EXPLORATION OF DESIGN FOR COHABITATION WITH NATURE THROUGH NATURE EXPERIENCE (NEX)

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ABSTRACT

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This thesis aims to suggest an approach to design for human and nature cohabitation. For this aim, this study situates human and nature interaction as nature experience (NEX) by applying user experience design. The fieldwork of this study is small interview groups conducted with young people from nature-related professional backgrounds. Based on the literature review and findings of the fieldwork, this thesis suggests five main conclusions. Firstly, nature is a socio-ecological-cultural system. Secondly, nature experience is a reciprocal process for all species. Thirdly, nature experiences in urban settings are non-inclusive in terms of ecological reality. Fourthly, the ideal nature experience is participatory. Fifthly, designers should embrace Cohabitation Intelligence (CI) as an approach to design for cohabitation. Cohabitation Intelligence is a non-human-centered design approach that requires systems thinking and ethical awareness to notice NEXs between humans and nature. This thesis contributes to the literature by developing NEX and Cohabitation Intelligence (CI) for the design for cohabitation with nature.

Keywords: Nature Experience (NEX), Design for Cohabitation, Experience Design, Non-Human Living Beings

ÖZ

DOĞA DENEYİMİ ARACILIĞIYLA DOĞA İLE BİRLİKTE YAŞAM TASARIMININ KEŞFİ

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Bu tez çalışması, insan ve doğanın birlikte yaşam tasarımı için bir yaklaşım önermeyi amaçlamaktadır. Bu amaçla, bu çalışma insan ve doğa etkileşimini kullanıcı deneyimi tasarımından faydalanarak, doğa deneyimi (NEX) olarak ele alır. Bu çalışmanın saha çalışması, doğa ile ilgili uzmanlık alanlarından gelen genç katılımcılarla yapılan küçük görüşme gruplarıdır. Literatür taraması ve saha çalışmasının bulgularına dayanarak, bu tez beş çıkarım ortaya koymaktadır. Birinci çıkarıma göre, doğa sosyo-ekolojik-kültürel bir sistemdir. İkinci olarak, doğa deneyimi tüm türler için karşılıklı bir deneyimdir. Üçüncü çıkarım, kentsel alanlardaki doğa deneyimleri ekolojik gerçeklik açısından kapsayıcı olmayan deneyimlerdir. Dördüncü olarak, ideal doğa deneyimi katılımcı bir deneyimdir. Beşinci çıkarıma göre, doğa ile birlikte yaşam tasarımı için tasarımcılar Birlikte Yaşam Zekası olarak adlandırılan yaklaşımı benimsemelidirler. Birlikte Yaşam Zekası, insan ve doğa arasındaki etkileşimleri (NEX) fark edebilmek için sistem odaklı düşünme ve etik farkındalık gerektiren insan merkezli olmayan bir yaklaşımdır. Bu tez çalışması, NEX ve ve *Birlikte Yaşam Zekası* yaklaşımını geliştirip önererek doğayla birlikte yaşam tasarımı konusunda literatüre katkıda bulunur.

Anahtar Kelimeler: Doğa Deneyimi, Birlikte Yaşam Tasarımı, Deneyim Tasarımı, İnsan Dışı Canlı Varlıklar

To *Nature*

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LIST OF ABBREVIATIONS

ABBREVIATIONS

NEX: Nature Experience

CI: Cohabitation Intelligence

HCD: Human-Centered Design

HCI: Human Computer Interaction

DfSB: Design for Sustainable Behavior

CHAPTER 1

INTRODUCTION

> Designer was taught to listen to all voices, no matter how weak.
> Maybe we should ask the birds what they want? Perhaps they can help?
> thought Designer. (Sandelin, 2018, p.11)

We are not able to practically ask birds what they want; however, we cohabitate with many birds in urban areas more than ever before. Humans caused the extinction of some bird species due to close interaction with different goals. Beyond birds, we construct diverse interactions with nature from the beginning of life. Through time, these interactions resulted in the degradation of nature and environmental crises.

1.1. Anthropocene, Cohabitation, and City

Humans in the age of extreme climate change show their impact on rising seas, resource reduction, ecosystem migration, and many species extinction (Weller et al., n.d.). Design researcher Stuart Walker indicates that:

> When we create things we draw on the materials of the earth. In the process, we unavoidably alter and in some way diminish the natural world. To build a road, we dig up vegetation and soil that may have been centuries in the making. We blast and crush rock and exploit hydrocarbons, which were formed over millions of years. And we pave over land that once provided habitats, absorbed rainfall and was part of the ever-changing cycles of nature. Such industrious human activities have long been so commonplace that they are done without compunction. (Walker, 2010, p.813)

In particular, these human activities transformed the world to a considerable extent; the current epoch is described with a term to emphasize the human as the significant reason behind this ecological damage: Anthropocene (Crutzen & Stoermer, 2000).

Human activities have been shaping the life conditions on Earth (Ahlborg et al., 2019). However, Anthropocene promises how we are connected with other species in the complexity of socio-technical systems (Smith et al., 2017) instead of the duality of human and nature (Haraway, 2016). This duality devises other species as resources to be exploited, problems to get rid of for human needs (Heitlinger & Comber, 2018). Furthermore, these kinds of dualistic approaches do not function in the age of Anthropocene (Heitlinger & Comber, 2018). Since "in the Anthropocene, there is no place on Earth that remains 'untouched' by humans, even the pollution we have projected into the air has made its way to into the furthest reached of the planet" (Smith et al., 2017). Hence, we cannot separate nature from human due to our connection.

This new epoch with the degraded nature is like a mirror in which humans can see the results of their activities. This thesis situates Anthropocene as a perspective that humans and nature are entanglements due to the transformation of the environment. Hence, the cohabitation of humans and nature is the assemblage of human and nature entanglements in the Anthropocene.

Urban settings are progressively entangled human-nonhuman places that unfold the possibilities for increased multispecies interaction (Smith et al., 2017). Cities are complex socio-technical systems (Smith et al., 2017; Ahlborg et al., 2019), which are networks of social and technical interconnections. However, there are emerging approaches for situating cities as socio-ecological systems to address the human and environment relationship in Anthropocene (Ahlborg et al., 2019).

1.2. Human and Nature Relationship as NEX

This thesis situates nature experience (NEX) as an approach to understand and explore the connections of humans with nature. In other words, it employs human and nature interaction and relationship as NEX. This research also emphasizes and tries to understand the designer's position and responsibilities for this cohabitation since

design can operate between humans and nature for an alternative future with cohabitation. This study approaches nature as an ecologically complex and interactive system with its all biotic factors like animals, plants and bacteria, and abiotic, non-living ones like air, water and soil.

1.3. Aim of the Study

This thesis aims to suggest an approach to design for human and nature cohabitation. In order to achieve this, it discovers fields and positions that design discipline can take by exploring the nature experiences of young people from nature-related professional backgrounds. Thus, it is expected to contribute to transforming the relationship between humans and nature for a better cohabitation in the urban environment. Concerning this aim, this study aims to answer the following questions:

Main Question

What are the nature experiences of young people from nature-related professions toward urban cohabitation?

Sub Questions

1. How do these young people define the ideal nature experience for a better cohabitation?
2. How do these young people perceive nature?
3. How can design discipline act to construct a better relationship with nature?

The Scope of the Study

This study explores the human and nature relationships within the urban context from a designer's perspective by referring to *user experience design*. Firstly, it discovers how nature has been manifested through literature and how design functioned for nature through its practices in quasi-chronological order. Concerning this, human and

nature relationship is described as nature experience (NEX) for the cohabitation of both parties. Secondly, it gathers different nature experiences through the pre-acceptance of this diversity for cohabitation in the urban context. Thus, this thesis looks at nature experience for cohabitation and how designers can design for an advanced cohabitation by applying the experience framework.

The Structure of the Study

This thesis consists of five chapters*: Introduction, Literature Review, Methodology, Findings*, and *Conclusion*.

After the introductory chapter, I present the related works from the literature. This review includes five headings. In the first heading, I submit manifestations of nature regarding human and nature relationship. In the second one, I look at how design functioned for nature through its evolution for sustainability, which shows the transformation of design discipline from product-based approaches to systemic approaches. The third heading offers experience design as a sustainable design approach and introduces its fundamentals and human-centered design. In the fourth heading, I review the nature experience (NEX) by discussing its theoretical framework and characteristics. The fifth heading introduces design for cohabitation through the critique of human exceptionalism under non-human centered design. After introducing the necessity of non-human centered design to survive in a system of socio-technical systems and ecological systems, I review proposed design approaches to design for cohabitation. In the methodology chapter, I explain the research methodology which is a small interview group conducted by inviting young people from nature-related professions and I share its reasonings and the implementation process. In the findings, I present the perceptions of nature, the attributions of nature experience in urban settings, the current relations with nature young professionals cohabitate in urban settings, and related problems, and suggestions of young professionals for an advanced cohabitation. The concluding chapter summarizes the

study, presents and discusses the conclusions, and provides suggestions for further research.

CHAPTER 2

LITERATURE REVIEW

The literature review embraces the human-nature relationships with a theoretical framework defining this relationship as nature experience.

Firstly, I share the related work about what is nature as the *Manifestations of Nature*. Secondly, I present how nature was manifested into design literature. Thirdly, I submit *Design for Sustainability through Experience* by stating the theoretical framework of this thesis. Fourthly, I introduce a new term *Nature Experience (NEX)* as an approach to design for cohabitation by reviewing the related works out of design. Finally, I submit the emerging approaches and methodologies for the *Design for Cohabitation with Nature.*

2.1. The Manifestations of Nature

In this heading, I present prominent manifestations of nature and values attributed to it from the related works in order to understand how nature is conceptualized. I review these manifestations as *Nature as Resource*, *Nature as Perception*, and *Nature as Culture*.

2.1.1. Nature as Resource

The common value of nature is its utilitarian value as a resource (Kellert, 2004). These values include nature as a biological resource, industrial resource (Rezende, 2017; Kellert, 2004), and psychological resources for recreation and wellbeing (Tussyadiah, 2014; Francis et al., 2013; Kaplan & Kaplan, 1989).

Kellert (2014) indicates that utility is the traditional and reductionist sense of material benefit, which is the result of exploiting nature. According to him, the natural world was an essential resource and physical security. However, he adds this dependence to nature was reclaimed by modern society through a discourse of domestication of the wild world, which is an illusion.

Besides, Vining suggests that "for many in the industrial world nature has become a sentimental luxury" (2003, p.90). Similarly, Soga and Gaston (2016) indicate that natural components are considered as luxury even by city planners and policymakers. Concerning the necessity of urban, Chan et al. (2016) state that when nature is used as an instrument for a benefit, this instrumental perception of nature might make it replaceable.

