

A Review of Landscape Assessment Paradigms in Landscape Perception Research

Salaudeen, A. B.¹, Dung-Gwom, J. Y.², Bayo David³

¹Plantation Establishment and Management, Forestry Research Institute of Nigeria

²Urban and Regional Planning Department, University of Jos, Nigeria

³Montane Research Station, Forestry Research Institute of Nigeria, Jos Nigeria

Abstract:- Intriguing landscapes ignite the preferential consciousness of man for its assessment. Theories of landscape aesthetics has since been under scientific scrutiny with focus on what determines landscape preference. In this regards, two main schools of thoughts have merged in terms of aesthetics quality inherent in man's mental view or in the quality of landscape viewed by man. The paper therefore presents practical considerations in adopting and applying these paradigms, especially in terms of theoretical background, criteria for testing and measurement and the strengths and weaknesses of these schools of thoughts. This is found imperative for researchers to understand before consideration of suitable landscape approach in landscape studies.

Keywords:- Assessment, Landscape, Paradigms, Perception, Research, Review.

I. INTRODUCTION

The word landscape was first used in Dutch as "landscape" (Falade and Oduwaye, 1998, Prato, 2006). This according to Kuo et al., (2000) entered the English language as landscape in the late 16th century. It is the term given to the combination of the mineral geomorphology and the surface mantle, consisting of overburden topsoil, floral and fauna, vegetation and minerals. In Europe, the earliest "layers" are often from the classical period. After the Roman, landscape planning in Europe gone through several distinct periods, each characterized by distinctive layouts and architectural styles. The periods were the medieval, reconnaissance, industrial, modern and recently, postmodern. These periods however were not simultaneous in different parts of the continents and the styles were not identical. Mathew and Herbert (2004) confirmed that, in the former colonies of Africa and Asia, ancient centers like the old city of Kano in Nigeria had areas dated from the colonial period with quite distinct landscapes, adjacent to them. Williams and Patterson (2007) also confirmed that, these localities consist of business areas and elite housing areas, formerly the homes of the colonial rulers. Harris (2004), described the landscape as the world around us, including socio-cultural values of humans. Dwyer et al., (2006) looked at landscape in its widest sense and equated it with the environment, which is literally, our surrounding. Nowak and Walton (2006)

described the landscape as any piece of land when it is possible to perceive it in its physiographic and environmental characteristics. It is the dynamics of nature, social, environmental, cultural and political forces of man. It is usually referred to as outdoor scenery and is specifically applied to natural scenery such as field, forests, water, mountain, fabric, combination of these. Falade and Oduwaye (1998) gave a comprehensive definition of landscape as a cultural concept, a sensory response, perceived, learned, and recalled by the individual as he places himself in his surroundings. This perception of landscape covers other terms such as landscape district, landscape elements, and landscape quality or character. Landscape to some is a concept that is elusive and perceived as poetic or cultural entities which have changed in the courses of history (Johnson, 2001).

II. EVOLUTION OF LANDSCAPE PLANNING

Since the advent of organized society, people have engaged in some form of environmental planning. This is evident in the elaborate planning schemes of the ancient Mesopotamians for distributing irrigation water in the arid and semi-arid regions. Also the Roman civilization, which drained wetland to gain added farmland and reconfigured harbours for navigation improvement (Song, 2007). At this period, nature was accorded little or no regard as being part of the environment but perceived with suspicion, ignorance and fear (Wana, 2007). The reconnaissance and the enlightenment age at the beginning of the fifteenth, seventeenth and eighteenth centuries came up with a friendlier atmosphere between humans and nature. Then nature was seen as what can be understood with logic and order. The concept of nature was extended to include pleasure and enjoyment of nature in the 18th and 19th centuries respectively. Nature was then given consideration for its own sake, beauty, spiritual meaning and influence on the general quality of life. This brought in the idea of landscape design as a new school of thought, which emerged in England (Hamilton, 2006). The improvement crusade of the 1850s has its roots in the United State. This is where associations applied the romantic concept of the reconnaissance and enlightenment age to beautify communities, streets, cemetery, townscape, parks and promoted laws for the protection of songbirds. On the overall, the Romantic Movement was credited with elevating

the concept of nature and the natural environment to the status of an important human value with an important underpinning for modern environmental planning. This includes the scientific understanding of the environment's role in public health through the documentation of environmentally sensitive epidemic like malaria, dysentery and typhoid fever. It has resulted in an improved public and institutional understanding between man and the environments, health and planning and development of municipal sanitary services. The conservation movement also came, in the 1800s due to the concerns for the damage and loss of land and its recourses because of development and misuse. This initiated the national park system when the first US national park was established along with its Canadian counterpart between 1872 and 1885 including the natural resources conservation service of the United state of America.

