

# Landscape Preference and Human Survival Well-Being

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## **Abstract**

*Humans have always been fascinated by the landscape. Aspects of the landscape that are intriguing play an important role in people's preferences for landscapes. Since classical times philosophers such as Plato and Socrates, have made inquiries about aesthetics; and numerous theories have emerged. These theories can be categorized into two paradigms. Even though both paradigms focus on the role of landscape in determining landscape preferences one group believes that the aesthetic qualities of a landscape are inherent in the landscape, the other argues that landscape aesthetics lies in people's cognition or mental understanding of the landscape. However, beginning with the seminal work of Kevin Lynch's *The Image of the City* (1960) and his classification of landscape elements that are important to the imageability of urban landscapes, attention has been given to the later paradigm that emphasizes the role of human evolution and cognition in shaping landscape preferences and thus aesthetics. However, this paper argues that, after several decades, no central theory related to landscape preference or aesthetics has emerged, even though many researchers who subscribe to the later paradigm based their theory on the same assumption; human well-being. Therefore, the recognition of the relationship between landscape preference and human well-being should be redeveloped and strengthened by bringing in new evidence.*

**Keywords:** Preference, Perception, Aesthetics, Well-being, Landscape Aesthetic

## **1. Introduction**

Humans have always relied on their visual sense for understanding the world around them and landscape has been a source of particular fascination.

This phenomenon has caused scholars to inquire into what makes a particular landscape beautiful and why? These questions have bothered philosophers and scholars of aesthetics for many years, and yet there has still been no unifying answer found. In other words, there is an absence of a central theory that can convincingly explain or knit together the many competing theories that constitute landscape aesthetics today.

One of the problems of not having a strong and persuasive theory to explain landscape aesthetics is that scenic or preferred landscapes are often neglected and dispensed with during development stage. This is not to suggest that no theories have been found strong enough to explain landscape aesthetic. However, the theories are overlapping if not, at odds with one another, causing confusion. Therefore, there is a need to strengthen the theory of landscape aesthetic and landscape preference.

The question now is, on what basis should the theory stand. What are the similarities among the available theories that can be used as a unifying argument? This paper attempts to provide suggestions for the development of a stronger landscape preference theory by analyzing available paradigms of aesthetics and landscape aesthetics theory.

## **2. Paradigm of Landscape Aesthetic Theory**

In general, there are two broad landscape aesthetics paradigms (Lothian, 1999); objective and subjective approaches and both of the paradigms have their own philosophical arguments. It is important as a researcher to understand these paradigms and the advantages and disadvantages of these two approaches before making a decision on which approach is suitable for study.

## 2.1 Objective Approach to Landscape Aesthetic

According to D. Preble and S. Preble (1994), the objective approach, “presumes unchanging standard upon which absolute judgment can be made about all art, regardless of time and place” (p. 24). The objective approach is established and has been an accepted theory for a long period of time; and it is rooted to the Classical Greek philosophy.

The objective approach in general terms, refers to the way people measure the aesthetic quality of the object, which is by using objective, observable means. Plato (427 – 347 B.C) and Aristotle (384 – 322 B.C.) are among the first philosophers to argue that aesthetic qualities could be observed objectively and that these qualities lie in the intrinsic properties of the object (Lothian, 1999). Therefore, based on this argument, landscape aesthetics is judged from its formal quality such as line, color and form (Lothian, 1999 and Daniel, 2001). During the Renaissance period, Leone Battista Alberti, an architect (1404 – 1472) further validated Plato and Aristotle arguments by suggesting architectural beauty is something that can be derived from order and arrangement.

Based on the above arguments, many proponents of the objective approach are people who have a design background such as artists, landscape architects and architects, and to a certain extent physical geographers. These professionals believe that the aesthetic qualities of an object lie in the formal properties of the object and exist independently on the common observer’s perception and interpretation of the object. They believe that one must have training in aesthetics such as an artist, architect or landscape architect in order to make aesthetics judgments.