2.1.2. Nature as Perception

Speculative biologist Uexküll (2010) calls nature as Umwelt, which describes what means nature for livings. According to him, all living beings in nature are the subjects, and how they live depends on how they perceive their world, Umwelt. In particular, how nature is perceived is flexible to social context (Clayton et al., 2017; Drenthen et al., 2009). In parallel, Francis et al. (2013) reveal that some middle year students perceive nature as a place to go to, not a place to be. Since when those students are asked to draw themselves in nature, three students share that they *"had not been to nature"*. According to the findings, along with these three students, some other students' response with similar concerns by saying that they do not go to nature often. According to the researchers, this shows that nature is experienced as a destination to go due to the trip like visits to nature, rather than an everyday interaction. What is more, there is a vision of nature only including plants, trees, water, and some terrains with a focus on "green-ness" with a reduced human and animal presence among these students (Francis et al., 2013).

Different conceptualization of nature gets in shape through previous experience and beliefs along with the attributes of nature, which individuals focused on (Lekies et al., 2015). Similarly, Drenthen et al. indicate (2009) that the complexities of nature perception also expand the complexity in human-nature relationships. What is more, they also state our nature view is influenced by novel technological advancements since nature and technology are deeply intertwined according to the surveys providing public visions of nature. Each new technology opens a new branch in the human-nature relationship by making it complex (Drenthen et al., 2009).

Nature is seen as more complex than formerly recognized, and new technological understandings find it essential to review that technological tools make many old nature ideas transformative, and there is no favored vision on nature. (Drenthen et al., 2009). They also add that conventional science and technology institutions are challenged by the plurality of these perspectives and epistemologies. According to them, the complexity in our nature image increases, and there is a crowd of new nature visions since nature "becomes increasingly intertwined with all kinds of cultural and technical mediations" (Drenthen et al., 2009, p.10).

2.1.3. Nature as Culture

According to Drenthen et al. (2009), there is a traditional idea that there is an apparent separation between cultural that is human and natural. In opposite to these ideas:

> Nature and society are intimately linked, if nature has become culturalized and culture naturalized than we can no longer separate the 'authentic' and 'natural' form the 'artificial', 'unnatural' and 'false'. The moral consequences of this have still to be thought through. (Drenthen et al., 2009, p.9)

Similarly, Haraway (1991) states that nature and artificial are profoundly related to each other that this makes the separation of nature from humans and the cultural questionable. Drenthen et al. (2009) point out that the ideas of nature are intensely mediated by culture. Abram and Lien (2011) indicate that nature is a cultural concept.

In particular, there are several nature perceptions and categorizations (Kellert, 2004; Drenthen et al., 2009; Cronon, 1995). Rezende embraces "the idea of nature being a construct of culture as much as culture is a construct of natural processes and phenomena" (2017, p.123). According to her, some historical actors conceived nature as a phenomenon that is separated from culture through global capitalist expansion in the nineteenth century.

Furthermore, Haraway (2003) offers *natureculture* to describe the coexistence of nature and culture that is human. It is an assemblage of nature and culture that embraces ecological relationships, and this concept emerges from the human and nature duality. Similarly, Weller et al. also put emphasizes on nature as a cultural notion along with its recognition as an ecosystem:

> We consider nature to be an all-inclusive, evolving system of which humans have substantial yet incomplete scientific and cultural knowledge. We believe terrestrial nature, i.e. 'the landscape' is best understood as simultaneously an ecosystem and a cultural system—a recognition that urban agglomeration economies and rural processes of extraction and transport now form a planetary network. (Weller et al., n.d.)

Haraway (1992) points out that nature is a cultural product, and a commonplace to "rebuild public culture" (p.296), but nature is not:

> a physical place to which one can go, nor a treasure to fence in or bank, nor as essence to be saved or violated. Nature is not hidden and so does not need to be unveiled. Nature is not a text to be read in the codes of mathematics and biomedicine. It is not the "other" who offers origin, replenishment, and service. Neither mother, nurse, nor slave, nature is not matrix, resource, or tool for the reproduction of man. (Haraway, 1992, p.296)

To sum up, even though there are ideas separating human and nature, human culture transformed nature. While nature was culturalized, culture was also naturalized. Thus, it is not viable to divide artificial and natural. Nature is a system of ecosystem and culture.

2.1.4. Summary

Nature was a biological resource to humanity from the very beginning of life. Later, biological value turned into industrial value, which turned nature into an industrial resource. Nature was utilized as a material. In the modern urban world, nature is considered a luxury rather than a necessity. Thus, nature loses its visibility in urban settings by transforming from a biological resource to a replaceable material.

Within modernization, the changed social contexts of people and relations with nature turned nature into a perceptual reality. Decreased everyday interaction with nature manifested as the reduced nature image in terms of species and the separation of humans from nature for some young people. Thus, those demonstrate that their relationship with nature is *going to nature* rather than *being in nature*. However, going to nature is also not a frequent activity. Besides, technology also increased nature ideas by making it more complex. Thus, there is no favored nature perception but many public visions of nature.

The traditional ideas conceptualize nature as a separate concept from the human. However, human culture has made nature evolve into a cultural product, as well as nature transforms culture. Thus, there is a reciprocal impact between nature and culture. Besides, nature is not only an ecosystem but also a cultural system, which increased its complexity. Furthermore, all these demonstrate that pristine nature is questionable.

I infer that although there is a plurality in visions of nature, the major categorization is the separation of physical nature and cultural nature. While physical nature includes all the ecological entities, cultural nature is the reflection of cultural mediations. However, this categorization is not functional to understand the manifestations of nature; on the contrary, a system of their assemblage is operational to comprehend its complexity. This assemblage is the ecological-cultural system.

2.2. Nature in Design: Sustainable Design

In this heading, I present an overview of how nature was given a position in the design discipline, in other words, how nature is manifested in the design discipline. The environmental degradation, which was initiated by consumerism, is where design discipline recognizes nature as an entity to improve its wellbeing along with human welfare. I submit this overview by making a quasi-chronological order of how design responded to ecological degradation. This heading includes nature as a material resource for design, design responsibility towards nature, and the evolution of design for sustainability.

2.2.1. Nature as a Material Resource for Design

Today, there is a distance between designers who build our artificial world with their product designs and nature from the very beginning of the design process (Mohammadganjee & Shahhoseiny, 2019). The current material culture scholars and design historians also accept that nature might lack the agent in the discourse of design (Rezende, 2017).

The design profession utilizes nature by applying human and financial capital to create artifacts, resulting in the transformation of *nature capital* into *human-made capital* (Fuad-Luke, 2009, p.XIX). This conceptual and practical transformation of nature into *raw materials* and *natural resources* to create artifacts is the commodification of nature and regarded as an untackled issue by some scholars in design research (Rezende, 2017). This transformed capital gains its form through symbolic capital, which characterizes societal values leading the design of perception of reality (Fuad-Luke, 2009, p.XIX). Nature was conceptualized as a reality to be separated from and spoiled through culture (Rezende, 2017), and design was operated to mediate industrial as products "culturally—socially, economically, symbolically, and practically" (Findeli, 2001, p.15) acceptable artifacts to alleviate the shock and impact

of industrialization in the period of global capitalist expansion by the industrial revolution.

However, the industrial revolution came with its massive implications on humanity and planet, the impact of which cannot be alleviated by the products, but proclaimed by philosophical movements mirrored "on its social, moral, ethical and environmental implications" (Vicente et al., 2012, p.2).

2.2.2. The Responsibility of Design

As a "powerful tool to shape" (Papanek, 1984, p.14) its social and natural environment, the design profession demands a high social and moral responsibility from its professional practitioners (Papanek, 1984). The design responsibility is the self-awareness and consciousness of designers for the fact that "they somehow recreate the world" (Findeli, 2001, p.14) through their engagement in any design project.

Papanek (1984) states that the design profession is one of the most dangerous professions, in fact, the second harmful profession after advertising due to the impact of designed objects for the environment (Papanek, 1984). According to him, the acts of designers inserted a murder at the mass production; in other words, there are murders on the assembly lines: design objects. These designed objects turned into "whole new species of permanent garbage to clutter up the landscape" (Papanek, 1984, p.14) when they completed their mission for their human. These object murders are suited with "materials and processes that pollute the air we breathe", which is a design decision given by educated designers. Materials and processes are the productions of science and technology; however, the frame which defines the decisions of a designer is not technology; it is ethics (Findeli, 2001). Whiteley (1993) argues that designers are responsible for the social and environmental impacts of their practices as a moral and ethical obligation. From an ethical point, Papanek (1984) proposes to the

professionals of architecture, design, and planning to stop working entirely as the most straightforward solution:

> In an environment that is screwed up visually, physically, and chemically, the best and simplest thing that architects, industrial designers, planners, etc., could do for humanity would be to stop working entirely. In all pollution, designers are implicated at least partially. (Papanek, 1984, pp. 18-19)

However, designers might work differently by "acting" instead of "not working". There are some paradigm shifts in design, which implies that a design artifact should not be granted as the natural outcome of a design project (Findeli, 2001, p. 14). These paradigm shifts expect from designers to "act rather than to make" (Findeli, 2001, p.14) within the complex systems. This shift positions "making (poiesis)" as "only a special case of acting (praxis), to the extent that even 'not making' is still 'acting'" (Findeli, 2001, p. 14). Although proposing no more design work, Papanek also indicates that there are works design can do, and that is "work positively" (p.19). According to Papanek (1984), the design has the ability and responsibility to be transformed into a way in which youth can act to change society. In order to cope with this challenge, the design should determine "its own agenda for positive change" (Fuad-Luke, 2009, p.XXI).

Besides, design has been implicated over the dystopia through artifacts (Papanek, 1984). Industrial designers centered the human in their approach to making better artifacts to compete. However, Walker (2010) indicates that this is caused by the restriction of product designer's work to these artifacts. Sherwin (2004) indicates that design processes should contribute to the environment and society by acknowledging ecological limits by demonstrating more responsibility.

"Our relationship with nature is broken"; however, there are many responses in the design profession that raise hope to fix it from within (Antonelli, 2018, p.7). While

regarded as the broker of this relationship (Papanek, 1984), the design is also considered as the hope to fix it. In light of these statements, the next heading provides an overview of how design acted like working positively and creating "environmental positives" by decreasing its negative effect on nature. However, the story of the design looks different in terms of "environmental positives" (Fuad-Luke, 2009, p.49).

2.2.3. Evolution of Design for Sustainability

In this heading, I present an overview of how design took responsibility to make improvements for nature by responding to ecological degradation. These responses come with paradigm shifts in design that aim to reach a higher positiveness for nature. In the next heading, I discuss sustainability which is the primary agency for these shifts in design, which is followed by the list of these design paradigms for sustainability.

