Journal of Civil Engineering and Architecture 12 (2018) 471-482
doi: 10.17265/1934-7359/2018.07.001

Latent Challenges in the Human-Nature Relationship for Sustainable Design and Planning

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Abstract: In the global context, the relationship between human beings and nature has been discussed in various fields of study. This paper introduced three of the important challenges in this relationship, which have, thus far, been only partially or implicitly acknowledged in design and planning. The aim was to elucidate the key disregarded and neglected aspects in the human-nature relationship that need to be considered in different phases of the design and planning of future projects. This paper will thus inform the designers and planners about the previously overlooked but important challenges in the human-nature relationship, which must be moved to the foreground of the design and planning processes. These challenges include the definition of the term "nature", the reciprocal effects among scales and adhering to or going beyond environmental sustainability. As the main conclusion, the paper shows how these challenges can improve the mutually supportive interaction between human beings and nature in the field of design and planning. Specifically speaking, the paper discussed how to convert the overlooked challenges in the human-nature relationship into potentials in the design and planning process. The main applied methods for this paper were a review of the related literature and the appropriate analysis.

Key words: Human beings, nature, challenges, design, planning, sustainability.

1. Introduction

The relationship between human beings and nature has been studied by different groups of people in various disciplines and fields of studies. The variety of debate with different or even divergent perspectives reveals a globally-accelerating momentum of efforts in improving human-nature interaction. The diversity of viewpoints has resulted in emphasising specific aspects while neglecting certain others. The gradually or drastically disregarded aspects, however, need to be moved to the foreground in order that we can be sustainable in an ideal sense. To this end, this paper discusses some of the key challenges in the human-nature relationship.

Specifically speaking, this paper opens up a discussion on several key challenges in human-nature interaction, which need to be clearly signified in different steps to achieve fully sustainable design and planning. The three challenges in this paper have been selected from a wide range of philosophical and practical aspects. The rationale behind this deliberate selection lay in opening up an investigative platform of varied scope for future research on the human-nature relationship. The three challenges are: the definition of the term "nature", the reciprocal effects among scales and adhering to or going beyond environmental sustainability.

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2. Challenge 1: Definition of the Term "Nature"

The concept of "nature" has, thus far, been diversely defined. Existing dissimilarities, and even contradictions, can not only be found in different fields of study but also in definitions from scholars working in a single field of study or even in a single discipline. In traditional definitions, "nature" refers to any non-human element that can be distinguished from human activities. In such definitions, nature is defined as the world of non-humans that is distinguishable from all human activities [1-4].

In contrast, alternative definitions suggest that the natural and human realms—specifically in terms of human culture—form an integrated whole [1, 3, 5-7]. In other words, while more traditional frameworks recognise the natural and human domains as two binary oppositions, alternative paradigms regard them as one intertwined, mutually-influencing form.

In fact, when considering nature as the world of non-humans, one key question is how to find or define the exact boundaries between the two entities. For instance, a large number of areas that seem to be completely natural, are, in fact, places where human imprints and symptoms of human activities can be found. Vast stretches of cultivated farmlands, planted forests or partially logged areas and numerous water reservoirs and artificial lakes provide some examples. By contrast, certain other areas that appear to be completely artificial or man-made include inserted fragments of nature. An apartment with a roof garden or a flowered yard and an eco-tech high-rise serves as examples of this situation [3, 4]. This comparison is further clarified by the following figures (Figs. 1 and 2).

Fig. 1 An example of the footprints of human beings in seemingly wholly natural areas: the rice farms of the northern parts of Iran [8].

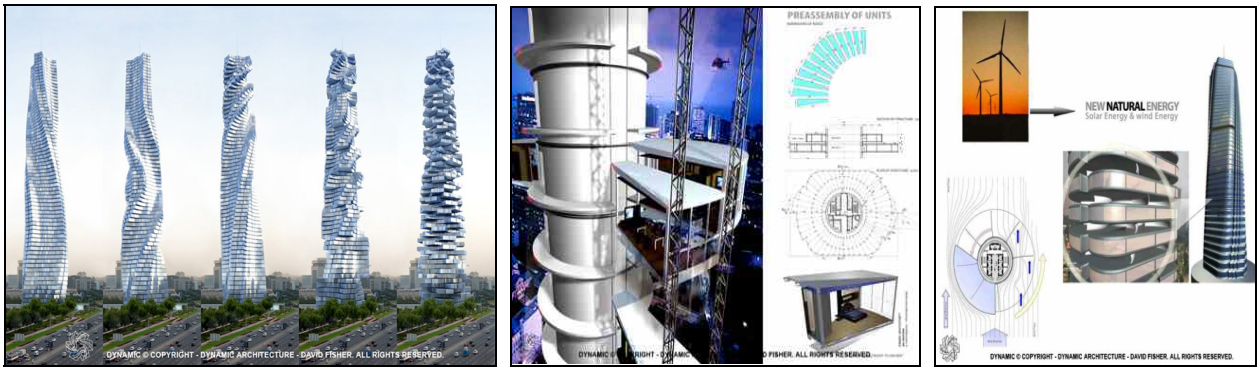

Fig. 2 An example of inserted fragments of nature in seemingly wholly artificial areas: the Da Vinci Tower, Dubai, UAE, by David Fisher, 2008 [9].