European artists, especially those from Northern Europe, have translated the objective approach into landscape. They argued that a landscape is beautiful and picturesque because of its formal qualities (Jellicoe, 1975). Among landscape designers, “Capability” Brown was very much influenced by the concept of nature and the picturesque when he designed the Hyde Park in London. To get at the sublime and picturesque quality, Brown used curvilinear lines, vegetation masses and vistas in composing landscape elements in the park.

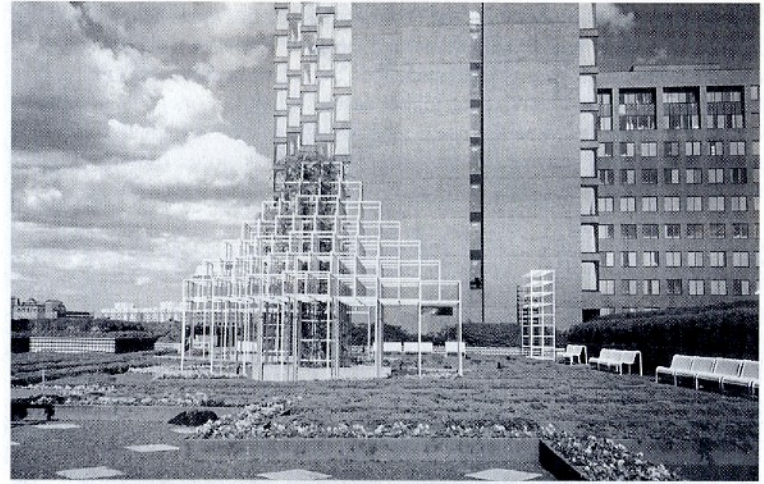


Figure 1. A landscape example with formal organization.

For landscape management, B. Litton (1968) argued that the landscape should be managed for its aesthetics based on its formal qualities such as line, masses, harmony and contrast. His works have influenced the development of Visual Resource Management Systems adopted by resource management agencies in the US. Meanwhile, in the United Kingdom, S. Crowe (1978) used similar arguments in proposing a management plan for British Forestry Commission. Besides design professionals, physical geographers who classify and map the landscape also use the objective approach. Indeed, the variables used to classify landscape are different from those used by designers, but still the geographers apply the quality or variables that are inherent in the landscape such as soil properties, land uses and vegetation cover to categorize their landscape evaluation.

The objective landscape approach found a new direction in 1933 when Aldo Leopold, who was then the Director General of US Forest Service, advocated the concept of an ecological aesthetics (Daniel, 2001). In contrast to the earlier landscape objective concept that emphasized aesthetic quality lies in the inherent physical characteristics of the object, Leopold argued that landscape aesthetics is derived from the naturalness and ecological integrity of the landscape. As a result, ecological diversity, integrity, and intactness of the landscape are important factors in determining landscape aesthetics quality.

The underlying assumption for the ecological aesthetics approach is that there is a positive linear relationship between the natural expression of the landscape and the aesthetic quality of the landscape. Therefore, natural and unmodified landscapes are presumed to have higher aesthetic values. Since the basic tenet of this approach is that landscape aesthetics lays in the ecological health and robustness of a landscape, proponents of this approach are often biological scientists such as biologists, ecologists and foresters.



Figure 2. Unmodified landscape has high ecological diversity.

It can be said, that since the ecological aesthetics approach is concerned with the natural integrity landscape, the advocates of this approach are often concerned with the protection and preservation of natural environment (Daniel and Vining, 1983). This is not surprising because Leopold's main intention is landscape conservation. Leopold's idea of a landscape aesthetics based on ecological values have been further developed by others, such as Leopold (1969), who developed a visual assessment technique for river valley landscapes and Smardon (1975) who studied wetlands visual quality in relations to culture, mainly in northeastern United States.