III. SCOPE OF LANDSCAPE PLANNING

Lawal (2000) observed that, an urban scene without gardens and adequate vegetation cover as envelop to the earth's surface, a scene where the only open spaces are purely bare is likely to be soulless and in fact, monotonous. Therefore, this necessitate the provision of adequate open space and natural vegetation that could bring life into the urban development in a proportional and better location for an outstanding characteristics of modern planning practice. The confines under which landscape planning operates is to make up for the urban features and character, hence making a reasonable choice of plant materials to cushion the adverse effects of the hard surfaces like roads, pavements, and courtyards and through a rational analysis of architectural and horticultural limitations (Song, 2007). Though trees are not so important to the urban landscape in giving vertical scale, Salaudeen (2005) however observed that, they are valuable in providing a foil, both in form and colour to the harsh and rigidity of masonry and brickwork that predominates the urban areas. Hence, right approach upon which the scope of landscape planning operates is to take landscape planning as a basic determinant in any developmental project as against the usual expensive cosmetics affair. Landscape planning is based on excellent environmental flavour as a result of response to socio-cultural norms and context for an enhanced spirit and soul of any setting. Landscape planning finds itself within other planning needs, as it is a social and political activity, which often requires conglomeration of other professionals such as planners, ecologist, engineers, geologists, architects, soil scientists, and urban foresters (Dwyer et al., 2006).

IV. LANDSCAPE ASSESSMENT MODELS AND THEIR APPLICATION

➤ *The Expert Model*

After the passage of the major value environmental legislation in the 1960s and 1970s, experts approach generally has dominated the practical side of the field, especially in the early days (Jonathan et al., 1999). Since then, various studies (Anne and Catherine, 2000; Arriaza et al., 2004) on visual effects of a broad variety of man-made structures have been carried out. According to Fairweather and Swaffield, (2000), this model is derived from: (i) fine arts and design, and (ii) ecology and resource management. Falade (1985) evidenced that artists, writers, and designers have become 'sensitised to beauty and ugliness' through their profession and training. This sensitivity gives them an edge over ordinary people in the judgement of landscape quality. The validity of this approach according to Jongman, (2005) rest on principles derived from the art and design disciplines, for this tradition draws upon the work of earlier professionals and the demonstrated successes or failures of designed landscapes and of specific landscape components. Also Hamilton (2006) affirmed that, the assessment of landscape quality is done by skilled expert or others given specific training to enable them conduct valid assessments within expert paradigm. The assumption base is that, assessment of landscape on the part of the general public can be emotional and subjective therefore it is necessary to employ professionals for objectivity and reliability assessments. Jackson (2001) further argued that "public opinion... is untenable as an approach to aesthetics, and that the assessment of a trained expert is far superior to surveys of the landscape preferences of the general public. Jongman (2005) noted that acceptable landscape assessment is either replicated or the person's position accepted which can be achievable through landscape assessment training programmes.

Kaltnborn and Bjerke (2002) developed a set of visual landscape manuals based on landscape architectural design principles to assess visual harmony using three fundamental concepts of characteristic landscape, the visual variety, and the deviations from the characteristic landscape. These basic concepts were examined using the criteria of dominance elements, dominance principles and variable factors. It is important to note that, along with the fundamentals of landscape character, variety, and deviations, there was a consideration of the level of "sensitivity" in this procedure as well. The BLM (1980) process of landscape assessment (similar to the Kaltnborn and Bjerke system) is based on landscape character of (i) form, line, colour, and texture; (ii) the influence of landscape elements; and (iii) the visual variety of landscapes. The seven 'key factors' of landform, vegetation, water, colour, adjacent scenery, scarcity, and cultural modifications as posited by the BLM cumulated (and scored in Table 1) into Scenic Quality Classes of:

Class A (19 – 33 points): combines the most outstanding characteristics of each rating factor

Class B (12 – 18 points): represent a mix of some outstanding and some common features