2.2.3.1. Sustainability

Humanity and the economy have been dealing with increased stress and responsibility for the environment and society for decades (McLaren et al., 1998). Hence, sustainability is an exceptional challenge of the century, along with its utopian and controversial concept (Fuad-Luke, 2009). However, utopian thinking might be an essential philosophy to overcome this ecological decline (Bookchin, 1982). The foundation of sustainability is based on the connection between human beings and nature (Vicente et al., 2012). Hawken et al. (2000) point out that sustainability is nothing beyond a change of personal, societal, and economic behavior. It is also described as "a dynamic process which enables all people to realize their potential and to improve their quality of life in ways that simultaneously protect and enhance the Earth's life support systems" (Forum for the Future, 1996). The latest approaches widely and recently recognize sustainability as a system property (Gaziulusoy, 2010; Clayton & Radcliffe, 1996).

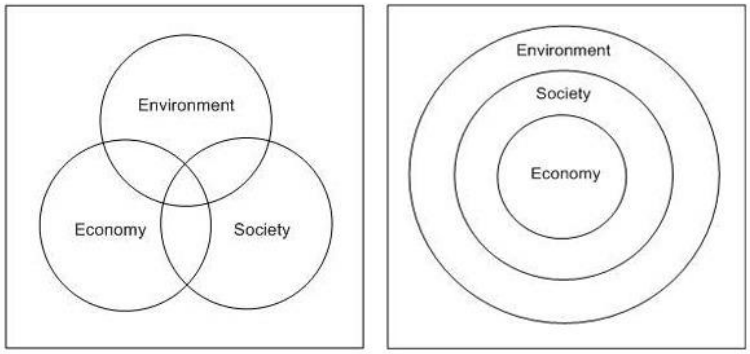

Figure 2.1. The weak and strong sustainability model

(Gaziulusoy, 2010, p.13)

According to Gaziulusoy (2010), sustainability has two models as a system property (Figure 2.1). These models are described as weak and strong sustainability models, and these models present different environmental, economic, and social relations:

> The strong sustainability model captures the interconnectedness of the environment, society, and economy better than the weak sustainability model does. As a result, the model provides a holistic standpoint which allows a better understanding of the effects of interrelationships taking place between the environment, society and the economy. As stated previously, the conceptual priority of sustainable development in society. Nevertheless, hierarchical interdependencies dictate the environment to be the operational priority since both society and economy are dependent on the environment as the provider of resources necessary to live and to produce. The economy is the subset of society as being both the result and the cause of some societal activities. (Gaziulusoy, 2010, p.14)

In other words, the strong sustainability model is a holistic approach to understand the interrelationships among the environment, society, and economy. However, the weak sustainability model is not capable of covering all the interrelations between those actors. Hence, this understanding of sustainability as a system property can function to understand interrelations between humans and nature in the socio-technical systems.

2.2.3.2. Sustainable Design

In particular, the story of design has been initially and mainly involved around sustainability in terms of its relations with nature (Vicente et al., 2012; Fuad-Luke, 2009; Myers, 2012/2018). *Sustainable design* was the response of designers (Ceschin & Gaziulusoy, 2016; Sherwin, 2004) for ecological degradation along with the reaction of the industry as *sustainability* and *sustainable development* concepts (Hawken et al., 2000). *Sustainable development* is generally described as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development [WCED], 1987, p. 43). Sustainability is often discussed by giving reference to future generations in terms of natural resources (Wood, 2000). However, there is an emerging field of sustainability science that focuses on finding out the essential character of nature-society interactions (Kates et al., 2001).

In the early 1980s, design has started to engage systematically with sustainability with interest from industry in environmental and social issues after the sporadic engagements initiated by pioneers like Buckminster Fuller and Victor Papanek since mid-twentieth century (Ceschin & Gaziulusoy, 2016). "With the spread of the Sustainable-Design approach, some of the focus was turned to eliminating harmful influence on the environment" (Tarazi et al., 2019, p.1622). In particular, Papanek (1995) states that:

> Perhaps there should be no special category called "sustainable design". It might be simpler to assume that all designers will try to reshape their values and their work, so that all design is based on humility, combines objective aspects of climate and the ecological use of materials with subjective intuitive processes, and relies on cultural and bio-regional factors for its forms. (Papanek, 1995, p.12)

In the next headings, I review design paradigms for sustainability under these categories: product-based approach and system-based approaches and socio-technical level.

2.2.4. Product-Based Approaches

In this heading, I submit the approaches which aim to reach sustainability through product-based solutions. These approaches are *Green Design* and *Eco-Design* and *Biomimicry.*

2.2.4.1. Green Design

After the initial concerns about ecological degradation, green product designs emerged with an emphasis on environmental enhancement (Vicente et al., 2012). This enhancement was managed through the "waste hierarchy of reduce-reuse-recycle" (Ceschin & Gaziulusoy, 2016, p.121) and early examples applied green design in a single part of a single product (Ceschin & Gaziulusoy, 2016). The *green* prefix is used as a reference to nature and environmental concern. However, it only encouraged green consumerism by an illusion of no impact on nature and did not operate significant progress for the environment (Madge, 1997; Vicente et al., 2012).

2.2.4.2. Eco-Design

Design for Environment (DfE) (Fuad-Luke, 2009) or eco-design depends on the life-cycle assessment of a product in order to understand its impact on the environment through its lifespan (Ceschin & Gaziulusoy, 2016; Fuad-Luke, 2009; Vicente et al., 2012). Eco-design operates between economic viability and ecological stability through eco-efficiency by applying life-cycle assessment of the product (Fuad-Luke, 2019) Life-cycle assessment shows the environmental performance of the product (Ceschin & Gaziulusoy, 2016).

2.2.5. Nature-Inspired Design: Biomimicry

Mimicry is the term originated from mimesis, with the meaning of competence to imitate somebody or something; however, Plato and Aristotle articulate mimesis "as the representation of nature" (Marshall & Lozeva, p. 2009). In particular, biomimicry is a popular term due to biomimicry advocate Janine Benyus (1997), who describes it as a "model, mentor, and measure". Likewise, Ceschin and Gaziulusoy explain as:

> Using nature as a model involves studying the models and processes of nature and adapting these to solve human problems and using an ecological standard to judge the 'rightness' of innovations. The rationale behind using nature as an ecological standard is that as a result of 3.8 billion years of evolution, nature has learned what works and what is appropriate. Using nature as a mentor puts emphasis on learning from nature rather than exploiting it. (Ceschin & Gaziulusoy, 2016, p. 127)

Alternatively, learning from nature does not mean that all the bio-mimicked products are sustainable design (Marshall & Lozeva, 2009). Biomimicry is used in three different levels of mimicking. In particular, biomimicry is mimicking forms, processes in nature, and imitating ecosystems (Benyus, 1997). Although biomimicry might be a lucrative method to transform knowledge in nature to an instrumental value for humans, it also brings both chances to harm nature and be eco-friendly (Marshall & Lozeva, 2009).

2.2.6. Emotionally Durable Design (EDD)

Emotionally Durable Design is used to strengthen the emotional attachment between the user and the product, which extends the use time of the product (Ceshin & Gaziulusoy, 2016). It operates for preventing psychological obsolescence towards a product due to changed desire and values instead of the end of product life (Cooper, 2004).

2.2.7. Design for Sustainable Behavior (DfSB)

Design for Sustainable Behaviour (DfSB) is an emerging approach (Ceschin & Gaziulusoy, 2016 p.123) since how users consume natural resources like energy over products define their environmental impact (Tang & Bhamra, p. 2009). According to Bhamra, the product is an interface to gather information about user habits and behavior:

> Products, as the interface between consumers and consumption activities, can give immediate and direct responses to users' operations: how they are perceived, learned and used. Designing a product means designing a user experience with the product, which also determines the compound impacts of this experience. A better understanding of what users do with, and how they interact with products, as well as the hidden factors behind the daily decision-making process should be gained in order to develop a valid critique of environmentally and socially significant consumption. (Bhamra et al., 2011, p. 429)

This design approach aims to transform user behavior towards more sustainable ones by benefiting from behavior change theories, and this approach enables designers to provoke users to change their habits and behaviors through interventions (Jackson, 2005).

2.2.8. System-Based Approaches

In this heading, I present the system-based approaches for sustainability. These approaches construct sustainability over a system.

2.2.8.1. Cradle to Cradle Design

This approach is biomimetic and aims to reach sustainability in production and consumption systems (Ceschin & Gaziulusoy, 2016). McDonough and Braungart (2002) coin this design approach, and it depends on the concepts *"waste equals food"* and *eco-effectiveness*, which a regenerative approach. According to them, there

are two nutrient types: biological and technological, those sustain a consumption and production loop by enriching ecological metabolism.

2.2.8.2. Systemic Design

Systemic design is an approach that is applied to design for situations consisting of complexity and ambiguity (Ryan, 2014) like sustainability (Palmberg et al., 2017). It engages with the inter-connected complex systems (Jones, 2014). It employs design thinking and systems thinking to design for complex and dynamic environments (Ryan, 2014; Jones, 2014). System thinking originates from system theory (Ryan, 2014; Jones, 2014). According to Hämäläinen and Saarinen, system thinking "highlights a domain of objects it believes are neglected – systems".

Nevertheless, they remain objects nonetheless, entities to be identified and reflected from the outside. The Systems Intelligence approach wants to avoid this externalist trap" (2007, p.40). They articulate the concept of System Intelligence as follows:

> By Systems Intelligence we mean intelligent behaviour in the context of complex systems involving interaction and feedback. A subject acting with Systems Intelligence engages successfully and productively with the holistic feedback mechanisms of her environment. She experiences herself as part of a whole, the influence of the whole upon herself as well as her own influence upon the whole. By experiencing her own interdependence in the feedback intensive, interconnected and holistically encountered environment, she is able to act intelligently. (Hämäläinen & Saarinen, 2007, p.39)

Another aspect of the systemic design is design thinking, which formulates the approach and methodology for the design process to solve a problem (Findeli, 2001; Jones, 2014). In design thinking, the design process starts with the identification and formulation of a need or a problem of humans and results with an imagined situation (Findeli, 2001; Jones, 2014) through a user-centered and iterative approach (Ryan,

2014; Jones, 2014). Thus, systemic design assembles systems and human-centered design to design for complex and multi-stakeholders systems (Jones, 2014). This approach also reformulates how to define problems through systems thinking, which shifts focus from discrete problems to contextual difficulties (Findeli, 2001; Ryan, 2014; Jones, 2014). Thus, Ryan (2014) emphasizes the significance of analyzing entities in context rather than isolation. In parallel, Fidelli (2001) suggests a new logical structure of design processes for designers:

> 1 Instead of a problem, we have: state A of a system;
> 2 Instead of a solution, we have: state B of the system; and
> 3 The designer and the user are part of the system
> (stakeholders). (Findeli, 2001, p.10)

> The designer's task is to understand the dynamic morphology of the system, its "intelligence." One cannot act upon a system, only within a system; one cannot act against the "intelligence" of a system, only encourage or discourage a system to keep going its own way; state B of the system is, among various possibilities, the one favored by the designer and the client according to their general set of values; state B is only a transitory, more or less stable, state within a dynamic process, never a solution; the production of a material object is not the only way to transform state A into state B; and since the designer and the user also are involved in the process, they end up being transformed, too, and this learning dimension should be considered as pertaining to the project. (Findeli, 2001, p.10)

Alternatively, Ceschin and Gaziulusoy (2016) articulate systemic design as an approach inspired by natural ecosystems by benefiting from the biomimicry by mimicking the natural ecosystems. They indicate that this design paradigm puts emphasis on production systems through a local lens and mostly focuses on production systems like Cradle to Cradle for sustainability. They also indicate that its focus on production systems without addressing the individual consumption is a pitfall of systemic design. Barbero and Toso (2010) explain the systemic design as an approach to design for sustainable and productive industrial systems along with products. They indicate its aim to "to implement sustainable and productive systems in which material

and energy flows are designed; as a result waste from one productive process becomes an input to other processes, preventing waste from being released into the environment" (p.68).