This question subsequently leads to the question of how to relate these two spheres. As discussed by Van der Ryn and Cowan in 1996, there are, basically, two interpenetrating worlds. The first is the living world, which has been forged in an evolutionary crucible over a period of more than four billion years. The second, on the other hand, is the world of roads, cities, farms and all the artefacts that people have gradually designed over the last few millennia [10]. In this view, the lack of integration between the two worlds could cause fundamental threats. There exist, however, various interpretations of the concept of

integration.

Indeed, when considering nature and human culture as an integrated whole, a different series of questions arise. For instance, we must consider the reconciling factors and ask whether it is a question of re-integration or of an eternally-existing integration. This is but one example of how the term "integration" can indeed be interpreted in various ways.

As explained above, in both definitions of the term "nature"—that is, nature as the binary opposite of the human realm or as part of an integrated whole—designers and planners are facing the key question of "interaction". As explained by Fuller and Irvine in 2010:

Dictionary definitions of the term "interaction" emphasise its mutual or reciprocal quality; two elements engaging and each influencing the other. As such, we consider interactions between people and nature to be those actions that result in measurable changes both to people and to nature; in other words, interactions are two-way relationships ... [which is different to] studying, for example, the effects of exposure to nature on people, or human impacts on ecological systems in isolation [11, p. 137].

In other words, how the term nature is defined will affect how the interaction between human beings and nature can be defined. In design and planning, however, there is also the question of how designers and planners can mitigate the gaps between their definitions of nature and its (her) definitions among users in each specific context.

It can thus be summarised that the way people perceive nature shapes their ways of behaving towards nature. The way(s) of perceiving and behaving towards nature will, in turn, affect the future characteristics of the natural structures in any context. These characteristics will also subsequently shape the future generations' points of view on what nature is and how they should behave towards it [3, 11-14]. What has been neglected—or more precisely, less considered—in the current design and planning processes is investigating and identifying the dominant perception of nature by the users in each particular context.

This has subsequently resulted in dictating the ways of perceiving and behaving towards nature by some designers and planners who deviate from the identity-based human-nature or human—nature interaction belonging to users' contexts and backgrounds. This paper, thus, introduces the necessity of investigating the ways of perceiving and behaving towards nature by the majority of users in each context as a key initial challenge in the design and planning process. The rationale here is that this will help to shape and adapt the core aspects of design and planning to the users' communal identity in each specific context. Fig. 3 summarises the discussion of this section.

