

Landscape Resilience

An Examination and Evaluation of Existing Definitions in the Field of Landscape Resilience

A Brief Review of Literature

Farshad Bahrami*

M.A. in landscape architecture, College of Fine Arts, University of Tehran, Iran.

Morteza Hemmati

Ph.D. Candidate in landscape architecture, College of Fine Arts, University of Tehran, Iran.

Received: 2019/10/04

Accepted: 2020/02/17

Available online: 2020/03/19

Abstract | Resilience, as a new concept in sustainability literature, has created a new understanding of the relationship between humans and the environment. In addition, with increasing environmental challenges facing humans in the new century, this concept has been extended in different fields and redefined by scholars of different disciplines. Landscape, a science that deals with the interaction between humans and the environment, has been no exception; in recent years, after the introduction of resilience into urban literature, this concept has now found its way into the literature of the field. Researchers are now seeking to develop a theoretical framework based on this concept to preserve the landscape in the face of dynamic environmental disturbances. However, a careful perusal of literature of resilient landscape reveals that not all aspects of the landscape have been considered in available studies. Since an incorrect conceptualization of the term, landscape, through these definitions lead to a malfunction of existing theoretical frameworks in the face of disorders, this study attempts to evaluate the existing definitions. This study also aims to review the available definitions of the term of the landscape resilience and compare them with the fundamental definitions of the concept of the landscape. To this end, this study first briefly reviews the literature of resilience in the field of urbanism and landscape, and then, presents the theoretical foundations of the landscape and its properties. Thereafter, the concept of landscape in landscape resilience is compared and contrasted with the fundamental definitions of the term landscape, and their discrepancies are discussed. The results of this study indicate that, in all definitions, the perceptual aspects of the landscape have been neglected, and only its objective aspects have been included. In addition, this concept has been considered as equivalent to environmental ecosystems. As a result, the term “landscape”, in all definitions, in the field of landscape resilience is substantially different from the concept defined by landscape literary experts.

Keywords | *Resilience, Landscape ecology, Resilience landscape, Landscape definitions, Objective-Subjective.*

Introduction | Landscape is a new discipline that has gained its recognition as a new field of environmental science in the 21st century, and this liberating discipline has received attention in the face of the disturbances caused by one-dimensional relations between humans and the environment (Alehashemi & Mansouri, 2017). Landscape is an example of a complex system that encompasses multiple subsystems, and like a dynamic living system is growing and changing. The changes are

so much rapid that a complete understanding of various factors contributing to its changes is impossible (Masnavi, Ghara'i & Hajibandeh, 2019). This is one of the main reasons why landscape is known as a complex and dynamic system (Meinig, 1979). Like any other systems, landscape is threatened by many environmental disturbances caused by climatic changes, unnecessary development, and uneven interventions around the world (Bahrami, Alehashemi & Motedayen, 2019). For that reason, many concepts such as resilience have been proposed to mitigate the disturbances. The concept of resilience is related to

* Corresponding author: 09398116461, farshad.bahrami@ut.ac.ir

the science of “sustainability”. Resilience has emerged as a new way of thinking in the sustainability approach in contrast to “resistance”. Resilience makes any system more resistant to chaos by offering different ways, approaches, and methods. Resilience was introduced by Holling (1973) in relation to the science of ecology, and thereafter, this term was defined and conceptualized in various disciplines and fields including geomorphology, natural resource management, economics, social sciences, social-ecology, international development, psychology and natural risk management by scholars of these disciplines (Holling, 1973; Tusaie & Dyer, 2004; Perrings, 2006; Rose, 2007; Downes, Miller, Barnett, Glaister & Ellemor, 2013; Brown, 2016; Brown & Williams, 2015; Quinlan, Berbés-Blázquez, Haider & Peterson, 2016; Folke, 2016).

In recent years, the concept of resilience has been introduced into urban planning literature by urban thinkers. It has also been combined with landscape approaches by few scholars. This group of experts has been trying to explain a new term “resilient landscape”, and some have provided conceptual frameworks for applying the above definition. The widespread resilience sciences, on the one hand, and many aspects of landscape science, on the other hand, have prompted the authors to pose this question: “Do the existing definitions of resilience cover all aspects and dimensions of landscape?” To answer this question, the literature of resilience landscape and resilience is reviewed, compared, and contrasted with the theoretical foundations of landscape. The results of matching the definitions from the two sources are presented and their discrepancies are discussed.

Research questions

What is the nature of landscape in resilient landscape definitions? Does the term fit the definitions of landscape in the literature of this field? If the answer is no, what do the above-mentioned definitions refer to, and what aspects of the landscape in landscape definition are covered by the neglected definitions?