2.2.8.3. Design for Socio-Technical System Innovation

Cities are the major systems of socio-technical systems by nature (Ceschin & Gaziulusoy, 2016), and currently, many designers also study cities with non-traditional approaches (Heitlinger & Comber, 2018; Smith et al., 2017; Ryan, 2013). The agenda of design for socio-technical system innovation is the transformation of these systems "through technological, social, organizational and institutional innovations" (Ceschin & Gaziulusoy, 2016, p.138) for sustainability. Furthermore, it suggests a change in the relationships of actors in the system, along with the transformation of system structure (Torresa, 2017). Hence, it is a strategical approach (Ceschin & Gaziulusoy, 2016). It is essential to understand the interrelationships between actors and systems which are ecological, technological, social and cultural (Marshall, 2012). Designers can transform the interactions of people with systems, services, organizations, and policies, and they can apply participatory design, speculative design and design futures (Ceshin & Gaziulusoy, 2016).

2.2.9. Summary

In summary, I present the evolution of design for sustainability from its very first ecological concerns and reveal the understandings in design regarding nature and design relationship to understand how nature finds positions in design.

Although nature is a resource to designers for the embodiment of their designs, it does not have an agent in the design discourse. The commodification of natural materials by design turns into social, cultural, economic, and symbolic values through the industry. However, the industrial revolution brought the degradation of nature and

environmental values. The design has a transformative effect on the social and natural environment through any design. Thus, designers should be aware of this capacity of their profession, and this awareness they should have is the design responsibility.

Design has been implicated in pollution of the environment due to the use of natural resources and production processes due to technology and permanency of after-use products. Thus, design activities were harmful to nature. However, these design activities are the result of the design decisions of designers. They can transform the effects through an ethical perspective. Designers are also advised to act to create improvements for the environment as an alternative to making products. Thus, while the design is considered to be the reason of this ecological degradation, it can also develop a response towards the degradation. Thus, I infer that designers were not able to detect their transformative effect on nature due to the lack of awareness of their relations to their natural environment. This awareness might be only acquired through a philosophical movement for designers.

Designers responded to ecological degradation with sustainable design, which aims to eliminate the harmful effect on the environment with sustainability. Sustainability is a concept that is conceptualized differently through time. It mainly aims to support the ecological processes through the change in personal, societal, and economic behaviors. The latest sustainability approaches take it as a system feature, which is an assemblage of environmental, economic, and social interrelations. However, this model explains the interconnectedness of those relations in two models: weak and strong sustainability model. The strong sustainability model provides a more holistic approach than the weak sustainability model. It explains the strong sustainability model as a nested layer of economy, society, and environment from the inside out. However, the environment is still positioned as an instrumental limit to human activities that mediate the ecological degradation in these approaches. That is, the hierarchy between human that is society an economy, and the environment makes sustainability a human-centered approach.

In particular, the history of sustainable design includes many design paradigms from a product approach to systemic design. I categorized these paradigms as product-based or system-based solutions or aimed at a system innovation for change. For product-based approaches, I reviewed eco-design, green design and biomimicry, Emotionally Durable Design, and Design for Sustainable Behavior. Designers aimed to increase the environmental performance of the products through life cycle assessments or benefiting from nature like a model for sustainability or design for behavior change. Design for Sustainable Behavior differs from other products-based approaches due to its focus on an individual's actions. It situates products as an interface to provoke sustainable behaviors. I infer that Emotionally Durable Design and Design for Sustainable Behavior are the psychological approaches due to their emphasis on emotions, psychology, and behaviors for sustainability.

In system-based approaches, I reviewed Cradle to Cradle, Systemic Design and Socio-Technical System Innovation. Cradle to Cradle Design's purpose is sustainability through consumption and production systems. However, systemic design is an approach to design for complex and ambiguous situations like inter-connected systems. It is a human-centered design approach, applying system thinking and design thinking. System thinking provides an inclusive approach in order to see all the reciprocal relations in a system through System Intelligence. This approach also encourages a holistic problem definition method for designers instead of discrete problems from the system. In systemic design, designers formulate any problem with their interdependent relations to a network. The last design paradigm was Socio-Technical System Innovation, which aims to innovation through the transformation between the relationships of actors and the system for sustainability in a socio-technical system. These two latest design paradigms for sustainability differ in terms of the scale and change they aim to create.

2.3. Design for Sustainability Through Experience

In this heading, I discuss experience design as a sustainable design approach due to its dematerialization of what Papanek criticizes about the responsibility of designers while shaping the world through products (see Section 2.2). First, I give a brief overview of the evolution of design from product to experience. Second, I review experience theory and then the human-centered design approach of experience design.

2.3.1. From Product Design to Experience Design

There is a paradigm shift in design from product to system approach for sustainability, which was presented in the previous heading. In other words, the design profession transforms itself for sustainability through a progressive approach. This transformation goes to a focus from product to system, and from material to the organization of things; that is, how things related to each other. With the focus on sustainability, the design embraces a focus on the organization of tangible or intangible things that are interrelated with diverse relations. As Walker (2010) points out, the product-based traditional approach has been replaced with the approach that "the design of a product exists within a wider system of production, consumption, and disposal" (p.813).

For a system with less damage, Walker (2010) states that each interrelated component of the system has to be changed; however, the system is "large, multi-faceted and complex and has its own inertia, making it cumbersome and unresponsive to change" (Walker, 2010). Fortunately, the design can operate, function and perform between *things* and *systems* (Boradkar, 2007) instead of the option to change the system. That is, it can mediate between things and systems by changing their relations. This ability of design makes it the best tool to deal with contemporary societal, economic and environmental problems (Fuad-Luke, 2009). The system we live in is a complex structure and the *system* is approached here as a whole consisting of economic, social and environmental relations between its actors and actants regarding the sustainability

definition (see Section 2.2.3.1). These relations are in the agenda of designers for a while that Papanek (1995) indicates that "we no longer ask, 'How does it look?' or 'How does it work?' We are more interested now in answer to, 'How does it relate?'" (p.7).

Similarly, Moholy-Nagy (1938) points out the relations, that the ability to see everything in a relationship is essential for the complex design processes. The shift from tangible products toward a system approach puts forward the actors within the system by making the artifacts secondary (Findeli, 2001). The emphasis on the system and relations created a new paradigm in the story of industrial design. The change in the definition of industrial design demonstrates this difference. In 1959, the first congress of the International Council of Societies of Industrial Design (ICSID), renamed as the World Design Organization (WDO) in January 2017, the industrial designers are defined as:

> An industrial designer is one who is qualified by training, technical knowledge, experience, and visual sensibility to determine the materials, mechanisms, shape, color, surface finishes and decoration of objects which are reproduced in quantity by industrial processes. The industrial designer may, at different times, be concerned with all or only some of these aspects of an industrially produced object. (WDO, n.d.)

However, the latest design definition suggests a design paradigm that includes many radical changes when compared to the first one by ICSID in 1959. The latest definition of design shared in 2015 by this organization:

> Industrial Design is a strategic problem-solving process that drives innovation, builds business success, and leads to a better quality of life through innovative products, systems, services, and experiences. Industrial Design bridges the gap between what is and what's possible. It is a trans-disciplinary profession that harnesses creativity to resolve problems and co-create solutions with the intent of making a product, system, service, experience or a business, better. At its heart, Industrial Design provides a more optimistic way of looking at the future

> by reframing problems as opportunities. It links innovation, technology, research, business, and customers to provide new value and competitive advantage across economic, social, and environmental spheres. *(WDO, n.d.)*

The different aspect of this definition is its inclusion of *experience* for a better quality of life apart from its predecessors. The evolution of what is industrial design from product, service, system to experience resembles the journey of design for sustainability. Experience design in a system of relations does not only encourage designers to design new experiences instead of products but also improve the current product experiences. Thus, this approach might help to improve our relations with nature by decreasing the humans' ecological impact and suggesting new experiences of nature. Therefore, I formulate the nature experience by benefiting from user experience design (UX) terminology and abbreviate as *NEX*. This new paradigm also brings new concepts through the questions of how our experiences might be ecologically sustainable.

In summary, there is a transformation of design discipline from materialization to dematerialization in terms of its outputs. The product-based practice of design has evolved into a system of relations. Thus, designers are interested in the relations in the system rather than the look of design in isolation. This paradigm shift has manifested as experience design. By visiting the sustainability approach that is a system property, experience design can develop relations within a system. As a result, experience design is a sustainable design approach due to its dematerialization and function to design relations in the system. Furthermore, to design for a system of relations require to see everything in relation. However, this new paradigm did not replace all the material solutions but transformed into a discipline that provides services and experiences to solve diverse problems along with other materialized solutions.

In the next heading, I explore nature experience through user experience theory and human-nature relationships.

2.3.2. User Experience Design

Before I discuss nature experience, I overview experience design theory to present the foundations of NEX. Then, I discuss NEX mostly through literature from urban planning and environmental psychology.

Experience is a complex concept (Langdridge, 2006), just like nature and design, and experience design was developed to optimize the relations in the complex systems with socio-cultural context (Tussyadiah, 2014). *Experience* term comes from Human-Computer Interaction studies (Oppelaar, Hennipman & Veer, 2008). Although the field is older than the term, the design researcher Don Norman suggested the term *user experience* for his team at Apple Computer in 1993 (Nielsen, 2017).