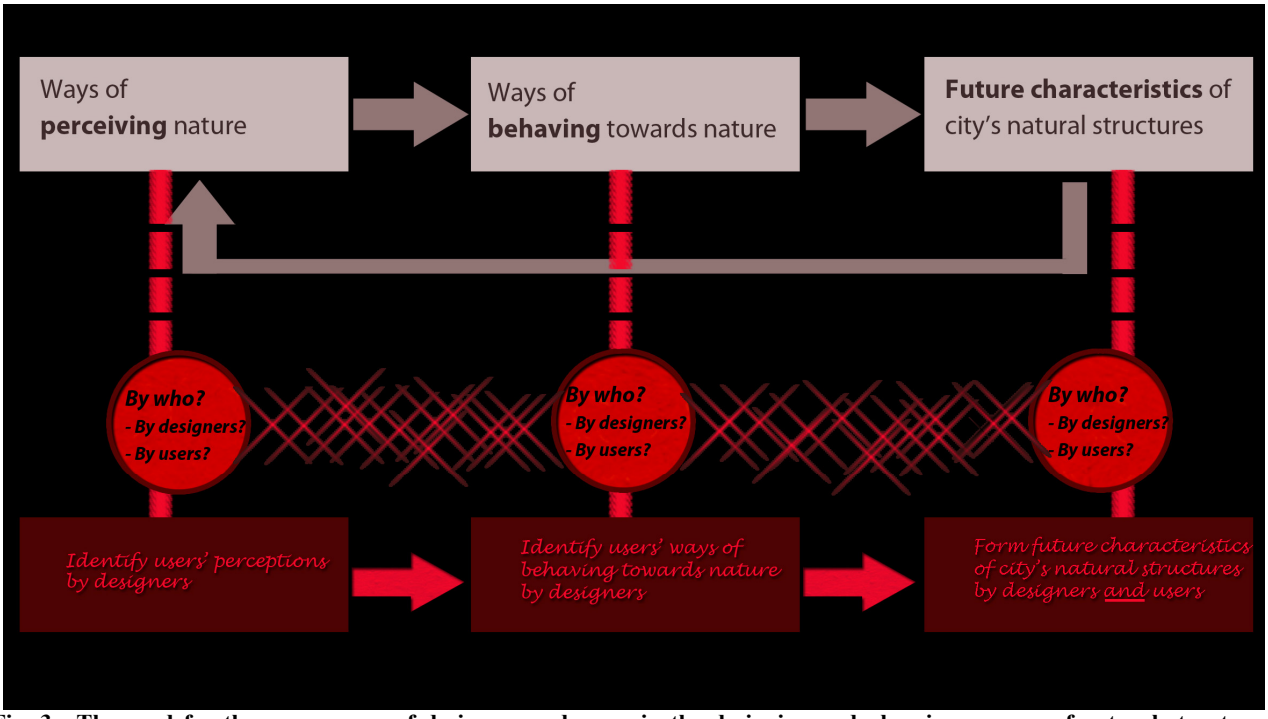

Fig. 3 The need for the co-presence of designers and users in the designing and planning process of natural structures (Source: Author).

3. Challenge 2: Reciprocal Effects among Scales

The relationship between human beings and nature has been considered in various fields and on a spectrum of scales ranging from the micro to the global. The Industrial Revolution and the modernisation process signalled a turning point where the world witnessed an accelerating momentum of changes within the human-nature relationship. The driving force behind these changes originated from certain modern-era trends in the human manipulation of the environment. These specific trends are briefly explained here.

First, the ways in which humans affect the environment have been forever proliferating. Therefore, as many argue, we currently live on a human-dominated planet. Second, a magnitude of environmental issues has arisen, at the local to the regional and, finally, at a global level. Third, the complexity and magnitude of the impacts are increasing. Finally, growing populations continue to result in an increase in per-capita consumption and environmental impact. Energy resources are being developed at an ever-increasing rate, giving humans enormous power to transform and affect the environment [15, 16].

As a result of these drastic changes since the Industrial Revolution, the modern era, specifically from the middle decades of the 19th century on, saw most people on the planet begin to live in towns and cities. Therefore, human interactions with nature mostly take place in urban environments. In such contemporary societies, human beings face two warring premises regarding their relationship with the natural world. On the one hand, there is a general belief that the success of the modern world depends on controlling and converting nature—if not conquering it. On the other hand, there is the persistent belief that human physical, mental and even cultural well-being rely on experiencing healthy and diverse natural systems [11, 12, 16-20].

Based on the second above-mentioned premise, in order to achieve a human-nature interaction that is responsive to the potentials and problems of both spheres, a refashioning of this relationship seems to be

inevitable. Furthermore, according to the above-described trends of the modern era, the scale of the issues has shifted from the local to the global. In the current design and planning arena, the global-scale issues in the human-nature relationship have already been significantly acknowledged. As an outcome of the modernisation process, human-nature interaction has become a global-scale issue with common worldwide concerns.

To this point, the term "scale" has been used by a variety of scholars to denote the degree of the human manipulation of nature. In early civilisations, human beings had direct interaction with a pristine, untouched nature. Subsequent encroachments on the natural world led to the formation of villages and small-scale towns and cities. Later, during the modernisation process, the city and urban features became so significantly important that human development changed the remaining pristine natural realm and structures in absolute terms. This change in scale continued to expand until the last visage of an untouched nature all but disappeared [16, 21].

However, this paper introduces another aspect of the scale of human-nature interaction. This aspect relates to the need for a consideration of the reciprocal effects of the scales of the human-nature relationship and consequently how they reflect on the design and planning process. This research introduces the necessity of moving forwards and backwards between different scales of human-nature interaction. Although the magnitude of the study on this relationship is essentially global, the belief that each context must be studied separately is upheld. In other words, in order to achieve a sustainable human-nature relationship, the global solutions to the needs, potentials and problems of human beings and nature need to comply with the detailed characteristics of each single context. Here, the term "context" refers to various scales, including region, country, city, neighbourhood, group, and each individual.

The following short explanation from Makower posited in 2014 further clarifies the interconnection of the terms "scale" and "context".