Research Method

This research seeks to scrutinize the concept of landscape resilience by criticizing, and comparing the existing definitions of landscape resilience with the concept of landscape. This research adopted qualitative approach in order to address the research questions. In this regard, at first, existing definitions of resilience thinking, and especially landscape resilience were reviewed. Then, the theoretical literature of landscape is extensively reviewed, and approaches as well as features of the landscape were extracted. The existing definitions with the title of landscape resilience were evaluated based on landscape qualities. In order to gather data and information, the

research was conducted by searching through libraries and scientific databases, especially (1) “Scopus”, (2) “Science Direct” and (3) “Web of Science”.

In this regards, to collect and review the literature of landscape resilience, the keywords including “resilience”, “landscape resilience”, and “resilient landscape” were searched in databases from 1973 to 2019, which 7 books, 68 articles, and 8 research reports were identified. However, in order to address overlapping theoretical literature and prepare an intensive literature review, 4 books; 28 articles; and 5 reports were used in this paper. In addition, to gather and review the theoretical literature of the landscape, the keywords including “landscape”, “landscape approaches”, “objective-subjective”, “dynamics in landscape”, “holistic in landscape”, and “landscape features” were searched from 1939 to 2019 in three languages: English, Persian, and French. In this regard, 32 articles, 15 books, and 3 reports were identified. Due to the redundancy of topics and abridged perusal of theoretical literature, 11 articles; 15 books; and 3 reports were used in this research.

Literature Review

The first research on resilience was carried out by Holling (1973) in the science of ecology. Later, Mileti (1999) conducted a study on urban planning and this concept was expanded in urban sciences. The formation of this thought in the urban sciences was reflected by research in different aspects of the urbanization, including adaptation of the city in the face of disturbances (Pickett, Cadenasso & Grove, 2004); urban Local-Spatial resilience (Ghara'i, Masnavi & Hajibandeh, 2018); urban ecosystem (Alberti & Marzluff 2004; Colding, 2007; Ernstson, van der Leeuw, Redman, Meffert, Davis, Alfsen & Elmqvist 2010); resilience in spatial planning (Albers & Deppisch, 2013); resilient cities and natural hazards (Godschalk, 2003); the resilience of urban transformation (Smith, 2010; Hodson & Marvin 2012), urban resilience through the lens of civil engineering (Bozza, Asprone & Fabbrocino, 2017); regional resilience (Christopherson, Michie & Tyler, 2010) and so on. Although resilient thinking has evolved in urban literature, scholars have been increasingly aware of the importance of the concept of landscape in urban literature and this has encouraged them to combine resilient thinking with the definition of landscape. The science of landscape itself was formally established in the 15th century as modernity emerged (Berque, 1995, 2013; Roger, 1994; Collot, 2011). Since the late 19th century, landscape has emerged as a concept in human's philosophy and perception, and Simmel was the first researcher who integrated philosophy with landscape knowledge using the term “landscape philosophy” (Brunon, 2010). In the 21st century, landscape has been recognized as a

discipline for the future, and it has been considered an “interdisciplinary” subject (Chomarat-Ruiz, 2008). Reviewing landscape resilience literature shows that little research has been carried on resilience. Ahern (2013) is the first among researchers who have addressed this concept in the field of urban landscape. In addition, in line with Ahern’s ideas, Hemmati (2015) has tried to provide a theoretical and conceptual framework for resilience by presenting six evaluation indicators. In a report, Cockburn, Lindley, Kotze & Dubazane (2015) have made suggestions for the resilience of landscape architecture. Also, in a report based on landscape resilience, Local Land Services in Central West (2016) has examined this issue. Beller, Robinson, Grossinger & Grenier (2015) Sijmons (2015), and Lister (2015) have defined this concept in their own research. McIntosh, Marques & Hatton (2018) have also delved into this issue from an ecological perspective. In 2019, the American Landscape Architecture Society (ASLA) has also published a definition of the concept in its Website Resolute Landscape. However, none of the above studies have compared and evaluated the concept of landscape through the lens of experts in the field or assessed it based on definitions presented as a resilient landscape.

Resilience thinking in urban sciences

Resilience thinking can be traced back to the ideas of chaos theory. This concept has been explained in chaos theory as a set of strategies for managing critical situations and making decisions against unpredictable disorders. However, given the popularity of the concept of sustainability in the twentieth century, the term gained recognition by criticizing some issues of sustainability, and a new chapter was created in the science of resilience under the title of resilience. In Latin, resilience is derived from the Latin word “Resilio” meaning “return to the past” (Klein, Nicholls & Thomalla, 2003). The term resilience was first defined by Holling (1973) in ecology science as the ability of a system to absorb shocks, changes, and disruptions while maintaining system performance. Since the time of Holling, numerous scholars have expanded the concept of resilience. Alberti, Marzluff, Shulenberger, Bradley, Ryan & Zumbrunnen (2003) believed that resilience is a concept that combines ability, learning, adaptation, self-reorganization, and balance, as well as chaos absorption (Alberti et al., 2003). Walker & Salt (2006) argued that resilience is the capacity of a system to withstand disturbances and changes while maintaining functionality, structure, feedback, and identity. Folke (2016) also believed that the concept of resilience means the ability and sustainability of the system to deal with disturbances, and system capability to evolve despite changes and chaos. According to the experts, resilience can be regarded as the ability or capacity of a system to withstand disturbances and this term has emerged against “resistance”. Also in the 1990s, the concept of resilience

