## 1. INTRODUCTION

"I don't divide architecture, landscape, and gardening; to me, they are one." Luis Barragan. Landscape is a life, everything in our life, and entire stuff around us. Landscape architecture is the relation between the landscape and architecture to create an environmental user experience. The relation is based on many factors such as the architecture design and architecture style, the project location, which represents the geographic characteristic of the project site, etc. [1]. The ecology and landscape ecology is a science that radically studies the transformation and conversion of nature. The ecology is illustrated as "Discursive elasticity that allows it to be used to structure the world in a number of ways" [2]. The ecology and landscape ecology provide a regional understanding of the natural features in a particular area. The natural characteristic can guide the landscape architecture and architectural design process, leading to a more efficient design and practical user experience. The ecological landscape designs are based on the geographical location since they consider the climatic characteristic, terrains features. It is the interaction between the natural environment and design; they are commonly called responsive design.

The geographical location has a distinguished impact on the environment, which varies from place to others regarding the type of vegetation, water resources, weather condition, available materials, and terrains. These have been reflected on indigenous dwelling design since there is a real differentiation between the built environment in a high elevation territory vs a low elevation territory [3].

The landscape architecture is important to the health aspects such as breathing system, psychology, and general health since the trees help to filter the air and produce more oxygen to atmosphere. The green color and the natural view give the brain a perfect meditation and relief from life stress [4]. It has been used by the hospitals to induce a good mood in patients and allow them to relax [5]. If a region has wonderful landscape features, it will positively impact the inhabitant's general health since they are going to eat good organic food and breathe clean air.

Nowadays, the landscape architecture is more important than ever since the urban development has overwhelmed the cities with concrete blocks and steel beams which separate people from their environment. According to The National Human Activity Pattern Survey (NHAPS), the American spend 90% of the day in an indoor environment, which negatively impacts their health and wellbeing. The necessity of landscape architecture has been raised due to the new busy lifestyle that we experience every day [6]. Everyone deserves a connection to the environment by outdoor areas for their daily life activities such as a small garden in a workspace for a lunch break, and well-vegetated pedestrian walkways. Not only the outdoor spaces have positive impacts on human health since the view of the outdoor environment has been proven a positive impact on the patient's healing process. Ulrich [7] found that the access to the outdoor environment in patients' hospital rooms improves the healing process. Kaplan and Talbot [8] found that having a view to nature in the workplace reduces job stress and increases job satisfaction.

## 2. RESEARCH PROBLEM

Responsive landscape design is challenging due to the required comprehensive knowledge of geographical feature and climate characteristic. The lack of understanding of the nature types and their climatic differences led to unenvironmental landscape design which is inefficient in terms of energy and water consumption, and human thermal comfort. The absence of relation between the built environment and nature results in disruption of natural balance.

## 3. RESEARCH OBJECTIVES

The research objective can be summarized as follows:

•Categorize the natural and built landscape.
•Investigate the relation between the built environment and nature.
•Provide environmental design strategies.

## 4. LANDSCAPE ARCHITECTURE CONSIDERATIONS

Landscape architecture is creating a great environment for individuals on a large scale, such as the region, city, and neighborhood, and on a small scale like the front yard of a house. A landscape design must consider the local geographical location since it is the main factor that represents the site Terrain and climate, which have a major impact on human comfort and needs. The geographical location influences the design decisions and the entire development of any built environment.

The landscape design is composed of geographical features, human comfort and needs, and cultural identity. The design reflects local people's historical traditions, customs, behaviors. The geographical location includes a variety of natural landscape categories that illustrate the climatic and terrestrial features which must be considered to reach an optimal design that will serve a specific area. The goals of landscape architecture are to address human outdoor needs and activities, human thermal comfort, and water conservation, and natural resources preservation. The classification based on the natural and built form of landscape (Figure 1).