The essence of scale is that it is simultaneously finite and infinite. When we observe a building from the perspective of scale, we observe it as it is, embedded in its localised context. But we are also aware of the fact that at the lower end of the scale its details do not end with a doorknob, and that at the upper end of the scale it is a part of a neighbourhood, a city, a country and a greater economic and political region ... In architecture and urbanism, scale thus oscillates between the tangible and the material on the one hand and the abstract and the conceptual on the other... [22, p. 9].

As a result, studying different scales and their mutual effects is essential to achieving sustainable design and planning. As an outcome of this section of the paper, the reciprocal effects among various scales have been acknowledged in the context of designing and planning in terms of the human-nature relationship. The explicit admission of such a necessity will subsequently create a new step in moving towards sustainability.

4. Challenge 3: Adhering to or Going Beyond Environmental Sustainability

In the previous section, some of the key aspects of the modernisation process in terms of human-nature interaction were discussed. However, the modernisation process and technology were considered from a more tangible perspective, that is, scale. This section discusses the human-nature relationship from a more subjective viewpoint. This viewpoint includes the debate about the possibility or, more precisely, the need of going beyond the physical and mental concerns in forming a win-win relationship between human beings and nature.

In the two (most) prevalent and binary visions pertaining to the relationship between humans and nature, one (the most important) key concern is protection. In the "taming" or controlling approach,

nature is regarded as a wild and uncontrollable entity that can be threatening, hostile and dangerous to human beings. Hence, followers of this approach believe that humankind should actively tame nature in order to eliminate or diminish its potential dangers and devastations [3]. Meanwhile, in the "protecting" approach, nature is regarded as valuable in itself, regardless of its utility for humans. In other words, in full contrast to the taming approach, the eco-centric/bio-centric approach of protecting nature suggests that nature should be protected from all human activities and interferences. This view is adopted by many environmentalists and conservationists who emphasise the inherent values of nature [3, 13, 23]. This comparison is further clarified in Fig. 4.

In the two mentioned practical approaches then, the core of the relationship lies in recognising each world as an "opposite", as an impeding and dangerous entity that threatens the survival and progress of the other and one that necessitates protective measures. Of course, this negates any possibility of positive interaction between human beings and nature. In contrast to these two approaches, a practical approach with a more positive viewpoint of the human-nature relationship would involve the possibility of developing the interaction. As discussed by Kellert [17], in a restorative environmental approach, for example, there are two important aspects: minimising the adverse environmental effects of modern construction and development; and designing in a way that provides sufficient and satisfying contact between people and nature. In such a viewpoint, the low-environmental-impact design, which is based on reducing the negative impact on nature, should be complemented by a positive-environmental-impact design or a biophilic design.