expanded in the urban literature and emerged in the urban planning literature in the face of environmental disturbances and the adaptability of social and environmental structures (Mileti, 1999; Lu & Stead, 2013). Pickett et al. (2004) defined urban resilience as the capacity of a system -in this case, a city- to adapt to chaos. This definition of urban resilience refers to the capacity of a city to maintain its functions and structures in the face of disturbances, disorders, and change (Holling, 1973, 1996; White, 2013). Urban resilience also refers to “the ability of an urban system-and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales-to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity” (Meerow, Newell & Stults, 2016, 39). This definition emphasizes the resilience of cities and believes that a city needs an adaptive approach to increase its components’ ability to withstand disorders. The concept of urban resilience has gained importance over the past decade with the rise of environmental crises and unpredictable changes, and today it can be named as one of the most prolific keywords in urban literature. It is also noteworthy that this concept has been extended to the disciplines and fields related to urban sciences, and it has been redefined by experts in each discipline in accordance with the concepts, requirements, and challenges of that discipline.

Landscape Resilience

As discussed earlier, the concept of resilience had long been introduced into the urban sciences but the importance and popularity of the concept of resilience in modern urban literature encouraged some researchers to extend the resilience literature to topics such as resilience, resilience of landscape, and landscape resilience. It should be noted that this concept was first practiced in landscape projects in the works of landscape architects such as van Wallenberg and Yu in the face of environmental crises and later, it was academically explained by scholars in the field.¹ Ahern (2013) has attempted to develop a model for the evaluation of a resilient landscape through five indicators in the field of “Ecological Urban Landscape”. In his definition, indicators of redundancy, diversity, multifunctionality of the urban system, urban ecological networks and communication or interconnection, and adaptive design and adaptation to changes are proposed. He emphasized ecology and preferred landscape ecology specialists to their counterparts in similar disciplines because of their interdisciplinary expertise, their attention to location, dynamics and ecological processes, and their commitment to applying scientific knowledge to landscape planning and landscape management policies (Ahern, 2013).

In addition to Ahern (2013), Hemmati (2015) has also defined the ecological compatibility of landscapes by emphasizing the ecological dimensions of the landscape and presenting six indicators in “Landscape Compatibility”. He believes that “the stability of the landscape today depends on its compatibility. Compatibility is the result of revising the previous concepts of sustainability. Today, the new definition of ecological sustainability refers to the ability to adapt to different environmental conditions and transforms it from a static to a dynamic status (Hemmati, 2015, 75). It is also important that Hemmati maintains that he has used adaptation returns instead of resilience. In their study, Cockburn et al. (2015) have based” the resilience of landscape” on three concepts: resilience thinking, creating shared value, and social learning. They argue that the resilience landscapes approach is a new way of working with stakeholders in multipurpose landscapes to create ecosystem resilience through learning, participation, localized action as well as the value chains of agricultural and forestry commodities. These resilience landscapes encompass not only the livelihoods of local communities but also valuable food chains and markets. Beller et al., (2015) point out that landscape resilience refers to the ability of a landscape to maintain its desired ecological functions, robust biodiversity, and important landscape processes in the face of changing conditions and turbulence despite numerous stressors and uncertainties. Also, “Topos” journal in its 90th number, published a special issue titled “Urban and Landscape Resilience” in 2015, in which researchers including Lister (2015) and Sijmons (2015) defined resilience. Lister (2015) believes that resilience design requires an evidence-based approach that results in an environmentally friendly design in face of complexity, uncertainty, and vulnerability. According to this definition, landscape resilience is considered as functional resilience of spaces (Lister, 2015). Like Lister (2015), Sijmons (2015) also believes that most of the global environmental problems have urban roots; therefore, to reduce the chaos in the landscape, urban problems and chaos have to first be addressed.