Class C (1 – 11 points): represents features common to the area

➤ *Psychophysical Model (Q Methodology)*

The Psychophysical Model otherwise called Q methodology according to Laing (2006) is founded upon traditional experimental psychology, in which carefully controlled experimental manipulations are used to stimulate measurable reactions in subjects. In landscape assessment research, its special strength has been to widen the base of scenic assessments, by measuring the aesthetic values of the general public. Though looks theoretical, but closer consideration reveals several implicit assumptions about the nature of the human - landscape interaction. The most important is that, observer response to either the landscape or its elements as opined by Obembe (2009). This model relies heavily on stimulus-response assumption that originates in psychology, especially behaviourism.) This assessment according to Laing (2006) is done by non-experts with a position that, landscape of aesthetic value can be assessed by non-experts through samples of their preference (Salaudeen, 2010). Psychophysical landscape perception research has been in response to agencies' need to assess landscape quality with focus on landscape properties that can be manipulated by resource managers and landscape experts. In the model of human-landscape interaction, the landscape tends to assume the dominant role, with stimulus properties that are external to the observer, invariant, and perceived without conscious thought. On the human side are passive observers, generalised into groups of "general public" or perhaps special interests groups, whose aesthetic response is conditioned by the stimulus properties of the landscape. The outcomes of such interactions are statistically verified measurements of public perceptions of landscape quality, with the identification of environmental elements that can be manipulated by resource managers (Obembe, 2009).

It will be surprising that, most of the call for landscape perception research involving testing of general public samples comes from landscape and natural resource managers and designers in order to determine what landscape visual quality is in order to be able to manage and protect it (Rogge et al., 2007). However, research in the psychophysical paradigm has focused on forest landscape planning and management of rural landscape, outdoor recreation settings, and comparisons of natural and man-made landscapes. This method has been used for designing forest road corridors, for testing the visual effects of timber harvesting and management, and for creating scenic beauty maps of forest areas (Fairweather and Swaffield, 2000). Much of the outdoor recreation landscape perception work has used psychophysical methods. Recreation planners and managers have an established tradition of testing user

preferences, and therefore it is logical that they turn to psychophysical methods in assessing landscape quality (Song, 2007). A fair portion of psychophysical landscape perception research is methodological-suggesting, validating, or criticizing methods. Controversies surround the use of surrogates to depict landscape, resulting in a number of comparative tests of assessment of photos with assessment done on the site where the photos were taken (Clamp, 1999; Wolf, 2005). Several tests have shown differences between stated landscape preferences and behaviour. Laing (2006), posit is a good application of psychophysical methods of landscape assessment which involves a standardized testing procedure, based on ratings of landscape photographs, which are then measured to depict landscape quality. A variation on rating or ranking landscape scene photographs is a forced distribution technique borrowed from psychology called the "Q-sort method" (Arriaza et al., 2004).

➤ *The Cognitive Model*

The central concept underlying the cognitive model is that, humans do not just respond to environmental stimuli but through selective thinking of which landscape quality has value to them (Jackson, 2001) on the basis of visual information. The meaning of that construct is the important focus of cognitive approaches to research. In this case, meaning is of primary importance because researchers are less concerned with what landscapes are valued than with why they are so valued. The pursuit of landscape meaning leads in diverse directions, from diverse underlying assumptions. These assumptions are often more explicitly stated in the cognitive approach, rather than only implied as is true for much of the expert and psychophysical model research. Several lines of cognitive research are based upon assumptions about the role of perception in human adaptation and evolution. One such approach is a psychobiological one, an adaptation of (Kaplan, 2001) arousal theory to landscape aesthetics.

By the very nature of the landscape perception research models discussed, fewer methodological examples can be presented for the cognitive and experiential model than for the expert and psychophysical models. The latter two research approaches have been oriented specifically toward development of methods applicable to investigating perceived landscape quality, while cognitive research concentrates on meaning, and experiential on experience of landscape. Much of the cognitive work has been especially concerned with verbal assessments of landscapes, using such techniques as survey questions, adjective checklists, or semantic differentials (Wolf, 2005).