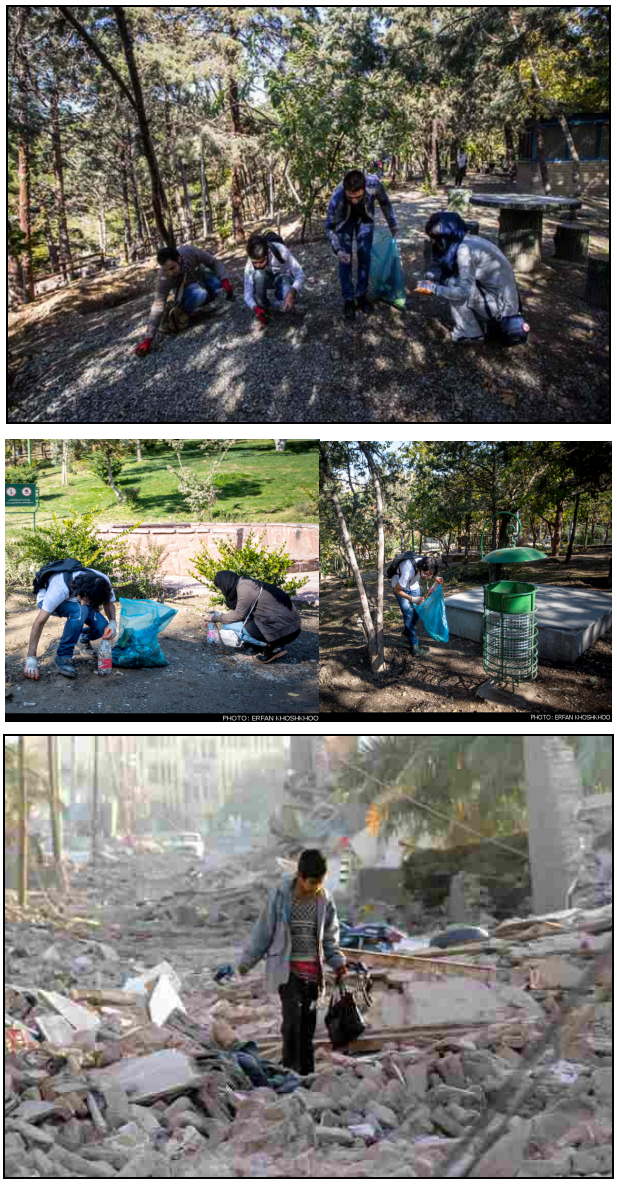

Fig. 4 (Top and middle) Nature protected from human activities: groups of volunteers collecting and removing garbage in Taleghani Park, Tehran, Iran, 2014 [24]; (Bottom) The need for the protection of human beings from the dangerous face of nature: the Bam earthquake in Iran in 2003, an example of a natural disaster [25].

The biophilic or restorative environmental approach thus encompasses environmental design but adds the possibility of positive human-nature interaction to it. However, even in viewpoints that consider the

possibility of mutual interaction between human beings and nature, such as biophilic design, the main focus has largely been on just two aspects of physical and mental health. This paper thus introduces another aspect to the practical approaches that involve a positive possibility of human-nature interaction. That is, the aspect of reflecting a cultural affinity with nature in design and planning. In other words, this paper posits that the areas of physical and mental health must be complemented by the context-based features. This would then result in moving towards achieving physical, mental and, ultimately, cultural health. The context-based characteristics, especially the socio-cultural and historical features, need to be addressed in order to achieve sustainability in a comprehensive sense.

The discussion about the role of context-based features in forming and affecting the relationship between human beings and nature can also be traced in a more implicit manner throughout the debates about place attachment. The tripartite framework for place attachment proposed by Scannell and Gifford in 2010 is exemplified here to further clarify the point.

This framework proposes that place attachment is a multidimensional concept with person, psychological process, and place dimensions ... The first dimension is the actor: who is attached? To what extent is the attachment based on individually and collectively held meanings? The second dimension is the psychological process: how are affect, cognition, and behaviour manifested in the attachment? The third dimension is the object of the attachment, including place characteristics: what is the attachment to, and what is the nature of, this place? [26, p. 2].

The co-presence of social, cultural, physical and cognition (mental) characteristics in forming the place attachment concept is evident in Scannell and Gifford's tripartite framework, which is presented in Fig. 5. The social and cultural aspects in this diagram demonstrate the role of the context-based features in forming place attachment in designing and planning in terms of human-nature interaction [26].