## 2.2 Subjective Approach to Landscape Aesthetic

The other landscape aesthetic paradigm is the subjective approach. Proponents of this approach claim that the sense of landscape aesthetics is derived from

the interaction of the viewers with the landscape object (Preble and Preble, 1994). The approach emphasizes "the cognitive and affective reactions evoked by various landscapes" (Daniel and Vining, 1983: p. 65) in which the landscape is regarded as a stimulus that can trigger people's feelings and emotions (Kaplan and Kaplan, 1989). In the subjective paradigm, landscape aesthetics is also regarded as a human construct either at the societal or individual levels. The aesthetic quality of the landscape comes from the human mind's perception and interpretation of the landscape. This approach argues that the human preference for different landscapes or perception of aesthetic qualities of the landscape is based on human knowledge and understanding of the landscape. Some of this knowledge and understanding may be innate, something that people is born with, and some may be learned or acquired through experience and education. Learned knowledge and understanding come from culture, education and experience.

The subjective approach to landscape aesthetics emerged into the debate about aesthetics when British Philosopher, John Locke (1632– 1704) argued that beauty has both subjective and objective qualities (Lothian, 1999). Locke's ideas were well received by other modern philosophers in Germany and Britain. Philosophers such as David Hume (1711-1776) and Edmund Burke (1729-1729) expanded Locke's ideas by arguing that beauty is the extension of an observer's subjective response to an object (Lothian, 1999). However, Immanuel Kant (1724-1804) was the one who successfully defined aesthetic in subjective modes. Kant in his famous books *Critique of Judgment* (1790) argued that the aesthetics is in the mind of people where beauty is in the eye of the beholder (Daniel, 2001). In summarizing Kant's position, Lothian (1999) wrote that

*"Aesthetic experience is the mind's representation of the object and, experience with disinterest, is pure and is wholly subjective. The state of harmony between an object's imaginative representation and our understanding yields aesthetic pleasure. Such pleasure is neither sensual nor intellectual. It does not involve conceptual judgment. Objects, which we consider beautiful, have a special kind of formal quality dependent on their perceptual properties, a purposiveness of form but not of function-purposiveness without purpose. Aesthetic pleasure, which is free, without an ideal, and without cognitive determination, is universal and common to all who experience it" (p. 187).*

Lothian (1999) further argues that Kant's philosophy about aesthetics has been fundamental and profound and has shaped our view of aesthetics today.

Many theories about landscape aesthetics can be seen emerged based on Kant's philosophy. One of the earliest landscape aesthetics theories developed is by K. Lynch. In his book, *The Image of the City* (1960), he wrote that the people's reaction to urban environments is the result of their perception and memory of a particular city. Working intensively in the City of Boston in the United States, he argued that people perceived the city and were able to recollect it in the form of an image comprising of different landscape elements. These elements can be classified into five types; landmarks, nodes, edge, district and path. However, even though Lynch acknowledges the role of mind in perceiving elements and forming an image map he never investigates the issues of mind and aesthetics in more detail.

In 1975, J. Appleton argued that people prefer landscapes that have "prospect" and "refuge" because landscapes with these characteristics give them the opportunity to see (prospect) without being seen (refuge). Appleton based his arguments on biological and evolution theory (Darwinian theory). He argues that from an evolutionary perspective human beings need to be concerned about their safety in order to survive and pass on their genes. Thus, certain behaviors have evolved with respect to the landscape, such as the need to see (prospect) without being seen (refuge). Therefore, over the course of time, humans have evolved to prefer landscapes that offer prospect and refuge. This is true even for modern day humans who no longer need to seek shelter from beasts of prey. Appleton also associates his prospect and refugee theory with the notion that human beings are hunters and gatherers and these activities require them to find landscapes that have quality of seeing without being seen or prospect and refuge. Appleton is only one of the researchers who argued that landscape preference has an evolutionary perspective.

J. Gibson (1979) is another researcher who built his theory based on subjective paradigm. He argues that people prefer landscapes that provide affordance to them. In other words, people prefer landscapes that have the potential to provide or afford certain activities that are important to fulfilling human needs. Therefore, Gibson's theory has established a relationship between human needs and landscape preference. However, more studies are needed to validate this theory.