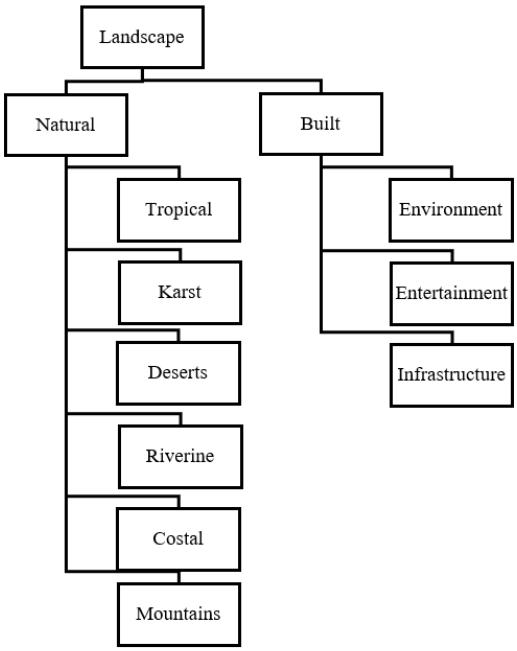


**Figure 1.** Landscape types and categories (by author)

## 5. LANDSCAPE CLASSIFICATION

These categories give a demonstration of how each location is different from others in many aspects, and differentiation is in climate, vegetation, ecosystem, fauna, and land shape and form since there is a literature deficiency in categorizing the landscape architecture based of geographical characteristic. These variables are the main factors that inform the landscape architecture design decision and support human needs and comfort. Anthropology variations, which are not a part of this classification, such as the inhabitant cultures, history, customs, behaviors, are also essential factors that impact the design decision.

### 5.1 Natural landscape

5.1.1 Mountains

Mountains are shaped by tectonic plates which are very rigid, and they have different materials, vegetation, and form that vary from place to place, according to the causes that contributed to the creation of these mountains [9]. Figures 2 and 3 show two different mountain types.

**Figure 2.** Mountains landscape Scene © 2020 ATLAS & BOOTS LTD

**Figure 3.** Mountains landscape Scene © 2020 ATLAS & BOOTS LTD

5.1.2 Costal

A costal geography is formed by land attachment; it is shaped by winds and waves that can be observed at in beaches, oases, …etc. (Figure 4).

**Figure 4.** Showing the features of Costal landscape © 2020 TripAdvisor LLC

5.1.3 Riverine

A riverine geography is formed by natural movements of water (Figure 5), and it includes the surrounding environment

(Figure 6).

**Figure 5.** The water framing and movement in riverine landscape type© 2020 Mawdoo3

**Figure 6.** The relation between the river and surrounding © 2020 Pariver of the year

5.1.4 Deserts

Deserts are the areas of earth that do not receive more than 250 mm of rain per year. There are two types of deserts: hot deserts which are located along the tropics of Cancer and Capricorn and cold deserts which are near to the Arctic and Antarctic Circles (Figure 7). These areas have little vegetation, due to a lack of rain, and they feature sand, rock, and gravel.


**Figure 7.** Illustrate latitudes, and the countries around the tropics of Cancer

**Figure 8.** Hot desert

**Figure 9.** Cold desert

All deserts are created because of little rain or snow over long periods of time (Figures 8 and 9). There are various factors responsible for the lack of precipitation. Hot deserts are greatly impacted by high pressure systems at the tropics. The rain shadow effect is one of the more significant factors that influence the desert formation.

5.1.5 Karst

Karst is a topography formed from the dissolution of soluble rocks such as limestone, dolomite, and gypsum (Figure 10). It is characterized by underground drainage systems with sinkholes and caves (Figure 11).