Human factors which is hard to differentiate from ergonomics and mostly used synonymously with ergonomics (Salvendy, 2012), forms the grassroots of experience design (Nielsen, 2017). Human factors are defined by The International Ergonomics Association (International Ergonomics Association [IEA], 2019):

> Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design in order to optimize human well-being and overall system performance. (IEA, 2019)

Similar to *Human factors* definition, Forlizzi and Ford (2000) explain there are two components of an interaction: user and product, and the interaction between these two components and their context influence the experience in user experience theory.

They state that through interaction, users reflect their cultural backgrounds and prior experiences along with their emotions, feelings, values, and cognitive models for any sensing and interpreting (Forlizzi & Ford, 2000); in other words, they bring their psychological world into action (Kashimura et al., 2013). According to Forlizzi and

Ford, this causes different "subjective interpretations of a certain moment" (2000, p.420) by the users. Similarly, although two people experience the same moment, their experiences vary due to the difference in their mental model and conditions (Pine & Gilmore, 1999). Hence, this demonstrates that "experience is a subjective value, not an objective value" (Kashimura et al., 2013, p.293). Don Norman (1988/2013) explains that *experience design* is related to emotional impact in his book *The Design of Everyday Things*. Besides, products as the other component of the interaction influence the experience (Forlizzi & Ford, 2000, p. 420). Those products are in a broad spectrum: objects, actions, services, and environments surrounding life (Margolin, 1997). In Hitachi, Japan electronic company explains this human-product relationship:

> Experience should be considered in terms of the characteristics of users and products or services, as well as the situations in which they are used. Experiences are multi-dimensional and relative phenomena that cannot be evaluated by a single measurement scheme, such as "good or bad" or "55 out of 100 points." (Kashimura et al., 2013, p.294)

In summary, experience design theory depends on the user, product and their characteristics, and its social and physical context; in other words, it depends on the interaction between two nodes of this relation and their context.

There are also fundamental approaches to implement experience design (Kashimura et al., 2013; Tussyadiah, 2014). According to Kashimura, these approaches are: "a human-centered design process, workshops for developing and visualizing creative ideas, and creating scenarios of the future" (2013, p.294). However, Tussyadiah indicates that these fundamental approaches are: "the human-centered approach to designing, the designing as iterative processes, and the holistic experience concept as an outcome of designing" (Tussyadiah, 2014, p.10). Both scholars point out the human-centered approach along with slightly different other two approaches. Similarly, Nielsen (2017) describes the experience as the "human-centered design of

interactive systems". In experience design, a human-centered design approach brings a principle to always "know your user" (Norman, 2005, p.14).

2.3.3. Human-Centered Design in Experience Design

Human-centered design differs from the traditional design practices since all the focus of questions and activities is on humans who are the intended *user* of the product, system or service to be designed instead of the designer's world or technological layers of the object (Giacomin, 2014). Human-centered design is a semantic turn from a technology-centered design to a human-centered approach in design that recognizes the involvement of humans to artifacts not only as a designer but also as a user (Krippendorff, 2006). Human-centeredness has a foundation to improve the human use of a technological system (Krippendorff, 2006). Designing for humans includes optimizing the traits of a product, system, or service (Giacomin, 2014) according to the meanings and contexts by human senses (Krippendorff, 2006).

Don Norman raises the question of "how can one design something for people without a deep, detailed knowledge of those people?" (2005, p.14). The detailed knowledge of those people is reached through psychology, anthropology, and social and behavioral sciences, which theoretically underpins a human-centered approach, which enables designers to understand people's needs, behaviors and actions that emerged from the interaction with the products (Tussyadiah, 2014).

The human-centered design aims to provide the best solution which meets the needs of users through an iteration of understanding the use of context, defining the user needs, providing design solutions for user needs, and the evaluation of designs in terms of user requirements (Kashimura, 2013). In order to complete these design tasks, its practitioners use a set of methodologies, and the fundamental methodology is to define the *persona* which is the representation of a group of users (Kashimura, 2013). "The users are instead represented by an archetype of a user, called persona" (Blomquist &

Arvola, 2002, p.197). Persona is a hypothetical representation of a real user, defining one's goals, abilities, and interests (Matthews, Judge, & Whittaker, 2012). Personas are applied with creating a representative user of a product through a given name, face and defined attributions in regards to user's needs, goals, and tasks (Blomquist & Arvola, 2002). Personas help designers to understand the user's world (Nielsen, 2004).

2.3.4. Summary

In this heading, I review the experience design that originated from Human-Computer Interaction studies. However, I situate experience design as a sustainable design approach due to its dematerialization and ability to function for relations within the system. Design has evolved from a product-based approach to an experience-based and systemic approach, which enables us to see the interrelations between the actors in the system along with the traditional approach. Thus, this brings the requirement of a new ability to see everything in connection rather than isolation.

This thesis defines the experience and its design, along with other related terms and methodology. Those show that experience is a subjective interpretation of the interaction between humans and non-humans. Experience depends on the characteristics of two related nodes of the interaction and their social and physical context. The literature shows that psychology is the discipline along with other related disciplines which enables us to understand the user's characteristics. Since the emphasis of experience is on human-centered design, I review human-centered design in experience design to understand its possible effects on theorizing Nature Experience (NEX).

2.4. Nature Experience (NEX)

In this heading, I review the literature of nature experience in order to understand and explore its characteristics concerning the experience theory. I explain how I construct

NEX and then review the related works through humans, nature, and their context. Experience theory demonstrates that human emotions, values, and prior experiences (Forlizzi & Ford, 2000) influence the experience along with the context of use and social and cultural factors.

Experience design is mostly used as *user experience* as Don Norman (2013) coins, and it is mostly abbreviated as UX. Benefiting from the experience theory, I see the potential to use the experience to understand nature experience which might enable a better cohabitation with nature and design for it. In experience theory, user and product are placed as the two components of the interaction. I replace those with human and nature as the two nodes of this interaction. I combine *nature* and *experience* terms and abbreviate it as NEX, which might create the opinion that I offer a nature-centered approach by replacing the *user (human)* with *nature.* However, I do not offer any emphasis on a single component of this interaction, but remove the centralization of human by offering a non-human centered or beyond-human-centered approach. I discuss the non-human-centered approach in the context of cohabitation, nature experience (NEX), and sustainability in the following headings.

Similar to the interaction proposal of this thesis and experience theory; Davis, Green, and Reed question human-nature relationship by modeling this relationship as an experience which is equal to "a personal relationship with the environment analogous to how they experience a relationship with another human being" (2008, p.173). In other words, they replace a human and human relationship with human and nature relationship. Being environmental psychology scholars, they ground this to the familiar narratives about nature, implying the personal relationships and bonds with nature.

They add how two individuals may influence each other's wellbeing, human and nature have this interactivity, which is "a reciprocally dependent relationship" (2008, p.174). The Anthropocene epoch might be shown as the result of this relationship.

While humans degraded ecology's wellbeing, nature responded with global warming, which threatens human wellbeing.

The related works which apply *nature experience* term are majorly reached from environmental psychology, urban studies, and tourism studies (Gatersleben, 2018; Scopelliti et al., 2016; Tussyadiah, 2014). In tourism studies, there is also an emerging trend of applying experience theory and interaction design to promote recreational experiences and increase their experience quality (Tussyadiah, 2014; Arvola et al., 2007; Wheaton et al., 2016). However, these studies mostly focus on the influences of nature experiences on human health and wellbeing, along with some reference to the agency of nature experience to encourage pro-environmental behaviors (Soga & Gaston, 2016). Moreover, nature is attributed to "Vitamin G (Greenspace)" to refer to its medical impact (Groenewegen et al., 2006). In other words, there is an emphasis on nature's instrumental value in terms of the psychological health and wellbeing of humanity. Hence, this human-centered approach makes these nature experience studies anthropocentric. However, this study focuses on understanding a model of a non-anthropocentric experience of nature for cohabitation.

Besides, in the literature, there was another suggestion to call nature experience which is called as *experiences of nature* popularized by Louv (2008) and abbreviated as EoN by Clayton et al. (2017) apart from my proposal NEX, and Clayton et al. discuss nature experience in terms of biodiversity crisis from a non-human-centered approach.

To sum up, in the literature, nature experiences are studied to increase the health and wellbeing of humans. These studies are human-centered due to their motivation towards human wellbeing rather than the collective wellbeing of humans and nature. Hence, due to the gap in the literature in terms of the collective wellbeing, I modeled nature experience as NEX by employing user experience theory. Humans and nature act as the two actors of this reciprocal relationship. This model focus on the human

and nature relationship as a reciprocal experience that can be studied for an advanced cohabitation with nature.

2.4.1. NEX as Transformative

For years, it has been said that nature experience is disappearing (Pyle, 1993/2011; Soga & Gaston, 2016; Cox & Gaston, 2018). The extinction of nature experience is a phenomenon described by Robert Pyle (1993/2011) over 20 years ago. Cox and Gaston (2018) indicate that human societies encounter the extinction of experience with a continuous decline in interactions with nature. Likewise, Soga and Gaston (2016) point out that there is a limited number of people who have daily contact with nature, which might be described as alienation that also defines the extinction of experience.

By focusing on the transformation of experience in detail, direct human-nature interaction decreased due to the drop-in opportunities to experience nature directly (Soga & Gaston, 2016; Cox & Gaston, 2018). The accessibility of natural areas is a factor for direct nature experience (Neuvonen et al., 2007). Urban environments are the reason for the decline in nature interaction since cities provide fewer opportunities to meet with nature (Byrne, 2011; Kellert, 2004), and more than half of the world's population lives in urban environments (World Health Organization, 2019). Concerning the urban context leading to the decreased nature interaction, some scholars suggest that the loss of orientation (Cox & Gaston, 2018) towards nature, the perception that nature is not correlated to the city, are the reasons for the loss of direct experience (Miller, 2005). Similarly, Kellert suggests two other assumptions for this disconnection from nature in urban areas:

> First, that wildlife - at least, healthy, abundant species and habitats - are not an integral component or part of modern urban life. Second, that city life and economics have largely transcended human dependence on nature, and urban existence is no longer reliant on ongoing contact with healthy natural

> environments to achieve lives of meaning, satisfaction, and prosperity (Kellert, 2004, p.9).

However, Cox et al. (2017) indicate that exposure to nature in the urban environment is complex and multiple, and the urban residents mostly interact with nature through their daily lives. In particular, Byrne (2011) indicates that human-nature interaction in urban has three typical patterns. These are "exchanges with pets and pests", "chance encounters with the few hardy native plants and animals able to co-exist with us", and "gardening, recreating, or watching nature documentaries on television" (Byrne, 2011, p.1). Similarly, Pilgrim et al. (2008) point out that modernization declined the dependence on nature for biological reasons such as taking out local environmental goods and services. Thus, it decreased the daily and direct experiences to meet with nature, which also resulted in the loss of traditional knowledge about ecology (Kahn et al., 2009). Seppelt and Cumming (2016) also point out that this made many individuals break from ecosystem reality and ambiguity.