In addition, in a study conducted by Local Land Services in Central West (2016) in Australia, the term “landscape resilience” has been used. In this paper, landscape resilience is defined as the ability of natural landscape and ecosystems to recover from disturbances such as clearing, grazing, wind storms, landslides, fires, droughts, floods, climate change, chemicals, weed invasion or hunting. In this definition, the term landscape is an “ecosystem” and some approaches have been proposed to deal with its ecological crises and disturbances. Also in a similar study, focusing on ecological dimensions and environmental ecosystems, McIntosh et al., (2018) argue that landscape resilience

is the ability of landscape ecosystems for reconstruction in a balanced ecological state after human intervention. They maintain that this ability depends on the intrinsic properties of its component, the energy exchanged between the components of different systems, the ability of each component for reorganization when one component is connected to another, and the compatibility of the influence between them and the type of human occupation. In defining this term, the American Society of Landscape Architecture (2019) states that the purpose of resilient landscapes is to recreate and reassemble communities for self-reorganization in the face of severe turbulence. In today’s world where natural disasters are the main cause of the overthrow and destruction of traditional structures, compatible and multilayer systems can maintain their critical functions and provide more cost-effective and practical solutions compared to traditional structures. According to definitions proposed by many scholars, if we consider resilience as a conceptual model that makes a system -the landscape- resilient, we will be able to scrutinize the nature of the system (landscape) and understand how it has been conceptualized by researchers (Table 1).

Theoretical foundations of Landscape

Rediscovering the concept of landscape in the field of urban sciences has been one of the most important achievements of this science in the last century. Introducing this concept into the urban sciences has resulted in new approaches to the concept of cities. Such approaches argue that city is a whole and it is not limited to physical features. It should be noted that today’s landscape is recognized as one of the most widely used concepts in urban literature; this concept has evolved over time and has been used in many fields in recent

Table 1: The description of the nature of landscape resilience in researchers’ words. Source: authors.

| Nature of landscape resilience | Researchers |
|------------------------------------------------------|--------------------------------------------|
| Ecological dimensions | Ahern (2013) |
| Dimension of landscape ecology | Hemmati (2015) |
| Dimensions of ecology and community participation | Cockburn et al., (2015) |
| Relationship of natural ecosystems | Beller et al. (2015) |
| Functional dimensions of spaces | Lister (2015) |
| City and environment | Sijmons (2015) |
| Natural dimensions and ecosystems | Local Land Services in Central West (2016) |
| Ecosystems | Mcintosh et al. (2018) |
| Multilayer system in the face of environmental chaos | ASLA (2019) |

years (Alehashemi & Mansouri, 2017). Therefore, understanding the meanings of the landscape without understanding its conceptual developments may lead to an incorrect understanding of the concept. According to Roger (1994), the term landscape was first used in the fifteenth century to describe a painting. This concept became more popular after the Renaissance, and it was referred to the pure beauty of nature in the 18th century (Berque, 1995). In these centuries, the natural environment used to be described based on external and objective attributes. However, in the twentieth century, the suspicion of thinkers such as Hegel and Heidegger about the foundations of the Renaissance shed light on the new aspects of landscape. By expanding on the issue of existence which was put forward by Hegel, Heidegger questioned limiting phenomena into two merely objective and subjective groups (Mansouri, 2010). Landscape relies on the bipolarity of objectivity and subjectivity and adopts an individualistic view of nature emphasizing the detachment from the physical world (matter). However, it is conceptualized by rejecting the polarities and the uncertainty of the world as an objective-subjective phenomenon and the relation between the subject and the object (Alehashemi & Mansouri, 2017). Although landscape researchers have adopted different approaches to conceptualize the landscape, all definitions include 'perception'. Some scholars have emphasized the concept of "objective-subjective". For example, according to Alehashmi and Mansouri (2017), "several objective, subjective, or objective-subjective approaches have been developed to explain landscape discipline. However, in the 21st century, the objective-subjective approach has been recognized as the most innovative and comprehensive in the field of landscape" (*ibid.*).

In addition, Mansouri (2010, 31) has stated in another study that "The nature of landscape is defined by its place and it is the product of human experience in space". Berque (1995), one of the founders of this landscape approach, believed that landscape is an objective-mental phenomenon and in fact, it is a social reality produced by nature and culture). He argued that "landscape is born from the stability of the relationship between the two dimensions of our being, from moving between our animal aspect and our psyche and between our soul and what is surrounding us. This relationship is not separated into objective information in one section and mental images in another, but is objectively and subjectively interconnected and combined in an intelligent structure" (Berque, 2013, 67). The relationships between objectivity and subjectivity and human-associated places are ecological and symbolic; and it can be called "Ecosymbolic" (Berque, 2000). Similarly, Lassus (2013) emphasized the inseparable and