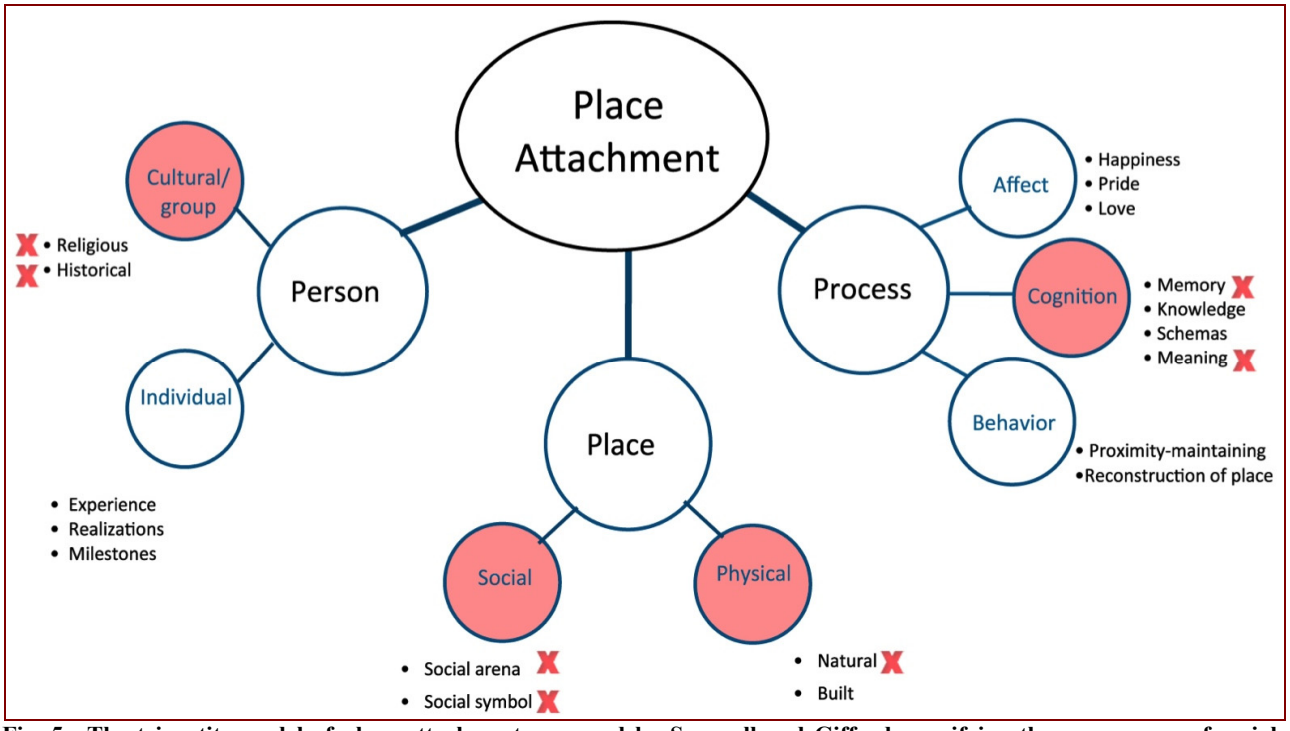

Fig. 5 The tripartite model of place attachment proposed by Scannell and Gifford, specifying the co-presence of social, cultural, physical and cognition characteristics in forming the place attachment (Source of the original diagram: Ref. [26]).

It should be noted that in certain key scholarly debates about specific practical approaches to human-nature interaction, the cultural and historical aspects have already been acknowledged. For instance, as was discussed by Kellert in 2005, a biophilic design or restorative environmental approach entails two dimensions of organic (naturalistic) design and vernacular (place-based) design. "Organic design involves the use of shapes and forms in buildings and landscapes that directly, indirectly, or symbolically elicit people's inherent affinity for the natural environment" [17, p. 5]. This approach can be realised through using natural systems of lighting and ventilation, organic materials and natural elements such as water and vegetation. It can also be achieved through the application of non-functional, decorative and ornamental elements. Meanwhile, "[V]ernacular design refers to the buildings and landscapes that foster an attachment to place by connecting culture, history and ecology within a geographical context" [17, pp. 4, 5]. Restorative environmental design can be referred to as green or sustainable design due to its focus on establishing a win-win human-nature interaction [12, 17, 20].

Although the necessity of considering the context-based features in design have already been addressed in Kellert's and certain other scholars' viewpoints of human-nature interaction, the physical and mental aspects have been reflected in designs with greater weight [17]. In other words, the physical, mental and socio-cultural characteristics have not yet been addressed in design and planning with equal share. This paper thus explicitly posits the necessity of allocating a greater weight to this previously disregarded or overlooked aspect in order to create a balance between different aspects of sustainability in the design and planning arena. The following example, as a proposed prototype project for the future, further clarifies this point and is presented in the following images (Fig. 6).