Alternatively, modernization has also changed the social construction of nature and nature experience (Clayton et al., 2017) instead of the extinction of experience. In contrast to supporters of the extinction of experience, Clayton et al. suggest that there is no extinction of experience; on the contrary, nature experience transforms through the change in society, which results in a change in social factors and context. Likewise, Arredondo et al. (2018) affirm the transformation of nature experience by an emphasis on different forms of nature experience by technology. Similarly, Kahn et al. (2009) state that technology has begun to transform our ancient relationship with nature into changing experiences. While nature experience has a central place in the daily lives of past people, it transformed into a *managed experience of modern people:*

> Whereas in the past people encountered nature as a fundamental part of daily life, intimate and individual, it is now sought out as a managed "experience" that is planned (e.g., touristic or educational experiences) and shared with a wide range of others (e.g., Facebook posts or Instagram uploads). Such EoN is defined and used for specific predictable effects such as individual well-

> being, satisfaction, escape, and as a method for educating citizens to have the "correct"(i.e., according to the conservation objectives) concerns about nature. With these specific services in mind, EoN can also be easily rejected for having not met the preconceived criteria. (Clayton et al., 2017, p.648)

Despite this managed experience of nature, NEX is a manifold which is "embedded in social and political contexts", and nature experience is a process including (Clayton et al., 2017):

1. Interactions between individuals and natural entities
2. Social and cultural context
3. Consequences for new skills, knowledge, or behavioral changes. (Clayton et al., 2017, p.646)

Concerning this definition of NEX, the related works also suggest two types of nature experience: direct and indirect nature experiences. When there is physical accessibility of nature, it enables a rich engagement of multiple senses (Kaplan & Kaplan, 1989), whereas *indirect experiences* lack the olfactory and tactile sensations. Likewise, Pyle (1993/2011) argues that indirect experiences cannot substitute direct nature experiences. Conversely, Arredondo et al. (2018) report that indirect experiences have the potential to create a similar emotional impact and nature experience.

To sum up, there is a traditional idea that nature experience is extinct; however, there are also opponents of this idea by suggesting that nature experience is in a transformation. Nature experience is a process between human and natural entities in a social and cultural context, which brings new knowledge and behaviors. It is transformative since social and cultural factors change. Humans are disconnected from nature since dependence on nature decreased, and the direct interaction with nature decreased in urban settings. Thus, urban settings are considered as places which are not integrated into nature. However, this loss transformed nature experience from direct interactions to indirect interactions thanks to technology. Thus, nature turned into a managed experience rather than a fundamental daily experience. This

transformation of nature experience has implications like decreased knowledge and experience with nature, which disconnects from ecological complexity and ambiguity.

2.4.2. NEX as Subjective and Formative

In this heading, I review related work to discover the characteristics of a human as an influencer of NEX concerning experience theory. Recalling the experience literature, the emotions, values, and prior experiences of humans affect the experience along with the characteristics of related things that are nature in this study and context and social factors. As stated previously, the experience is a subjective phenomenon. Similarly, environmental psychology literature demonstrates that cognitive psychology and emotions influence NEX along with with the context which defines the accessibility of nature (Cox et al., 2017). Each person represents another NEX (Cox et al., 2017).

As before mentioned, there is a reduced but transforming nature interaction. According to Seppelt and Cumming (2016), this reduced nature interaction derives less care towards nature. These changed interactions with nature also redefine what is normal in the local environment, and the amount of this change is questionable and significant. Concerning prior knowledge and experience, how people perceive nature shapes their interaction with nature (Talbot & Kaplan, 1984). According to Papworth (2009), there is a loss of knowledge to define the normality of environmental change since the last generation does not know the past conditions and other individuals lost their memory related to early status of nature; hence, they do not have a baseline information to accept or refuse change on the natural environment.

The interaction with nature is also formative in how humans relate to the environment around themselves (Kellert, 2004). Likewise, the results of the study conducted by Soga et al. (2016) demonstrate how values regarding nature develop. According to the results of their research, how the students valued the natural environment around them

depends on their perception along with their emotional connectedness to nature, and which are positively related to each other (Soga et al., 2016).

Experience is continuously construed through the person's life, goals, and motivations (Kaplan & Kaplan, 1989), which create the values. Due to the decline in nature interaction, "experiencing nature regularly appears to be the exception rather than the norm, with a person's connection to nature being positively associated with incidental and intentional experiences" (Cox et al., 2017, p.79). However, a limited experience of nature might create irrational anticipations that disappoint people when the experience does not give the ideal, which leaves a belief that nature is disconnected from everyday life (Clayton et al., 2017).

2.4.3. Experience Patterns for Nature Experience

Clayton et al. (2017) point to a list of the dimensions of nature experience by focusing on biodiversity. Instead of their results for biodiversity, I present this list due to its potential to be an initial version of a *persona* study for NEX by providing experience patterns. As noted before, persona methodology helps designers to group people in terms of use. Similarly, this list might represent experience patterns for NEX, and help to explore nature experiences.

According to the researchers, the spectrum-like structure of this list presents the experiences in continuous but varying points. They indicated that some dimensions in this incomplete list might be sophisticated through subdivisions. However, according to the researchers, this list is a beginning to define the traits of nature experience, which has an impact on the reaction of people to experience through "changes in knowledge, attitude, and behavior" (p.647). These defined dimensions are:

(1) Observing vs. interacting

(2) Consumptive vs. appreciative

(3) Self-directed vs. other-directed

(4) Separate vs. integrated

(5) Solitary vs. shared

(6) Positive vs. negative

(1) *Interacting* experience is reported as lively, multisensory, and emotionally more engaging and creating long-term memory when compared to *observing* experience. (2) They indicate that *consumptive* experience aims to use nature as a resource to utilize and modify it, while *appreciative* experience does not apply nature as a resource, overlaps with *observing* experience. (3) According to them, despite precious autonomy and control increasing desire to interact with conservation, *self-directed* nature experiences have fewer possibilities to provide several moments enabling intended behavioral changes or "specific educational outcomes" when compared to *other-directed*. (4) *Integrated* and *separate* experiences originate from the individual access to nature and in these experiences, nature is separated from every day or integrated into daily lives (Clayton et al., 2017). While *integrated* experience transforms habits and behaviors more, *separate* is differentiated by its serious cognitive effect on directing new perspectives (as cited in Clayton et al., 2017). Connecting to nature is mostly driven by the motivation to disconnect from modern urban settings (Kaplan & Kaplan, 1989), and this connection is explicated by the contrast between these two contexts (Clayton et al., 2017). (5) Although researchers do not describe any specific characteristics for *solitary nature experience*, they describe *shared* experience as a facilitator to convey values, attitudes, and behaviors toward nature between socially bonded individuals (Chawla, 1998). The last nature experience pair is a positive and negative nature experience, emotional reaction to nature experience (Clayton et al., 2017).

To sum up, nature experience is subjective since it is a process developed through emotions, values, and prior experiences of humans, as explained by experience theory. Each individual has a different set of characteristics in terms of these aspects.

Nature experience is normative since the experiences also reproduce and develop emotions and values regarding nature. The changed context to reach nature also redefine what is nature by influencing the experience. Thus, this normative aspect of NEX also varies connection to nature and regulates what to accept nature as a base.

However, experience theory might help to understand or find a pattern among diverse NEXs through persona methodology. According to the initial efforts to define the dimensions of nature experience, those experience patterns vary in terms of the method, motivation, and quality of experiences.

2.4.4. Summary

In summary, I reviewed nature experience as NEX and the current understandings of nature experience from other fields like urban studies and environmental psychology in terms of user experience theory. These related works show that NEX is a transformative, formative, and subjective process.

NEX is a reciprocal process for cohabitation with nature, which mediates the collective wellbeing of humans and nature. Thus, the two actors of this interaction influence each others' wellbeing. Besides, it is essential to approach nature experiences by abandoning the human-centered approach for an advanced cohabitation. User experience theory advances nature experiences by suggesting methods to understand and transform these experiences.

NEX is a transformative, formative, and subjective process in urban settings. Nature experience transformed from a fundamental and direct experience to a managed and indirect experience due to social, cultural, and technological factors that decreased accessible nature in urban settings. Thus, all these changing factors dynamically transform nature experience and disconnect people in urban settings from the complex and ambiguous reality of nature. Nature experience varies among people due to their different inner world and prior experiences. Through NEX, people in urban ascribe some emotions, values, and a mindset towards nature, which reproduce the perceptions of and connection to nature. Hence, nature experience has a reciprocal relationship with nature perception.

2.5. Design for Cohabitation with Nature

Due to the Anthropocene, there is a network of interactions among humans and natural entities, which is called cohabitation. Although humans and nature coevolved from the very beginning, these new and increased interactions caused many problems between humans and nature, which requires a new cohabitation model to design. Although literature for nature and Anthropocene show that these two actors of the Earth closely cohabit together than ever before, there is a massive distance between humans and nature in terms of their experiences. These problems create possibilities for designers to act by proposing new methodologies and perspectives to mitigate cohabitation problems.

In this heading, I review how design reacted to human and nature interactions in a socio-technical system and what design says for its future pathway about new human-nature cohabitation after the response of design with sustainable design. I review cohabitation through the lens of possible approaches and methods for harmonious cohabitation with human-nature interaction. The current design literature applies a critique of human-centered design by signing this approach problematic for cohabitation with nature. While *design responsibility* is the primary term to explain

the ideal attitude of designers for sustainable design, *ethics* is used to relate designers to cohabitation. After the critique of human-centered design, I review methodologies for cohabitation with nature.

2.5.1. Non-Human Centered Design

In this heading, I review a non-human centered approach in design through the discussion of why the human-centered design does not function any longer and the characteristics of non-human centered design for cohabitation. Non-human centered design is about the designation of "more-than-human worlds" which is a shift from human exceptionalism and human-centeredness towards a more inclusive understanding and design for other species (Heitlinger & Comber, 2018).

"The networked character of the socio-technical landscape has forced collisions between the city, its infrastructure, and its citizens" (p.42), and in order to fix these collisions, smart technologies for cities are offered (Forlano, 2016). However, the values, along with these technologies, do not recognize the frictions in the daily life of urban places (Kang & Cuff, 2005). According to Forlano, contradicting with the social habits of residents of the cities, those values define "who is included and who is excluded" (2016, p.44) in urban areas. This dominant system of values makes people also alienated from other species which are intended to be excluded but share the space with people (Heitlinger & Comber, 2018).