continuous nature of the objective and subjective aspects of the landscape and believed that the landscape is an idea that is intimately connected to the environment and is an interaction between appearance, hidden, truth and imagination. In line with this attitude, Atashinbar (2009) emphasized the dynamism of landscape and its relation to the perception and mind of audience. This view of landscape is also reflected in the definition of the European Convention. According to Council of Europe (2000), landscape is "part of the earth, as perceived by locals or visitors," which "evolves over time and is transformed by natural and human forces". Some researchers have also emphasized its "perceptual" dimensions. In her book, the language of landscape, Sprin (2000) described landscape as follows: It is an Interaction is between environment and people and refers to perceptual phenomena. Bell (2012) and Haber (2004) have introduced the concept of landscape as "perceived environment". Using the term "place", Sheybani (2010) is one of the scholars who have interpreted landscape as a locus of phenomena, and Turner (1997) also referred to the "perception of every person" of the environment. Lewis (1979) emphasized the perceptual dimension of landscape and argues that landscape is almost what we face and perceive when we leave our houses. According to Meinig (1979) landscape is not only what stands before our eyes but also what lies in our minds. In similar a vein, Steiner (2011) also used "the current intellectual community" the importance of the subjective point of emphasis. Hägerstrand (1993) has also highlighted the "subjective aspects of society" in the definition of landscape. Other scholars considered the term "culture" to be equivalent to subjective thinking (Duncan, 2004; Duncan & Duncan, 2009; Wu, 2008; Mc Harg, 1969). Scholars such as Tuan (1979) and Bourassa (1978) also referred to the aesthetic aspects of landscape, and introduce them as the product of its subjective dimension and its relation to its objective qualities. By analyzing the concept of landscape from experts' points of view and scrutinizing the terms used scholars, it is possible to understand the essence of landscape. Based similarities in the terms used, it is possible to categorize landscape into the following categories (Table 2).

Discussion

Reviewing the fundamental thinking of the landscape shows that the concept of landscape, as a new discipline, includes various aspects and dimensions, and overlooking each of these aspects would provide a limited understanding of this concept. Examining the definitions of resilient landscape indicates that the term "resilience" refers only to the objective dimensions of the environment, in which human perception, as an integral part, is overlooked. For instance, in Ahern's definition

Table 2: The description of the nature of landscape in researchers' words. Source: authors.

| The nature of landscape | Sources |
|---------------------------------------------------------------|------------------------------------------|
| Objectively-subjective | Mansouri (2010) |
| | Alehashemi and Mansouri (2017) |
| | Atashinbar (2009) |
| | Berque (1995) Lassus (2013) |
| perceptual nature | Sprin (2000) |
| | Bell (2012) |
| | Haber (2004) |
| | Lewis (1979) |
| | Meinig (1979) |
| | Council of Europe (2000) Turner(1997) |
| Cultural | Mc Harg (1969) |
| | Wu (2008) |
| | Duncan (1990) |
| | Duncan & Duncan (2009) |
| The mental aspects of society | Hägerstrand (1993) |
| | Steiner (2011) |
| The subjective aspect of the objective qualities of landscape | Tuan (1979) |
| | Bourassa (1978) |

(Ahern, 2013), five indicators, “biodiversity; urban ecological networks and connectivity; multifunctionality; redundancy and modularization, adaptive design” have been proposed for assessing landscape resilience; however, none of the indicators includes the perceptive aspects of the resilient landscape. Hemmati (2015) has conceptualized “adaptation [resilience] by redefining ecological sustainability and has proposed patterns for landscape design to increase their potential against natural disasters and hazards”, and in this conceptualization, he equated the landscape with a set of multiple landscape ecologies. However, the ecology of the landscape is one of representation of the landscape, not the landscape itself (Mansouri, 2015). Also, Cockburn et al. (2015) mentions that the purpose of landscape resilience is “creating ecosystem resilience” and has not referred to the perceptual aspect of landscape resilience. Although in the definition, they have referred to society, they have seen society as an ecological component rather than the agent of perception which presents landscape. Similarly, Beller et al. (2015) have also argued that “preserving ecological functions” is the ultimate goal of a resilient landscape. In Lister’s definition, landscape is also considered equivalent to “functional dimensions of space” (Lister, 2015). In the Western Land Local Services Center (2016), “natural landscape and Ecosystems” in the word of Mcintosh et al. (2018) or the objective aspects of the landscape, are the main agent of this definition. It should be noted that the ecosystem is part of the landscape and requires knowing the whole of a concept and understanding one

of its components would result in ambiguity. In definition proposed by the American Society of Landscape Architects, functional and ecological layers are considered the same as landscape (ASLA, 2019).