*Figure 3: A landscape example that provides affordance to people needs.*

G. Orians (1980 and 1986), and Balling and Falk (1982) proposed the habitat and savannah theories. Habitat theory poses that when human beings first appeared on earth, they sought landscapes that could fulfill basic human needs, such as food, shelter and water. Based on this, proponents of this view argue that the reason why people prefer landscape with trees and water is that trees provide place for shelter and water is necessary for sustenance. They argue that we carry these evolutionary traits today. They also posit that people prefer a savannah type environment because it is a type of landscape that the ancestors of human beings have evolved. They argue that the reason that the ancestors of humans left the trees and started walking up right was that they were adapting to a savannah type landscape, a landscape with groupings of trees and open spaces between them. As food ran low in one grouping of trees, they had to walk to the next grouping. Standing upright helped them spot potential predators. It is vital to note that Orians, Balling and Falk arguments lean heavily on Darwinian theory. However, it should also be noted that one could take a creationist perspective by saying that it would make sense that God would equip humans with certain innate knowledge and behavior to survive in the landscape just as he equipped animals with other traits for their survival.

R. Ulrich in his series of studies in the late 1970's and early 1980's looked at the relationship between human affective responses and landscape nature. He found that the relationship is significant. He found that when people are exposed to greenery their affective responses (blood pressure, palm sweat, etc.) are significantly lower in comparison to people who are shown urban environments. Ulrich's studies provide clues that nature is vital for human well-being, but his studies have not continued since the late 1990's. Therefore, there is a need for additional work in this area.

The relationship between landscape preferences and human survival or well-being is furthered by the works of S. Kaplan and R. Kaplan (1979 and 1982) in their Information Processing Theory. From the position of their theory, they argue that humans are "information hungry creatures" therefore they prefer landscapes that can offer information that will help them make sense of the world around them, and from an evolutionary perspective this information is important for their survival. They further argue that information is critical to people's ability to function well in the environment. They believe that the people's preference for landscape can be explained by two things: the content of the landscape, such as trees, mountains and water; and the spatial organization of the landscape. Based on numerous research studies, they and their students have found that people prefer landscapes that have trees and water and possess spatial qualities of mystery, legibility, coherence and complexity.

In summary, the subjective paradigm acknowledges that landscape aesthetics lies in people's minds, which is largely influenced by human evolution. However, the most important thing that these theories assert is that landscape preferences are very much related to human survival or well-being. Without certain knowledge and behaviors that justify them to prefer some landscapes to others, people may have problems adjusting to their environment.

### **2.3 Objective versus Subjective Approach**

From the discussion above, we can see that there are two broad paradigms of landscape aesthetics, the objective and the subjective, as per suggested by Lothian (1999). The objective paradigm advocates that landscape aesthetics lies in the inherent physical properties of the landscape. On the other hand the subjective paradigm proponents argue that landscape aesthetics lies in people's mind and their reaction to the landscape. Accordingly, both objective and subjective paradigms acknowledge the importance of landscapes in determining landscape aesthetics, but the differences lie in the importance of human perception in determining landscape quality. The objective paradigm places

humans in peripheral position, in which people—like a camera—passively record the landscape. Here an observer is looking at landscapes as though they are paintings or works of art. Meanwhile, the subjective paradigm places the observer in the central position, in which landscape aesthetics is determined by the result of human perception and understanding of the landscape.

Nevertheless, Lothian (1999) and Daniel (2001), argue that from the philosophical point of view, both objective and subjective paradigms cannot be right. One paradigm must be less true than the other; and it is argued that the subjective paradigm holds more promises to become a basis for a broad theory of landscape aesthetics (Lothian, 1999; Daniel, 2001).



*Figure 4: Objective approach justifies people as only observers of the landscape.*

One of the reasons why subjective paradigm has more promises is its method of assessment. This paradigm relies on the people or users responses towards landscapes. The studies based on this paradigm employ multiple user responses and thus increase the validity of the study. Furthermore, the data analysts involve rigorous statistical research. Since the paradigm uses multiple users, the results become a collective voice of the people and therefore it is useful for the designers and planners to use the results as a basis to undertake their design and planning works. On the other hand, landscape assessment based on objective paradigm often fails to highlight the collective voices of the users about certain issues but the experts alone. Furthermore, results of a study by Craik and Feimer (1979) show there is no coherence and similarities in results of landscape assessment based on objective paradigm by two persons.