➤ *The Experiential Model*

The experiential model focus on the interactions of both the human and landscape components (Lowenthal, 2007). Researchers using experiential methods have concentrated heavily on understanding the nature of the interaction and its outcomes, rather than identifying particular scenic landscapes

features. The experiential viewpoint also stresses the active nature of this interaction. In this view, people are not simply observers of landscape but participants in them, and the way they participate has some influence on their landscape values. A useful way to explain the experiential approach would be as it relates to the components of our model. Humans are seen as active participants in the landscape, and human qualities such as intentions, needs, knowledge, abilities, and culture, affect judgements. The landscape is the landscape as experienced, whether it is the setting for everyday activities, scenic wonder, or creative inspiration. According to Fairweather and Swaffield (2000), the roots of the experiential approach derive primarily from phenomenology, landscape study, and the history of art and literature. Use of this paradigm is most characteristic of geographers, who, in their long striving to understand the evolution of landscapes and human activity in the environment, have also been interested in landscape values. It also emphasizes the value of a subjective approach, of direct involvement with people and landscape instead of objective detachment. One approach, phenomenology, attempts to study things as they are experienced holistically without trying to define, categorize, or structure through understanding and description of the phenomenon as it (Hamilton, 2006). A phenomenological approach strives for insights into the process of landscape encounter and the primary contribution to date can be seen in terms of the human landscape interaction model (Anne and Catherine, 2000).

Techniques in this approach are not as structured as other models, tending to concentrate on holistic descriptions. This lack of structuring is deliberate and rests on the assumption that landscape value should be defined by the criteria used by the individuals experiencing that landscape rather than experts studying it. There is also an admission of importance of the subjective element and an attempt to use it to understand the process of landscape experience rather than to attempt what seems to be the impossible task of ‘objectification.’ Accordingly to Obembe (2009), the description of techniques used in experiential landscape perception study starts from the most subjective, phenomenology, and proceeds through landscape study to examination of creative works. Phenomenological techniques rest upon the unstructured experience of a situation. The primary approach is to elicit descriptions of personal experience as it happens, without attempting to be analytical, and to avoid preconceived notions that may distort the basic experience so that such experience can reflect on the present insights that contribute to understanding. In this method, the group members share descriptions of their experiences, which are recorded and used as material for reflection and subsequent generalisation. Rogge et al., (2007) described this method as that which involves ‘‘seeing with the soul of the eye’’ using the training and awareness to examine the depths of landscape experience. This approach is aimed more towards understanding and development of the ability to see what is in landscapes than towards manipulating the

landscapes themselves. It emphasises education rather than landscape design.

V. CRITERIA FOR EVALUATION OF ASSESSMENT MODELS

Bureau of Land Management (2000) suggests four criteria used in the evaluation of landscape assessment models. These criteria - validity, reliability, sensitivity and utility - have been used in the assessment of various approaches to landscape assessment. *Validity* is the relationship between what is measured and what is expected to be measured like a relationship between IQ and intelligence, topographic relief and scenic quality. *Reliability* is the consistency of results from repeated measurement; if a test given under similar condition does not yield similar results, it is not considered reliable. *Sensitivity* measures actual differences like between a park and a garbage dump, we should doubt its sensitivity. *Utility* determines whether the test yields findings that can be used for what is intended; a measurement that does not show what landscape element can be managed will not be useful for managers, no matter how valid.

VI. CONTRIBUTIONS, STRENGTHS AND WEAKNESS OF THE LANDSCAPE ASSESSMENT MODELS

The *expert model* provides a description of the landscape from the viewpoint of the professional designers, planners, or managers. Descriptions are derived from artistic or ecological principles and tend to include those attributes of the landscape that (i) are within the technical training of the respective professions and that (ii) can be manipulated through design, planning, and management decisions. It is generally assumed that at least some training in art or ecology is necessary for a person to appreciate landscape aesthetics fully, and there is some caution about incorporating the views of the general public, who may lack such training. The *psychophysical model* provides a means of predicting which landscape dimensions will be associated with public perception of scenic beauty. These associations are derived from ratings by the general public obtained from controlled, experimental manipulations of landscape views, or landscape surrogates or simulations. There seems to be an assumption that the psychophysical techniques will be able to tap the underlying psychological processes behind perceptions of aesthetic, which are more basic than artistic or scientific training. The landscape variables, as in the expert paradigm, are usually selected with reference to specific planning or management needs of forest cover or area amount of surface water, forest vegetation, and meadow within a specified landscape. The *cognitive model* provides an understanding of people’s judgements of scenic beauty. It is similar to the psychophysical in that it draws upon statistical analyses of public responses. It differs, however, in that it does not usually emphasize physical landscape