Regarding this inclusion and exclusion, there is a need for developing new design processes for urban which include all species (Smith et al., 2017). Instead of this perceptual separation of humans and nature (Bennison, 2011), there is an applied cohabitation between humans and nature that is theoretically described as Anthropocene (Forlano, 2016). Similarly, Westerlaken (2017) argues:

> The world consists of diverse inhabitants and surprising engagements; so rather than reinforcing one dominant perspective that gains power once again,

> we need to move towards space for freedom, possibilities, and coexistence. (Westerlaken, 2017, p.54)

Smith et al. (2017) depict this existing cohabitation by criticizing human-nature dualism. They denote that nature and human dualism prevents us from capturing the networked structure of humans and nature in cities since this creates the illusion to see the elements of the city detached from each other. According to them, this is profoundly embedded in urban technologies:

> Consider, for example, an interactive kiosk at a bus stop. This tool may provide information for people riding the bus, or for tourists who need to consult a map. But it does not stand alone with a unified function apart from the nonhuman elements of the city. The structure may provide a home for birds (or may perhaps disrupt a previous home for birds). The light from the screen may affect moths and other nocturnal creatures. The kiosk could be designed to support water collection or to allow for a plant to grow on or in it to foster a more harmonious relationship among animals, humans, and technology. There are numerous, and many yet unknown, interactions that may occur at these intersections between technology, humans, and animals. (Smith et al., 2017, p.1716)

Hence, traditional methods like the human-centered design or called as the anthropocentric design does not function anymore in the complexity of "great economic and environmental crisis" (Forlano, 2016, p.45). Jönsson and Lenskjold (2014) demonstrate that "the precarious potentiality of new relations between animals, which might be extended to nature by definition, and humans raise significant new questions regarding the predominant anthropocentricity in design and design research" (p.1). Similarly, Smith et al. specify that:

> The Anthropocene forces us to reconsider the role that humans play in shaping the Earth. No longer can we see ourselves as exceptional, but in this new geological era, we are confronted with a need for hybrid thinking that helps us to learn how to work with and for other experiences on the planet. (Smith et al., 2017, p.1721)

With regards to human exceptionalism, Giacomin (2014) specifies that there are three significant movements with differentiated discourse and values which operate design:

> When attempting to characterize the major movements which operate within the world of design today, three, in particular, seem to each be characterized by specific discourses and values and to be practised by large numbers of designers and other professionals. Technology driven design, sustainable design and human centred design are major movements which usually lead to distinguishably different results despite operating within the same legal, regulatory, contextual and economic constraints. The different core discourses based on technical novelty, planetary impact or human meaning lead to notable differences in the resulting product, system or service. (Giacomin, 2014, pp.607-608)

To further understand the role of human exceptionalism in the design field, Steen (2012) explains that human-centered design found a place in design after the realization that technological derives produce products that humans do not want to use. The financial viability also limited human-centered design in terms of meeting human needs, and design responsibility points out to replace financial viability with ethics and morality (Tatum, 2004). Donaldson and Kymlicka (2011) offer to benefit from disability studies and citizenship theory to explore animal and human relationships for a democratic cohabitation that is multispecies. Similarly, Sandelin emphasizes the account of "significant others" (Haraway, 2003) in design by referring to the design philosophy principles which assert to "listen to all voices, no matter how weak" (2018, p.60).

By focusing on the accounts of animals in more detail, the differences between humans and non-humans are mainly discussed around the cognitive differences to regulate the relationship. However, Singer (1975) introduces the approach which proposes to embrace the similarities of human and non-human over differences. He argues that animals' wellbeing should be cared about since they can also experience pain and suffering, and he believes suffering brings equal consideration. Beyond pain and suffering animals have, it is stated that nature has an intrinsic value, which makes

it valuable by itself without any human evaluation of worth or human benefit (Bryne, 2011; Tallis & Lubchenco, 2014).

To further understand non-human centered design, it is essential to indicate this term does not mean the exclusion of human perspectives (Jönsson & Lenskjold, 2014; Smith et al., 2017) nor the centralization of nature in design thinking (Smith et al., 2017). DiSalvo and Lukens (2011) indicate that non-human centered design is not disappearing of humans; on the contrary, humans become another entity among others, all of which have the legitimacy in the radical pluralism consist of objects and things, humans and others. Similarly, Smith et al. (2017) explain what decentralization of human operates in design:

> Rather, a decentering of the human in design blurs the boundaries between people and things, emphasizing the interconnectedness that is inherent in human/nonhuman assemblages; a decentering would promote news ways of approaching technology development that accounts for multiple and heterogeneous standpoints within urban spaces. (Smith et al., 2017, p.1717)

Besides, Jönsson and Lenskjold (2014) specify that non-human centered design is an expedition to discover the possible pluralization of angles in design by manifesting human and non-human animal actors both have equal agency. They aim to expand the boundaries of the questions "*how* and *whom* we design *with"* to explore what decentralization of the human angles might bring into the design process.

To further understand the non-anthropocentric design, Forlano denotes that it is a more robust approach than sustainable design due to the human exceptionalism at sustainable design:

> The potential of nonanthropocentric design surely goes far beyond what is today considered "sustainable design," which might be understood as fulfilling human needs with incrementally more sustainable products and services. Instead, nonanthropocentric design could radically shift our experience of the world and allow us to dramatically reevaluate our "needs" and, instead, find

> pathways toward asking the right questions of corporations, governments, and of ourselves as designers. Designers who consider the nonhuman might find themselves reorganizing entire social and environmental systems. (Forlano, 2016, p.50)

Similarly, Liu, Byrne, and Devendorf (2018) point out that sustainability is also a human-centered approach that manages and sustains natural resources for humans.

To sum up, Design for Cohabitation with Nature is an emerging field for design. In summary, cohabitation with other species is necessary for the complexity of the socio-technical system by making a critique of human-centered design under *Non-Human Centered Design*. Urban areas which are the socio-technical systems by nature, are presented as the web of multispecies relations and entanglements, which requires new possibilities and responsibilities for design. In the next heading, I present featured design methodologies of the design for cohabitation with nature through a non-anthropocentric approach.

2.5.2. Design Methodology for Cohabitation with Nature

In the literature, there are few studies about the design for cohabitation with nature. This review majorly depends on what current studies offer for cohabitation. The related works show that design for cohabitation with nature is employed as research through design to understand cohabitation and its experiences. Hence the results are used for more understanding of cohabitation and awareness for preferable futures.

In this heading, I situate design for cohabitation as an approach that requires a philosophical inquiry that brings critical thinking, technology to understand nonhuman livings and methods to design a preferable cohabitation through literature review. In the next headings, I review *philosophical inquiry, the arts of noticing, foray, participatory design, and speculative design.*

2.5.2.1. Philosophical Inquiry

Forlano (2016) questions the proficiency of today's designers, even the most popular designers who are familiar with experience design and interaction design to design for the current socio-technical complexities. Forlano explains the collaborative city-making with a philosophical inquiry with the centralization of politics, values, and ethics. According to her:

> Designers must be able to engage with socio-political questions and frameworks to create the conditions for the formation of networks around important urban issues. This requires the ability to think critically and generatively. Designers must engage more deeply with the social sciences to avoid reinventing the wheel, and then they must go ahead and prototype and iterate new versions of the proverbial urban wheel. Designers are integrators of knowledge by their nature, but it is difficult to think critically and generatively at the same time. (Forlano, 2016, p.44)

Similarly, Heitlinger and Comber (2018) emphasize the importance of developing a theoretical lens to understand the complexities which are social, political, ecological, technical, and ethical.

> Design artefacts can raise provocative questions, dilemmas and possibilities for multi-species spatial practices to perform autogestion in hybrid digital-physical space, and to demonstrate productive collaborations in which humans and nonhuman actors cohabit, co-produce, and co-manage the urban commons, in ways that are respectful of difference and in timescales that are more nourishing of our relations and our Earth. (Heitlinger & Comber, 2018, p.10)

The related works offer to employ speculative design, participatory design, critical design and design fiction instead of typical design methods for design for cohabitation (Heitlinger & Comber, 2018; Forlano, 2016; Sandelin, 2018; Liu et al., 2018). These kinds of approaches have the potential to imagine preferable futures beyond the constraints of solution-oriented typical design approaches (Dunne & Raby, 2013).

Similarly, Anderson (2015) criticizes solution-oriented approaches by comparing design and artworks for Anthropocene. According to her, a critical mindset over proposals of actions should be prompted. Since solutions create an illusive effect that those proposed solutions will work:

> It's not the artworks themselves, but rather the exhibition-as-framing-device that triggers a red flag. While optimism may be lacking in some references to the Anthropocene—more often spun as an immanent catastrophe or apocalypse—such superficial statements mistake the Anthropocene for a false signifier that humans are in control of the planet. (Anderson, 2015, pp. 339-340)

Morton (2010) argues that modern society not only damaged the ecosystem but also thinking. Similar to Morton, Zylinska describes the Anthropocene as the "crisis of critical thinking" (2014, p.19), and proposes that thinking is the most prominent thing humanity can do before acting against Anthropocene. The importance of critical thinking is emphasized by Boehnert (2018) as a design methodology through "mapping" and "framing". In Boehnert's argument, mapping and framing are presented as design strategies to facilitate any reconfiguration for, mostly economics, systems. It looks framing is mostly like an outcome of critical thinking since she describes framing as a navigator to the foundations of norms to trigger novel ideas and results. Boehnert argues for the value of design techniques in her article by stating that designers use these strategic methods of problem-solving techniques and generating sense at complex circumstances.

In particular, Anderson (2015) indicates that any solution-oriented approach instead of thinking creates a misconception about Anthropocene that it is a wreck to be "saved" or "rebooted" with no bad outcome to the planet and its residents.

In summary, designers should develop a philosophical inquiry to acquire critical thinking towards the design for the complexity of values and ethics in socio-technical systems.