The usefulness of subjective paradigm method becomes much more significant with current socio-political climate that requires and demands transparency and good governance. As a result, landscape assessments that are able to show the collective voice of their community needs—or preferences—are gaining broader acceptance. Thus, landscape planning and design that is based on community preferences is more likely to be successful. Moreover, landscape assessments based on empirical measures are highly defensible in the court of law (Lothian, 1999).

Another reason why subjective paradigm holds more promises to be the basis for landscape aesthetics is its belief or acknowledgement that people assess landscape not like when they assess a piece of art. There are many factors that determine people's preference for landscape such as learned knowledge, experience with, and understanding of the landscape. Therefore, the appearance of the landscape should not be thought of as a cosmetic after thought because people react differently to the landscape compared to the paintings or art works. Results from the landscape preference researches show that landscape preferences relate closely to human needs (or affordances) (Gibson, 1979), expertise (Kaplan and Kaplan, 1989) and culture (Yang and Kaplan, 1990). Most significantly, landscape preferences also have been found to relate closely to human affective responses (Ulrich, 1983).

The relationship between human affective responses and landscape preferences probably is related closely to the idea that landscape preferences are the result of human involvement and evolution with nature for a long time (Appleton, 1975; Orians, 1982 and 1986; Balling and Falk, 1992). Through natural selection, people have evolved to prefer certain types of landscapes, which pointed to the survivability or well-being of human species. The assertion is very much different from objective paradigm concept that places the importance of landscape aesthetics mainly for viewing pleasure. The relationship between landscape preference and evolutionary perspective may not be taken well with creationists<sup>1</sup> but it is noted one does not have to believe that there is a relationship between landscape preference and human well-being. It is logical to believe that God would create people in such a way that they would be able to make sense of their responsibilities and functions in the world. According to Muslim's beliefs, man is sent to the world to become a caliph<sup>2</sup> (i.e., leader and steward) of the world.

Nevertheless, it should be noted that the subjective paradigm is not devoid of weaknesses. It can become expensive to apply because it requires inputs from many participants and it also requires skillful and experienced researchers to undertake rigorous data analyst. In contrast, the objective paradigm requires

only one person to undertake the aesthetic assessment, and certainly less time is needed to complete the assessment.

### **3. Conclusions and Direction for Future Research**

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Two landscape aesthetics paradigms, objective and subjective, have been analyzed and discussed. Albeit the objective paradigm has been established earlier than the subjective paradigm, and is widely accepted among design professionals; it is not too promising to become a basis to explain landscape aesthetics and preferences. This is due to its method of assessment which is based on an individual's evaluation. It is hard to defend the results of analysis based on the objective paradigm method because the results are not the collective opinions of the users. In addition, objective paradigm regards people as only a viewer of the landscape and thus landscape is often considered as a piece of artwork. The problem causes difficulty to landscape managers and designers to defend landscape as something that need to be properly managed.

In contrast, the subjective paradigm has been found to be more profound in explaining landscape aesthetics because of its method of assessment and acknowledgement that landscape cannot be assessed as a piece of artwork. Many factors have been found to influence landscape aesthetics and preferences such as human needs, knowledge and expertise and more studies are needed to further reveal factors influencing people's preferences. Furthermore, theories relating to landscape aesthetics that emerged from the subjective paradigm enhance the notion that landscape preference is important for human survival and well-being. Therefore, landscape preference does not merely become a basis for an argument about landscape beauty but is also useful and important for environmental and social management.

However, besides all the advantages that the subjective paradigm has over the objective paradigm, there is a need for additional exploration into human preference for different landscapes. This is important to assert that landscape preferences are important for environmental and social management. In addition, studies are needed to explore factors that potentially affect landscape preferences. The identification of new factors influencing landscape preferences is certainly welcomed as it will broaden our understanding about human preferences for landscapes thus enabling us to manage the environment better. On the other hand, strengthening the identified facts about landscape preference is also equally important. This will enable us to become clearer about the reason why landscapes are often found attractive, deemed beautiful and are crucial for human survival and well-being.