Table 1 shows that in different expressions and phrases, the nature of landscape is treated as “environmental ecosystems”. In addition, the examination of Table 2 indicates that several researchers have used different terms to describe the nature of landscapes. Although some of the terms in definitions have referred to a similar subject in a very different way, the difference between the objective-subjective and the perceptual nature, all the terms explicitly point to perceptual dimensions of the landscape using different terms. Reviewing the conceptual evolution of landscapes and its definitions by landscape experts show that humans as a “perceiver” is an indivisible component of the definitions of landscape, and plays a key role in understanding its nature. In other words, humans as a perceiver of the environment contributes to an intertwined whole entity which can be understood through a complex process of landscape (Lassus, 2013; Swaffield, 2002). Comparing Tables 1 and 2 also reveals that the nature of the landscape in these two definitions is neither identical nor equal. Therefore, the definitions offered for the resilient landscape are not concerned with all aspects of landscape and are of substantially different nature and are not comprehensive.²

Conclusion

Landscape, as an environmental science, has always been subject to various environmental disturbances. Therefore, scholars have attempted to make landscape sustainable in the face of various environmental disturbances. To this purpose, they have explained the concepts of resilience in the landscape. Reviewing the definitions of landscape resilience and examining the theoretical foundations of the landscape and its properties reveal that the discrepancies between the proposed concepts of landscape in these two. Moreover, it seems that the existing definitions of landscape resilience are not comprehensive enough to include landscape properties. The reason is that scholars have so far defined landscape resilience from the objective perspective of the landscape. They have considered it equivalent to environmental ecosystems which are one of the components of the landscape. In addition, in all definitions, the “perceptual dimension” of landscape has been overlooked. Ignoring the perceptual dimensions of landscape and limiting the definition of the resilient landscape to its objective aspects would destroy its integrity. By eliminating the perceptual dimensions of the landscape in these definitions, the concept of the landscape has been eliminated, and what has remained is not part of the landscape but something different from

the landscape. Comparing the qualities of landscape in the definitions of the term landscape resilience and the concept of landscape revealed that the qualities in these definitions are not congruent. The inherent inconsistency of the definition of landscape in the two scientific domains indicates that the two definitions are not equal, and that, there is no semantic unity for scholars. The plurality of meanings and multiple contents of a concept, experts cannot come to a consensus on a single topic and arrive at accurate conclusions. The incorrect

definitions cannot assist scholars to create a conceptual framework and subsequently develop practical strategies for creating a resilient landscape. As a result, the concept of the landscape resilience seems to require serious rethinking by landscape and resilience scholars. Also, given the growing importance of the subject, this concept should be examined in-depth and the shortcomings of its definitions should be addressed. This would help to develop a comprehensive definition for the concept of “landscape resilience”.

Endnotes

1. Michael Van Valkenburgh used this concept in designing the Project of Allyn Beach Park in 2005 and then in Hudson Beach Park in 2009. He was one of the first researchers who introduced resilience into the landscape. Then, in 2012, Kongjian Yu designed Kyunley Park project for which he drew his inspiration from this concept.
2. The definition should not be more restrictive than its definer, since it does not include all people. In this case, the term is said to be comprehensive; that is, the definition must encompass all known people (Khansari, 1987).