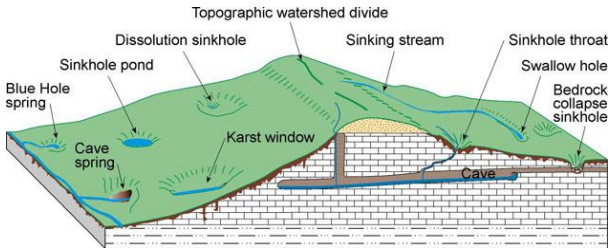


**Figure 10.** Demonstrate the tectonic of the Karst © 1997 – 2020 by the Kentucky Geological Survey

**Figure 11.** Characteristics of the Karst © Traveling Tour Guide

5.1.6 Tropical

Tropical rainforests are rich forests that appear along the equator (Figure 12). These forests receive a lot of sunlight and rainfall, and they are abundant of vegetation and variety wildlife (Figure 13). More importantly, these forests are habitat to 6 percent of wildlife.

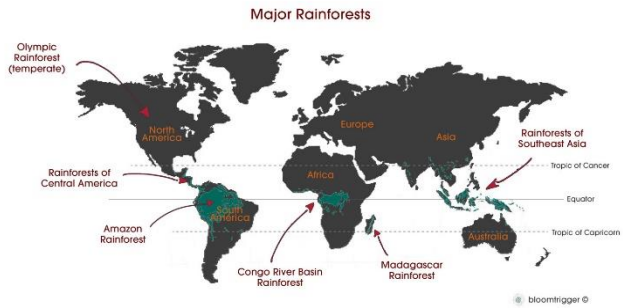


**Figure 12.** Show the Equator latitude and rainforests Map

**Figure 13.** Forest features

### 5.2 Built landscape

The Built landscape is created by humans, and it is evidence of human habitation and settlement in an environment. The built landscape should respect and work with the geographical location and climate since they affect building design, construction requirements, and materials, which vary from place to place.

Landscape projects are diverse depending on the inhabitants' historical tradition, customs, behaviors, user's needs, and region, or city development. Usually, these considerations are guided by the geographical location, which helps people understand what it is feasible to design for this site. In some projects, the rules of the location could be broken, but it will be counter to the natural environment and will cost a lot of money to establish and maintain. There are three main categories of built landscapes:

#### 5.2.1 Infrastructure

Infrastructure is defined by daily human needs such as buildings, roads, transport, energy, sewerage, water stream, and telecommunication systems—an example of the infrastructural landscape which works with the geographical location, especially with terrains and water streams. ChonGae Canal Park in Seoul, South Korea, which is designed by Mikyoung Kim and her firm, Mikyoung Kim Design in Boston, Massachusetts, is a great example of reopening a water stream along a seven-miles path through town. By the 1960s, the Cheonggyecheon stream in Seoul was contaminated by the four-lane highway that was flying over it (Figure 14). In the 2000s, the city's mayor, Lee Myung-bak, was concerned enough to destroy the highway and restore the stream to be a public place that can carry many events and festivals (Figure 15). The water level varies between hourly and daily depending on the time of year and amount of rainfall, but most days, almost 22000 gallons come from storm drains and the subway system.

**Figure 14.** Highway above Cheonggyecheon water stream in Seoul, South Korea (Before)

**Figure 15.** ChonGae Canal Park in Seoul, South Korea (After) © 2020, mikyoung kim design

**Figure 16.** Parking lot for School buses in Washington, D.C. (Before) © OLIN

#### 5.2.2 Entertainment

There are different types of entertainment: a promenade such as a playground, a zoo, an urban river, and a skatepark. There are landscape architecture examples that work and respect the natural and climate around the world. For an instant, Washington Canal Park in Washington, DC, was designed by the landscape architect David Rubin and the firm OLIN. This park had been a messy, and parking lot for school buses (Figure 16), but now it is one of the most interesting places in the town for ice skating in the winter and plashing in the water jets in the summer (Figure 17). The park harvests the rainwater from the pavement and roofs, then stores it in underground tanks. The water is then filtered for reuse for irrigation,

fountain, pools, and the splash pad. Also, the park's vegetation is mostly native to the Washington, D.C. region, which is easy to make them grow in the same atmosphere, and they are feeding the local birds and other animals in the city. The park has 28 geothermal walls, which help to control the temperature of the indoor spaces, and the pavement is designed with appropriate materials and forms to not increase the thermal heat. Besides, people use to come to the park in all year's season to sit on benches, lie on the lawn, and hang out with friends or family.