Lothian (1999) argues, “the landscape that humans prefer are survival enhancing” (p. 191). Roger Ulrich’s studies (1983) on the relationship between landscape preference and affective responses appear to hold promise to establish a clear and direct link between landscape preference and human well-being. However his work and his team may be limited by the focus on the role of nature in the urban areas. Furthermore, his works may be further limited because they tend to focus on a specific user group and not the community at large. Meanwhile, J. Appleton’s (1975) theory on the prospect and refuge relies heavily on paintings, but attempts to empirically validate the theory have been inconclusive so far (Miller, 1984 and Xu, 1983).

Therefore, we would like to suggest that more studies need to be undertaken to show the important relationship between landscape preferences and human well-being. The strong establishment of this link will enable us to further forward the argument that landscape design and management works cannot be regarded as mere beautification especially to policy makers and other design professionals. Thus, new research directions are needed to substantiate positive relationship between landscape preferences and aspects and human well-being. Among the new directions that could be explored in order to understand the relationship between landscape preference to human health is to study recent findings in genetic studies. Question such as whether people with different DNA configurations have different landscape preferences needs to be looked into. We posit that if the landscape preferences are indeed important for human well-being, there will be no significant differences for landscape preferences among people with different genetic make-up.

Another factor that needs further exploration is the relationship between landscape preference and culture. Culture is arguably, the most influential factor affecting preference because people grow up in a particular culture, which provides informal lessons on how one should perceived the world. Previous landscape preference studies by Yang and Kaplan (1990) showed that culture could cause similarities or differences. Cross-cultural study has become more important today because the effect of globalization has intruded into our daily life. Therefore, understanding about cultural differences and similarities has become more important than before.

However, culture should not be looked into with very narrow lenses. A study cannot just compare and contrast why landscape preference is similar or different among cultural groups but the study needs to try explaining reasons why a particular culture becomes significant predictor for landscape preferences. In this context, a study about the relationship between sub-culture and landscape

preference becomes important. It is argued here that a sub-culture—such as theological belief or worldview—has become more pertinent. For example, Judeo Christians and Muslims believe that their religions play important roles on their understanding about nature or landscapes and what roles should the people play with nature (Haron, 1988; Lothian, 1999). Furthermore, a study about culture can also shed lights on reasons why certain civilizations such as the Persian Culture survives till today but not for some others like the Khmer culture in the present day Cambodia. According to J. Diamond (2005), one reason a society fail to sustain is their choice to disregard nature. Question such as whether a civilization’s survival is related to its respect for landscape should be an interesting subject matter to be studied. The answer for this question is certainly noteworthy because it can lead to landscape planning quandary.

It is hoped that the above discussion will open new directions for future research in landscape preference. This paper posits that if the studies of human landscape preference are to move forward to a significant degree, it must be based on a better understanding of the relationship between landscape preference and human well-being. Further studies are advocated to provide a better understanding on how the human mind processes information about the world, hence, making preferences. Likewise, studies on the influences of cultural attitudes and values towards nature are welcomed. For landscape architects, planners, and architects, knowing the relationship between landscape preferences and human well-being whilst not neglecting how certain cultural groups express landscape preferences collectively is important. This information is imperative as to how landscape should be designed and managed.

#### **End Notes**

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<sup>1</sup> Creationists refer to a group of people who believe the existence of people are not evolve through time but rather created by God as is.

<sup>2</sup> Muslims believe that God (Allah s.w.t) sent human to the world to become a caliph (leader and steward) of the world.

#### **4. References**

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Appleton, J. (1975). *The experience of landscape*. London: Wiley and Sons.  
Balling, J. D., & Falk, J. H. (1982). Development of visual preference for natural environments. *Environment and Behavior*, 14(1), 5-28.