Reference list

- Ahern, J. (2013). Urban landscape sustainability and resilience: the promise and challenges of integrating ecology with urban planning and design. *Landscape Ecology*, (28), 1203-1212.
- Albers, M. & Deppisch, S. (2013). Resilience in the light of climate change: Useful approach or empty phrase for spatial planning? *European Planning Studies*, 21(10), 1598-1610.
- Alberti, M. & Marzluff, J. M. (2004). Ecological resilience in urban ecosystems: linking urban patterns to human and ecological functions. *Urban Ecosystems*, 7(3), 241-265.
- Alberti, M., Marzluff, J. M., Shulenberg, E., Bradley, G., Ryan, C. & Zumbunnen, C. (2003). Integrating humans into ecology: opportunities and challenges for studying urban ecosystems. *AIBS Bulletin*, (53), 1169-1179.
- Alehashemi, A. & Mansouri, S. (2017). Landscape, a Shifting Concept: The Evolution of the Concept of Landscape from Renaissance. *Bagh-e Nazar*, 14(57), 33-44.
- ASLA, American Landscape Architecture Society. (2019). *Resilient Landscape*. Retrieved from www.asla.org.
- Atashinbar, M. (2009). The Continuity of Identity in Urban Landscape. *Bagh-e Nazar*, 6(12), 45-56.
- Bahrami, F., Alehashemi, A. & Motedayen, H. (2019). Urban Rivers and Resilience Thinking in the Face of Flood Disturbance, The Resilience Planning of the Kan River. *MANZAR*, 11(47), 60-73.
- Bell, S. (2012). *Landscape: Pattern, Perception and Process*. London: Routledge.
- Beller, E., Robinson, A., Grossinger, R. & Grenier, L. (2015). Landscape Resilience Framework: Operationalizing ecological resilience at the landscape scale, A Report of SFEI-ASC's Resilient Landscapes Program, San Francisco: Estuary Institute.
- Berque, A. (1995). *Les raisons du paysage: de la Chine antique aux environnements de synthèse*. Paris: Fernand Hazan.
- Berque, A. (2000). *De peuples en pays, ou la trajection paysagère. Les enjeux du paysage*. Paris: Ousia. Hazan.
- Berque, A. (2013). *Thinking through landscape*. New York: Routledge.
- Bourassa, S. C. (1978). Toward a theory of landscape aesthetics. *Landscape and Urban Planning*, (15), 241-252.
- Bozza, A., Asprone, D. & Fabbrocino, F. (2017). Urban resilience: a civil engineering perspective. *Sustainability*, 9(1), 103-120.
- Brown, E. D. & Williams, B. K. (2015). Resilience and resource management. *Environmental Management*, (56), 1416-1427.
- Brown, K. (2016). *Resilience, Development and Global Change*. London: Routledge.
- Brunon, H. (2010). The notion of landscape in the humanities and social sciences: benchmarks on “culturalist” approaches: Thematic bibliography. Retrieved from <https://hal.archives-ouvertes.fr/halshs-00462112>
- Chomarat-Ruiz, C. (2008). *La critique de paysage peut-elle être scientifique? Projets de paysage*. Retrieved from www.projetsdepaysage.fr
- Christopherson, S., Michie J. & Tyler P. (2010). Regional resilience: theoretical and empirical perspectives. *Cambridge Journal of Regions, Economy and Society*, 3(1), 3-10.
- Cockburn, J., Lindley, D., Kotze, D. & Dubazane, N. (2015). The Resilient Landscapes Approach: WWF-South Africa Mondri Wetlands Programme.
- Colding, J. (2007). Ecological land-use complementation for building resilience in urban ecosystems. *Landscape and urban planning*, 81(1-2), 46-55.
- Collot, M. (2011). *la pensée-paysage Lonrai*. Bruxelles: Eurorpan sprl.
- Council of Europe. (2000). European landscape convention, Explanatory report. CETS No. 176. Strasbourg. Retrieved from: <https://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/176>
- Downes, B. J., Miller, F., Barnett, J., Glaister, A. & Ellemor, H. (2013). How do we know about resilience? An analysis of empirical research on resilience, and implications for interdisciplinary praxis. *Environmental Research Letters*, 8(014041), 1-8.
- Duncan, J. S. (2004). *The City as Text: The Politics of Landscape Interpretation in the Kandyan Kingdom*. Cambridge: Cambridge University Press.
- Duncan, N. & Duncan, J. (2009). Doing landscape interpretation. In DeLyser, D., Herbert, S., Aitken, S., Crang, M., & McDowell, L. (Eds.), *The SAGE handbook of qualitative geography* (pp. 225-247). 55 City Road, London: SAGE Publications, Inc.
- Ernstson, H., van der Leeuw, S. E., Redman, C. L., Meffert, D. J., Davis, G., Alfsen, C. & Elmqvist, T. (2010). Urban Transitions: On Urban Resilience and Human-Dominated Ecosystems. *AMBIO*, 39(8), 531-545.
- Folke, C. (2016). Resilience (republished). *Ecology and Society*, 21(4), 44.
- Ghara'i, F., Masnavi, M. & Hajibandeh, M. (2018). Urban local-spatial

resilience: developing the key indicators and measures, a brief review of literature. *Bagh-e Nazar*, 14(57), 19-32.