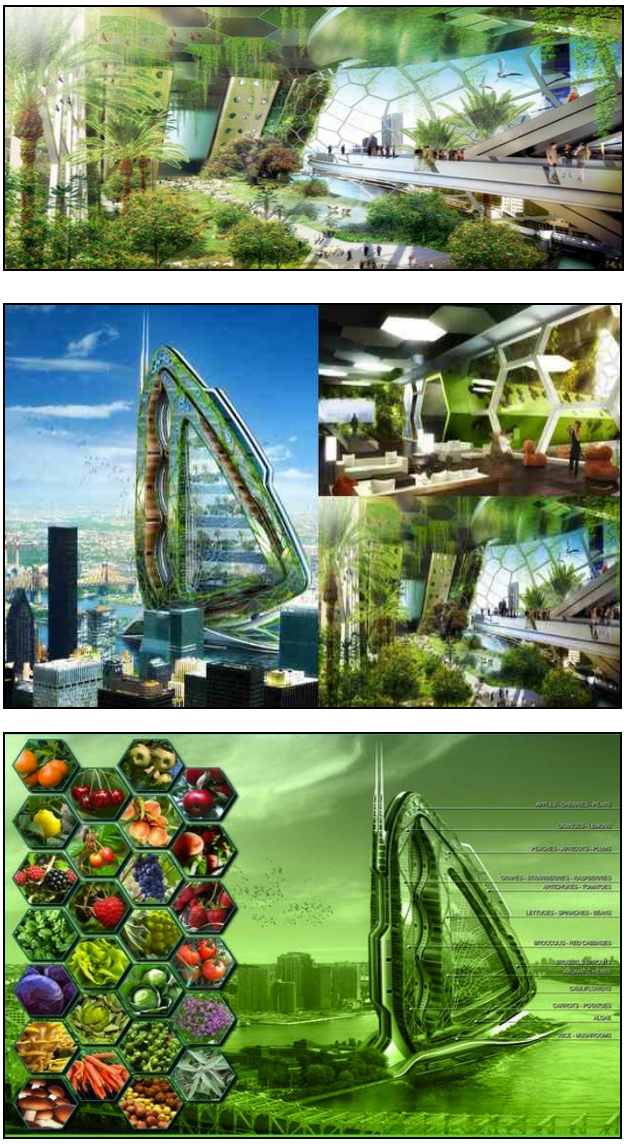

Fig. 6 Dragonfly: a 132-floor metabolic farm for urban agriculture in New York City, 2009, by Vincent Callebaut Architects [27].

Dragonfly, a nourishing vertically cultivated central park designed by Vincent Callebaut Architectures Paris in 2009, is supposed to be a vertical farm, self-sufficient in terms of food and water and in terms of energy through producing energy via biomass, photovoltaic cells and other renewable energy sources such as thermic solar, photovoltaic solar, wind, and tide-turbine energies [27]. The rationale behind this prototype was described as follows:

According to the PNUD (Programme of the United

Nations for the Development), the worldwide urban population will go from 3.1 billion of inhabitants in 2009 up to 5.5 billion of inhabitants within 2025...The architecture of the Dragonfly prototype suggests reinventing the vertical building (that outlined the urbanistic booming of New York City since the 19th Century) as structurally and functionally as ecologically and energetically ... The architecture has to be in the service of this new agriculture and to design this new social desire in this context of ecologic mutation and food autonomy! The Dragonfly project suggests therefore building a prototype of urban farm offering around a mixed programme of housing, offices and laboratories in ecological engineering, farming spaces which are vertically laid out in several floors and partly cultivated by its own inhabitants [27].

While considering the above explanation of the proposed prototype for New York City, "Roosevelt Island", it becomes clear that the project explicitly considered environmental or, more precisely, ecological sustainability. The social aspect has also been noted to some extent, albeit from a limited, specific viewpoint. In order to achieve sustainability in a fuller sense, it is necessary to explicitly and completely address the cultural and social aspects of sustainability. Reviewing this and other similar contemporary proposed projects raises the challenge of how cultural and social sustainability can also be achieved. This section can be summarised in terms of its suggestion to allocate sufficient weight to the cultural and social aspects of sustainability such that it parallels that of the ecological aspect. With this, we could achieve a fully sustainable design and planning arena.

5. Conclusions

This paper discussed three of the key challenges in the human-nature relationship that have thus far been overlooked or ignored. It was argued that these aspects must be moved to the foreground in the design and planning process that involves the human-nature relationship in order that we can achieve sustainability in a full sense. The three discussed aspects in this paper were the changes in the definition of the term "nature", the reciprocal effects among scales and adhering to or going beyond environmental sustainability. How these three challenges can form, affect and improve the human-nature relationship is summarised and graphically presented in Fig. 7, which serves as the main conclusion of this paper.