attributes or variables that are directly manipulatable by designers, planners, and managers. Rather, studies within this paradigm tend to search for meanings associated with landscapes. The qualities emphasized as important, such as complexity, mystery, degree of naturalness, and prospects and refuges, are decidedly influenced by human cognitive processing. The *experiential model* provides descriptions of the interaction between and among man and landscapes. The unit of analysis for the experiential is the human-landscape interaction, unlike the cognitive, which focuses on the human, or the expert and psychophysical, which emphasize landscape features. Also, unlike the other approaches, experiential research emphasizes the importance of varying modes of experience, including the nature of activity, the degree of awareness of the landscape, the social and cultural context, and the purposes to be achieved. It also recognizes that, there is a wider range of landscape values than merely the aesthetic, and seeks to place these when values in balance.

Many of the strengths and weakness of these assessment models are apparent from earlier discussions in this context. The *expert and psychophysical models* have been most used by environmental decision makers and managers. They rate high on utility because they specifically address those attributes and characteristics of the landscape that can be manipulated. In many cases, these techniques have been developed in close cooperation with environmental agencies (such as Bureau of Land Management). The *cognitive* and especially the *experiential models*, which have been of less interest to environmental managers, have tended to resist translation into landscape design or management. In many of the *psychophysical and cognitive studies*, a great deal of care has been taken to demonstrate that the measures are valid and reliable. Procedures are usually consistent and the information is presented in ways that enable replication and generalization. The data provide decision makers with some indication of the amount of confidence they can have in the findings. The *expert and experiential approaches*, on the other hand, are more subjective and idiosyncratic, and are often not amenable to rigorous statistical analysis. As a result, reliability and validity cannot be measured in the usual psychological sense. Sensitivity, in terms of the ability to detect real differences in meaning and value, is probably greatest in the *experiential model*. This approach probes most deeply into individual interactions with the landscape. However, much of the information may be highly personal, making it difficult to generalize to values held by a larger public. Both the *cognitive and psychophysical* have “give up” some of that sensitivity in return for applicability to wider public or general human values. It is uncertain just how sensitive the expert model is. Often the expert eye is apt to detect differences that are not perceptible to people without ecological or artistic training. On the other hand, many of the expert rating scales are ordinal (value ordered) and differences between valued landscapes may be difficult to clarify. As stated earlier, the *psychophysical model* relies

heavily on stimulus-response assumptions that originate in psychology, especially from the tradition of behaviourism. It is at this point that landscape perception research becomes involved in one of the oldest controversies in the social sciences. This dispute rests upon the degree to which external environmental factors can cause specific types of human behaviour and effect (perception). There has been a tendency, however, to view the landscape as the source of value and ignore the decision making of people.

VII. CONCLUSION

It is important to know whether a model emphasizes theory or applications. It should come as no surprise that most of the really explicit theoretical views have been classified in the cognitive model of this review, with some other important contributions arising in experiential work. These two approaches have been primarily concerned with understanding how values arise from the human-landscape interaction process. The expert and psychophysical have catered mostly to the needs of environmental decision makers and have paid more attention to applications. It is expected that this review will serve as a guide for the choice of models in future landscape research.

REFERENCES

- [1]. Anne, R. B. and Catherine, H. (2000). Environmental Planning for Site Development. E & FN Spon: Taylor and Francis Group Great Britain.
- [2]. Arriaza, M., Cañas-Ortega, J., Cañas-Madueño, J. & Ruiz-Aviles, P. (2004). Assessing the visual quality of rural landscapes. *Landscape and Urban Planning*, 69, pp115–125.
- [3]. Bureau of Land Management (BLM) (1980). Visual Resource Management Program. Washington, DC; US, Department of the Interior.
- [4]. Clamp, P. 1999. A Study in the Evaluation of Landscape and the Impact of Roads. *Landscape Research News*. 1(11): pp6-7.
- [5]. Dwyer, J., Schroeder, H. and Gobster, P. (2006). The Significance of Urban Trees and Forests: Toward a Deeper Understanding of Values. *Journal of Arboriculture*. Vol. 17(10): pp 276 – 284.
- [6]. Fairweather, J. & Swaffield, S., 2000. Q Method using Photographs to Study Perceptions of the Environment in New Zealand, In: Addams, H. & Proops, J. (eds), 2000. *Social Discourse and Environmental Policy: An Application of Q Methodology*. E. Elgar, Cheltenham. pp14-40
- [7]. Falade, J. B. and Oduwaye, L. O. (1998). *Essentials of Landscape and Site Planning*. Omega Hi-Tech Information and Planning Systems Ltd. Lagos pp. 259.
- [8]. Falade, J. B. (1985). *Nigeria's Urban Open Space: An inquiry into their Planning and Landscape Qualities*. PhD Thesis, Department of Architecture. Edinburgh University UK.