- Godschalk, D. R. (2003). Urban hazard mitigation: creating resilient cities. *Natural Hazards Review*, 4(3), 136-143.
- Haber. (2004). Landscape ecology as a bridge from ecosystems to human ecology. *Ecological Research*, (19), 99-106.
- Hägerstrand, T. (1993). Samhälle och natur. In *Region och miljö: ekologiska perspektiv på den rumsliga närings- och bosättningsstrukturen* (vol. 1, pp. 14-59). Kobenhavn: Nordisk Institut for Regionalpolitisk Forskning.
- Hemmati, M. (2015). Resilience: A design approach in chaotic environment. *MANZAR*, 7(32), 74-81.
- Hodson, M. & Marvin, S. (2012). Mediating low-carbon urban transitions? The forms of organization, knowledge and action. *European Planning Studies*, 20(3), 421-439.
- Holling, C. S. (1973). Resilience and stability of ecological systems annual. *Review of Ecology and Systematics*, (4), 1-23.
- Holling, C. S. (1996). Engineering resilience versus ecological resilience. *Engineering within Ecological Constraints*, (31), 32-44.
- Khansari, M. (1987). *Manteq-e Suri* [Formal Logic] (vols. 1 and 2). Tehran: Didar.
- Klein, R. J., Nicholls, R. J. & Thomalla, F. (2003). Resilience to natural hazards: How useful is this concept? *Global Environmental Change Part (B: Environmental Hazards)*, 5(1), 35-45.
- Lassus, B. (2013). A Global Approach to Territory: Landscape. *MANZAR*, (5), 31-32.
- Lewis, P. F. (1979). Axioms for reading the landscape. In Meinig, D. W. (Ed.), *The Interpretation of Ordinary Landscapes* (pp. 11-32). New York: Oxford University Press.
- Lister, N. M. (2015). Resilience: designing the new sustainability. *Topos*, (90), 14-21.
- Local Land Services in Central West. (2016). Building Resilience Landscape. Australian Government. Retrieved from www.centralwest.lls.nsw.gov.au
- Lu, P. & Stead, D. (2013). Understanding the notion of resilience in spatial planning: A case study of Rotterdam. *The Netherlands Cities*, (35), 200-212.
- Mansouri, S. (2010). What is the urban landscape. *MANZAR*, 2(9), 30-33.
- Mansouri, S. (2015). Is "landscape ecology" a correct interpretation? *MANZAR*, 7(32), 100-103.
- Mc Harg, I. L. (1969). *Design with Nature*. New York: American Museum of Natural History.
- McIntosh, J., Marques, B. & Hatton, W. (2018). Indigenous cultural knowledge for therapeutic landscape design. In Rosa, I. S., Lopes, J. C., Ribeiro, R. & Mendes, A. (Eds.). *Handbook of Research of Methods and Tools for Assessing Cultural Landscape Adaptation* (pp. 28-52). USA: IGI Global.
- Meerow, S., Newell, J. P. & Stults, M. (2016). Defining urban resilience: A review. *Landscape and Urban Planning*, (147), 38-49.
- Meinig, D. W. (1979). The beholding eye: Ten versions of the same scene. In D. W. Meinig, (Ed.). *The Interpretation of Ordinary Landscapes: Geographical Essays* (pp. 33-48). New York: Oxford university press.
- Mileti, D. (1999). *Disasters by Design: A Reassessment of Natural Hazards in the United States*. Washington: Joseph Henry Press.
- Perrings, C. (2006). Resilience and sustainable development. *Environment and Development Economics*, (11), 417-427.
- Pickett, S. T. A., Cadenasso, M. L. & Grove, J. M. (2004). Resilient cities: meaning, models, and metaphor for integrating the ecological, socio-economic, and planning realms. *Landscape and urban planning*, 69(4), 369-384.
- Quinlan, A. E., Barbés-Blázquez, M., Haider, L. J. & Peterson, G. D. (2016). Measuring and assessing resilience: broadening understanding through multiple disciplinary perspectives. *Applied Ecology*, (53), 677-687.
- Roger, A. (1994). Histoire d'une passion théorique ou comment on devient un Raboliot du Paysage. Cinq propositions pour une théorie du paysage. Paris: Champs vallon.
- Rose, A. (2007). Economic resilience to natural and man-made disasters: Multidisciplinary origins and contextual dimensions. *Environmental Hazards*, (7), 383-398.
- Sheybani, M. (2010). Pathology of Urban Landscape of Tehran. *MANZAR*, 2(9), 26-29.
- Sijmons, D. (2015). Resilient urbanisation as a landscape architectural question. *Topos*, (90), 30-37.
- Smith, A. (2010). Community-led urban transitions and resilience: performing Transition Towns in a city. In *Cities and Low Carbon Transitions* (pp. 175-193). Abingdon, Oxon: Routledge.
- Steiner, F. (2011). Landscape ecological urbanism: Origins and trajectories. *Landscape and Urban Planning*, (100), 333-337.
- Swaffield, S. (2002). *Theory in Landscape Architecture: A Reader*. Philadelphia: University of Pennsylvania Press.
- Tuan, Y. F. (1979). *Landscapes of Fear*. New York: Pantheon Books.
- Turner, T. (1997). *City as a landscape: A Post-Modern View of Design and Planning* (F, Nourian, Trans.). Tehran: Pardazesh va Barnamerizi-ye Shahri.
- Tusaie, K. & Dyer, J. (2004). Resilience: A historical review of the construct. *Holistic Nursing Practice*, (18), 3-10.
- Walker, B. & Salt, D. (2006). *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*. Washington: Island Press.
- White, I. (2013). *Water and the City: Risk, Resilience and Planning for a Sustainable Future*. New York: Routledge.
- Wu, J. J. (2008). Making the case for landscape ecology an effective approach to urban sustainability. *Landscape Journal*, (27), 41-50.

COPYRIGHTS

Copyright for this article is retained by the authors with publication rights granted to Manzar journal. This is an open access article distributed under the terms and conditions of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>).



HOW TO CITE THIS ARTICLE

Bahrami, F. & Hemmati, M. (2020). Landscape resilience, an examination and evaluation of existing definitions in the field of landscape resilience, a brief review of literature. *MANZAR*, 12(50), 38-45.

DOI: 10.22034/manzar.2020.218060.2032

URL: http://www.manzar-sj.com/article_105080_en.html