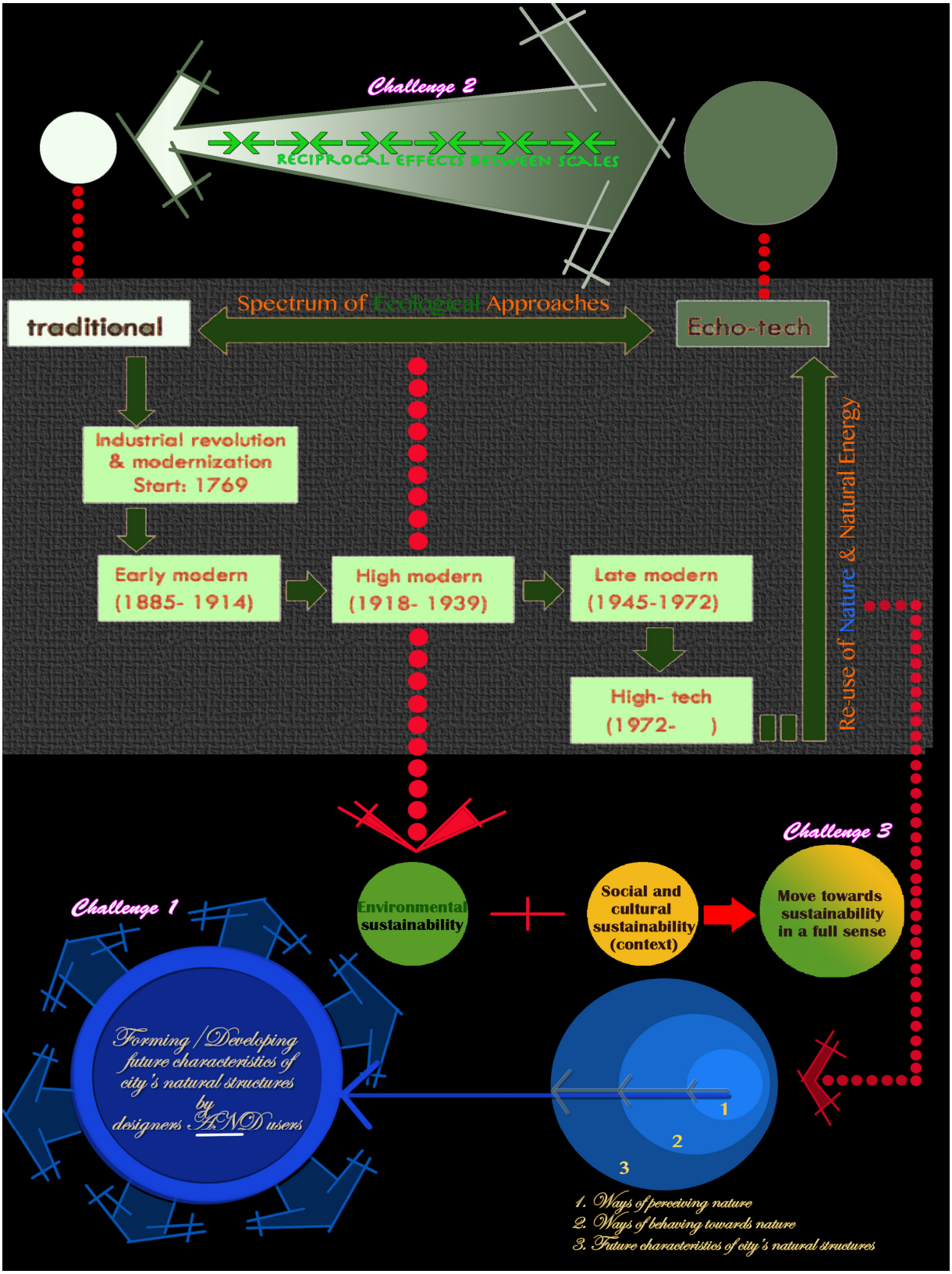

Fig. 7 Paper conclusion in a graphic presentation: the role of the three challenges in an integrated cycle moving towards sustainability (Source: Author; Source of the applied dates: Ref. [21]).

In a summarised explanation of this concluding diagram, it should be noted that since the Industrial Revolution and the advent of modernisation, the scale of human-nature interaction has significantly changed. This initially resulted in a distancing from traditional viewpoints and a subsequent deviation from the presence of nature in designs. However, later, the re-adoption of nature and natural structures has been reflected in the design and planning arena through key practical approaches such as environmental or ecological approaches.

Considering the existing spectrum of ecological approaches, going beyond the aspect of "protection" and creating a mutually supportive human-nature interaction is necessary. In order to achieve this win-win relationship, however, going beyond the environmental concerns is inevitable. In other words, in order to achieve a full sustainability, environmental aspects need to be complemented by the context-based issues, especially in terms of social and cultural sustainability (challenge 3 in this paper).

As a result of the shift from traditional to eco-tech design, and the subsequent possible increase in scale of the human-nature relationship, it becomes necessary to reconsider the existing values in various scales. In other words, considering the reciprocal effects of different scales in the human-nature relationship and reflecting this point in the design and planning process is a step forward in achieving sustainability across all scales. As a result, the needs, potentials and problems must be addressed in various scales, including region, country, city, neighbourhood, group, and each individual (challenge 2 in this paper).

However, in the designing and planning process on any scale that includes a focus on any aspect of sustainability, the initial challenge lies in how nature is defined. In other words, the ways of perceiving nature and the ways of behaving towards nature need to be studied as a key initial challenge for design in order that we can investigate the possible ways of forming and developing the future characteristics of a city's natural structures in terms of both designers and users (challenge 1 in this paper).

As a final point, it should be noted that this paper discussed three key challenges that can result in moving us towards fully sustainable design and planning. These three challenges were selected from a range of subjective and objective challenges. However, in future research, a variety of other latent, overlooked or disregarded concerns could also be investigated. Furthermore, further detailed analysis of these three challenges in specified contexts and case studies could open up a research platform for comparison. This would then create a future investigative context of how the common challenges can similarly and dissimilarly develop human-nature interaction in various contexts and backgrounds.

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