- Craik, K. H., & Feimer, N. R. (1979). *Setting technical standards for visual impact procedures*. Paper presented at the Our National Landscape Conference, Berkeley, CA.
- Crowe, S. (1978). *The landscape of forest and woods* (Vol. 44). London, U.K.: British Forestry Commission.
- Daniel, T. C. (2001). Whiter scenic beauty? Visual landscape quality assessment in the 21st Century. *Landscape and Urban Planning*, 54, 267-281.
- Daniel, T. C., & Vining, J. (1983). Methodological issues in the assessment of landscape quality. In I. Altman & J. F. Wohlwill (Eds.), *Behavior and Natural Environment* (Vol. 6, pp. 39-80). New York: Plenum Press.
- Diamond, J. (2005). *Collapsed: How societies choose to fail or succeed?* New York: Penguin Books.
- Gibson, J. J. (1979). *The ecological approach to visual perception*. Boston, MA: Houghton-Mifflin.
- Haron, D., Sulaiman, Y., Hassan, S. and Sidi, G. (1988). *Manusia dan Islam (Man and Islam)*. Percetakan Watan, Kuala Lumpur
- Jellicoe, G and Susan, G. (1995). *The landscape of man: Shaping the environment from prehistory to the present day*. Thames and Hudson, New York
- Kaplan, R., & Kaplan, S. (1989). *The Experience of Nature: A Psychological Perspective*. New York: Cambridge University Press.
- Kaplan, S. (1979). *Perception and landscape: Conceptions and misconceptions*. Paper presented at the Our National Landscape Conferences, Berkeley, CA.
- Kaplan, S., & Kaplan, R. (1982). *Cognition and environment: Functioning in an uncertain world*. New York: Praeger Publisher.
- Leopold, L. (1969). Quantitative comparison of some aesthetic features among rivers. *US Geological Service Circular* (620).
- Litton Jr, R. B. (1968). *Forest landscapes description and inventories: A basis for land planning and design* (PSW-49). Berkeley, CA: U.S. Forest Service and University of California Berkeley.
- Lothian, A. (1999). Landscape and philosophy of aesthetic: Is landscape quality inherent in the landscape or in the eye of the beholder. *Landscape and Urban Planning*, 44, 177-198.
- Lynch, K. (1960). *The image of the city*. Cambridge, MA: MIT Press.
- Maslow, A (1943). *Motivation and personality*. New York, Harper and Row
- Miller, P.A. (1984). *Visual preferences and implications for coastal management: A perceptual study of the British Columbia Shoreline*. Unpublished PhD, University of Michigan, Ann Arbor
- Orians, G.H. (1980) Habitat selection: general theory and applications to human behavior, in Lockard, J.S. (Ed), *The evolution of human social behavior*. Elsevier, New York. Pp. 49-66
- Orians, G.H. (1986). An ecological and evolutionary approach to landscape aesthetics, In Penning-Rowsell, E.C., Lowenthal, D. (Eds). *Landscape meaning and value*. Allen and Unwin, London.
- Preble, D. and Preble, S. (1994). *Artforms: an introduction to the visual arts (5<sup>th</sup> ed)*. Harper Collins College Publisher, New York
- Smardon, R. C. (1975). Assessing visual cultural values of inland wetlands in Massachusetts. In E. H. Zube (Ed.), *Landscape Assessment: Values, Perception and Resources*. Stroudsburg, PA: Dowden, Hutchinson and Ross.
- Ulrich, R. S. (1977). Visual landscape preferences: A model and application. *Man-Environmental System*, 7, 279-283.
- Ulrich, R. S. (1983). Aesthetic and affective response to natural environments. In I. Altman & J. F. Wohlwill (Eds.), *Human Behavior and Environment*. New York: Plenum Press.
- Xu.X. (1993). A cross cultural study of Prospect Refuge theory. MLA Thesis. Virginia Polytechnic Institute and State University, USA
- Yang, B.E. and Kaplan, R. (1990). The perception of landscape style. *Landscape and Urban Planning*, 19, p. 251-262.