- [9]. Hamilton, K. (2006). Green Adjustments to GDP. Resources Policy, Vol. 20 No. 3 Pp. 155 – 168.
- [10]. Harris, R.W. (2004). Arboriculture Integrated Management of Landscape Trees, Shrubs and Vines. 4th Edition, Prentice Hall, New Jersey pp. 416.
- [11]. Jackson, R. (2001). The Green City. Macmillan Company. Australia. Pp165.
- [12]. Jongman, R.H.G (eds). 2005. The New Dimension of the European landscapes. Wagering en . WU.
- [13]. Kaltenborn, B. and Bjerke, T. 2002. Associations between Environmental Value Orientations and Landscape Preferences. Landscape and Urban Planning. Vol. 59, pp1–11
- [14]. Kaplan, R. 2001. The Role of Nature in the Context of the Workplace. Landscape Urban Planning. Vol. 26, pp 193-201.
- [15]. Kuo, F.E., Bacaicoa, M. and Sullivan, W.C. (2000). Transforming Inner City Landscapes: Trees Sense of Safety, and Preference. Environ Behav. Vol. 30(1), pp 28-59.
- [16]. Laing, R. (2006).The Relationship of Observer and Landscape in Landscape Evaluation. In Transactions of the Institute of British Geographers, No.66, 130
- [17]. Lawal, M. I. (2000). Principles and Practice of Housing Management in Nigeria. ILCO Books Publishers, Lagos. pp281.
- [18]. Lowenthal, D. (2007). Living with and looking at Landscape. Landscape Research, 32, 5, 635 – 656
- [19]. Matthews, J. A., Herbert, D. T. (ed.). (2004). Unifying Geography: Common Heritage, Shared Future. London: Routledge. pp396.
- [20]. Nowak, D.J., and Walton, J.T. (2006). Projected Urban Growth (2000-2050) and its Estimated Impact on the US Forest Resource. Journal of Forestry 103(8): 383-389.
- [21]. Obembe, T. O. 2009. Landscaping as a Professional Activity in Nigeria: Lagos State as a Case Study.Unpublished MSc. Dissertation,Department of Urban and Regional Planning, University of Ibadan, Nigeria. Pp 192.
- [22]. Prato, T. (2006). Multiple Attribute Evaluation of Landscape Management Journal of around Management, 60(4), pp.325-337.
- [23]. Rogge, E., Nevens, F. and Gulinck, H. 2007. Perception of Rural Landscapes in Flanders: Looking Beyond Aesthetics. Landscape and Urban Planning, Vol.82, 159–174.
- [24]. Salaudeen, A. B. (2005). Landscape Planning: A Tool to Desertification Control in Northern Nigeria. Journal of Institute of Development Research (IDR), ABU, Zaria.
- [25]. Salaudeen, A. B. (2011). Assessment of Landscaping Practices Public Agencies in Jos City. A MURP Thesis, Department of Urban and Regional Planning, Benue State University, Makurdi, Nigeria.
- [26]. Song, Y. (2007). Landscape Planning Approach of Constructing Urban Stoma Water Management System. Peking University.
- [27]. Wana, J. P. (2007). Metro Nature Services: Functions, Benefits and Values. In: S. Wachter and E. Birch (eds.), Greener Cities. Philadelphia: University of Pennsylvania Press.
- [28]. Westphal, L.M. (2003). Urban Greening and Social Benefits: A Study of Empowerment Outcomes. Journal of Arboriculture 29 (3): 137-147.
- [29]. Williams, D. and Patterson, M., (2007). Snapshots of what, exactly? A Comment on Methodological Experimentation and Conceptual Foundations in place Research. Society and Natural Resources, 20,931–937
- [30]. Wolf, K. L. (2005). Business District Streetscapes, Trees and Consumer Response. Journal of Forestry 103 (8): 396-400.