**Figure 17.** Parking lot for School buses in Washington, D.C. (Before) © OLIN

**Figure 18.** Arizona State University campus, pedestrian path front of Student Union ©2019 Strategic Microgrid

5.2.3 Environment

In terms of environment, it is hard to distinguish it from the infrastructure or entertainment since both are optimal if they are connected to the surrounding environment [10]. For example, the buildings, roads, and parks need environmental features such as trees, water, and etc. which enhance the relationship between the project and its surroundings. Additionally, there are several kinds of projects that can be considered as an environmental landscape: vegetable gardens, wetlands, and green roofs. For example, the pedestrian paths in Arizona State University-ASU campus in Tempe, AZ (Figure 18) and the pedestrian paths in the University of Southern California-UCS (Figure 19) are different. Even though the students have the same requirements and needs, but the difference is the climate. The differentiation is obviously seen by the environmental design strategies that have been applied at ASU. The walkways and sitting area are covered by a ramada, and in UCS, they are totally open. These differences reflect the human thermal comfort and needs in a specific climate region.

The vegetation is much better if it is from the same territory since each plant grows naturally in its native area. It is hard to take trees from the rainforest and plant them in a desert region that has low precipitation. This plant increases water consumption, and it could fail because the tree might do not tolerate the new climate. For example, most people in Arizona state use the local plants, which not consume much water since they grow in the desert, and rocks or stones (Figure 20), while people in Florida state use high water consumption plants since Florida is a rainy and humid region (Figure 21).

**Figure 19.** University of Southern California campus, walkway front of Student Union © USC

**Figure 20.** House front yard in Tucson, AZ © 2010, Reliable Landscape Services

**Figure 21.** House front yard in Florida, AZ © 2010, Reliable Landscape Services

## 6. ENVIRONMENTAL DESIGN STRATEGIES

Landscape components, such as sitting areas, shelters, ...etc need to vary from place to place since each place has particular conditions. For example, individuals in the hot region do not want the summer sun, but they want the wind to reach or be close to the human thermal comfort, and people in cold places do not want the winter's snow and rain, but they want the sun.

There are many environmental design strategies to achieve human needs and comfort in any climate condition. Firstly, orientation, the first and most important step in the design process, makes the design very efficient, and helps to avoid the next techniques. Secondly, armatures are components added to the main object to protect the users from the sun radiation, wind, and …etc such as louvers, and a skin system. Thirdly, form manipulation occurs by cut and fill, and manipulation of basic geometry by twisting, sloping walls or roofs, …etc.

Fourthly, a ramada roof which offers protection by sheltering the place and comes with a variety of materials and forming. Fifthly, operable elements cover a considerable day and season situation by moving according to the sun or wind or any user's needs. It could happen in the skin system, louvers, and ramada roof. Sixthly, the flooring and surrounding building's materiality plays a significant role in human thermal comfort. The reflection and emissivity of the materials are critical factors in materials specifications responsible for the material performance in the outdoor condition. These strategies work together to make the landscape elements convenient and related to the area.

## 7. CONCLUSION

These natural landscape categories guide the built environment to be more suitable with geographical location and conserve sanative lands. The plant design that corresponds to the project site and local climate contributes to water conservation. The environmental design strategies enhance human thermal comfort in the spaces. The built landscapes are impacted by geographical locations, which is represented by natural landscapes, historical traditions, customs, behaviors, and user's needs. These differentiations influence design decisions such as materials, construction, vegetation, transport, and landscape elements. If the geographical climate changes, the built environment must change.

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