2.5.2.2. The Arts of Noticing

"The art of noticing" is a term coined by Anna Tsing (2015) to understand relational interactions of humans and nature through her theoretical narrative "collaborative survival". Collaborative survival explains human and nature relationships from the perspective that all the species are dependent on each other to survive in this degraded world. The wellbeing of all species depends on each other's activities, and this narrative embraces the destructive human actions and benefits from it to recognize the relations between humans and nature "assemblage". While Tsing uses the terms "collaborative survival", "the art of noticing" and "assemblage" to in her journey to understand matsutake, which is a mushroom species exposed to human damage. The art of noticing is the ability to see the livelihood of others in this collaborative survival which is explained:

> Making worlds is not limited to humans. We know that beavers reshape streams as they make dams, canals, and lodges; in fact, all organisms make ecological living places, altering earth, air, and water. Without the ability to make workable living arrangements, species would die out. In the process, each organism changes everyone's world. Bacteria made our oxygen atmosphere, and plants help maintain it. Plants live on land because fungi made soil by digesting rocks. As these examples suggest, world-making projects can overlap, allowing room for more than one species. Humans, too, have always been involved in multispecies world making. Fire was a tool for early humans not just to cook but also to burn the landscape, encouraging edible bulbs and grasses that attracted animals for hunting. Humans shape multispecies worlds when our living arrangements make room for other species. This is not just a matter of crops, livestock, and pets. Pines, with their associated fungal partners, often flourish in landscapes burned by humans; pines and fungi work together to take advantage of bright open spaces and exposed mineral soils. Humans, pines, and fungi make living arrangements simultaneously for themselves and for others: multispecies worlds. (Tsing, 2015, p.22)

Benefiting from this narrative, Liu et al. (2018) apply "collaborative survival" and "noticing" in their study to show how technology can help humans to construct and sustain preferable collaborations through their prototypes (Liu et al., 2018, p.1). They employ noticing as "practice of observation across a wide variety of methods. Not

limited to only the visual process of 'seeing', this embraces an understanding of ecological systems through multi-sensory examination." (2018, p.4). They apply different modes of noticing to engage, understand, and co-work with nature. In particular, Liu et al. explain the arts of noticing:

> These "arts" consist of moments in which humans notice and gain insight into how systems function outside of our anthropocentric norm. Noticing is the first step towards our ability to be "response-able" and offers us, as designers, an entry point into seeing how interactive things might serve processes of collaborative survival. (Liu et al., 2018, p.2)

By focusing on noticing in terms of design responsibility, the arts of noticing suggest an observational ability to get insights about the other life forms in the cohabitation. In summary, I focus on Tsing's concepts of "collaborative survival" and "the arts of noticing" to design for cohabitation along with the study of Liu et al.

2.5.2.3. Foray

Both Jönsson and Lenskjold (2014), and Liu et al. (2018) apply *foray* method in their studies; however, how they define and use this method is different. In their study, Jönsson and Lenskjold employ the concept of Umwelt and foray by biologist Jacob von Uexküll (2010). According to Uexküll, who argues for animal subjectivity, Umwelt is the perceptual environment of living things, and the foray is the way of experiencing this by the subject of the world through the theory of meaning. In other words, humans or animals perceive and inhabit in these environments.

Jönsson and Lenskjold (2014) consider foray as an informative and transformative research tool to understand interspecies relations. According to them, foray is also helpful in transforming the current anthropocentric design research. They model foray as an inquiring approach that applies co-design methods through a speculative perspective for design prototypes to explore other species' world that we have no direct access. According to them, foray is "informed speculation" (2014,

p.5). Similarly, Liu et al. (2018) apply foray in their study to explore how their technological prototypes help to construct multispecies collaborations. However, they apply foray as a method to recognize nonhuman living beings through a meet-up. In their study, they use foray to collect data about mushrooms.

I review *the arts of noticing* and *foray* as a methodology to design for cohabitation through design studies. However, both concepts originate from a philosophical inquiry telling a critical narrative: collaborative survival for the arts of noticing and foray for Umwelt. After reviewing *the arts of noticing* and *foray,* which might be evaluated as emerging approaches for the design for cohabitation, I submit non-traditional but common design methods in the next headings. These are participatory design and speculative design.

2.5.2.4. Participatory Design

The participatory design aims to include the potential users and stakeholders to the design processes which influence their life (Sandelin, 2018). According to Seed and Byrne (2010), animals can also use and make tools. Therefore, Westerlaken and Gualeni (2016) indicate that participatory design can provide meaningful and values and perspectives through animal participation. In particular, they state that animals can show their choices, expositions, and appropriations by interacting with prototypes and add:

> This could provide the designer with insights leading to more meaningful design iterations. In this participatory set-up, the designers have to translate their understanding of the animal experience into a design intervention or artifact. This means that the design decisions are eventually still taken by humans. (Westerlaken & Gualeni, 2016, p.3)

Sandelin indicates that the involvement of "other nonhuman actors – animals, microbes, vegetables – in participatory design processes challenges current notions of

the social and the public" (2018, p.60). The participatory design also described as co-design by varying.

2.5.2.5. Speculative Design

Speculative design overlaps with many other emerging design approaches and is used interchangeably (Dunne & Raby, 2013). In this heading, I review the methodology of speculative design in the context of nature experience and cohabitation. Although the *critical design* and *design fiction* were other proposed methodologies by the scholars, I only include speculative design due to their close relations in terms of methodology. While critical design and design fiction apply speculative design, one emphasizes critical thinking, and the second one focuses on the future and technologies (Dunne & Raby, 2013). Design for cohabitation already requires critical thinking and design for alternative futures.

Speculative design is a methodology to provoke alternative or preferable realities by changing everyday reality through the design of unreal moments or narratives (Dunne & Raby, 2013). Speculative design for systems aims to be "inspirational, infectious, and catalytic, zooming out and stepping back to address values and ethics" (Dunne & Raby, 2013, p.160). Similarly, speculative design tools might be used to create narratives for a preferable future world for collaborative survival (Liu et al., 2018).

As noted before, a philosophical inquiry and critical thinking help to broaden the speculations for preferable cohabitations. Having defined what is speculative design, it is possible to consider speculative design to gain knowledge (Anderson, 2015). Moreover, scholars who apply research through design, use speculative design to gain knowledge about other living beings through their technological interventions (Westerlaken & Gualeni 2016; Jönsson & Lenskjold, 2014). Similarly, Anderson (2015) indicates that speculative design is an advanced practice to produce a hub to

sort out the complexity of the Anthropocene. Speculation triggers assumptions for the related context to reach knowledge (Anderson, 2015).

2.5.3. Summary

We live in a complex system managed by the economic, social, and ecological actors; in other words, human and ecological actors. Anthropocene brings that we cannot think human and nature or culture and nature as separate entities, but rather as profoundly entangled concepts that form our urban experiences, and humans and nature is an assemblage that can survive collaboratively. Thus, humanity should accept the coexistence of other species in their life and abandon human exceptionalism. For an advanced cohabitation, the non-human centered approach is essential.

Besides, designers should develop a philosophical inquiry to acquire critical thinking towards the design for the complexity of values and ethics in complex systems. This critical thinking will bring essential ethics and responsibility to design for cohabitation for designers. Philosophical and theoretical approaches help designers to do critical thinking while designing for the ambiguous and complex systems of relations. There are two approaches in this literature review: Tsing's collaborative survival and Uexküll's Umwelt. Collaborative survival articulates that all the species are dependent on each other to survive, and human and nature is an assemblage transforming their environment to survive. In order to see this dependence, there is an observational ability: the arts of noticing. It helps to see non-human livings and their activities by understanding ecological relations and systems. Besides the arts of noticing, foray is an analytical and investigative research tool to understand interspecies relations by visiting an environment. These two approaches are emerging methods to research and design for cohabitation with nature. The current works also suggest two design paradigms: participatory design and speculative design. Participatory design is the design process to solve problems by including potential stakeholders that have a reciprocal effect on their lives. It might help to learn the choices of animals in Design

for Cohabitation with Nature. Speculative design is a methodology that suggests alternative realities by speculating the everyday. It provokes viable or unviable realities for the present and future. Speculation is a method to do research to gain knowledge or design preferable futures.

Designers should develop critical and analytical thinking to understand the current system of ecological, economic, and social dynamics. Design for Cohabitation with Nature requires a paradigm shift which influences how designers perform their professions in socio-technical systems since the current human-centered approaches do not work for the design in Anthropocene.

2.6. Summary

In this literature review, there is an overview of nature, nature experience, and design for cohabitation with nature in five different headings. In the first heading, there was a review of the manifestations of nature. In the second heading, nature in design was reviewed through sustainable design. In the third heading, experience design was introduced as a sustainable design and theoretical framework to understand the nature experience. In the fourth heading, nature experience was presented as NEX. In the fifth heading, design for cohabitation with nature was reviewed.

Nature is a system of ecological relations and resources for all living beings. However, nature is both perceptually and physically an ecological-cultural system due to human culture, society, and technology. The interactions with nature as a material value culturalize nature through technological mediations. Also, changing social and cultural factors reproduce nature perceptions. However, significant understandings for this thesis are ecological and cultural nature, which reciprocally influence each other.

Products have an impact on ecological degradation due to their production material and processes and their transformation to waste after use. Thus, designers responded

to this decline in nature with sustainable design as a result of design responsibility. However, designers were not fully aware of their ability to change the environment with their designs until this degradation, which is still viable.

Nature manifests in design discipline as a model to follow through the nature-inspired design for sustainability. Designers applied nature-inspired design to design objects that will function like nature. However, sustainability is an anthropocentric approach due to its focus on economic values rather than ecological values. Thus, it depends on sustaining natural resources for human wellbeing instead of the collective wellbeing of humans and nature. Although sustainability is currently defined as a system property in a system of economy, society, and environment, which aims to change environmental, economic, and social interrelations, it has still a human-centered model for the sake of human activities.

The initial efforts in design to transform the profession for sustainability are the keys to understand drives behind nature relations since design converts nature and human capital into tangible or intangible solutions. Some studies which present a categorization of sustainable approaches in design demonstrate that design has created these approaches in mostly two terms: product and system-based. System-based approaches followed the product-based approaches when the low capacity of these initial efforts was realized, and the paradigm shift has happened from product-based to systemic approaches.

In sustainable design, there are also psychological approaches that focus on emotions, psychology, and behaviors for sustainability. These are Emotionally Durable Design and Design for Sustainable Behavior. Although these approaches can transform the relations and experiences, they focus on designing products for sustainable behaviors, not designing the experience itself. Thus, these approaches are the first references through sustainable design to NEX in terms of their aim to provoke users for sustainable behavior.

However, the latest systemic approaches underline the relations between diverse systems and actors. These approaches encourage designers to design for complex relations, rather than focusing on a single problem and product or service solution. Systemic design is a holistic approach to understand the relations encouraging the system and design for the complexity and ambiguity of the system. Although its human-centered approach decreases its value for the collective wellbeing, it has the potential to provide an inclusive approach with systems thinking and system intelligence. Furthermore, its formulation of design problems with systemic and reciprocal relations rather than a discrete definition provides an advanced method for design. Moreover, this systemic problem formulation was what sustainable design has missed through its development from product to system-based approaches.

The socio-technical innovation design approach encourages designers to design for the transformation of the socio-technical systems. In this approach, the notice of and understanding the interrelationships between all the ecological, technological, social, and cultural actors are essential. What is more, all these technological, social, and cultural actors are all about humans, while ecological actors are non-human entities. In other words, there is a complexity of the interrelation of the human and natural world in a broader sense.

Experience design, which aims to design better relationships between humans and products, is a sustainable design method since it can replace product solutions without requiring natural resources, and it also develops advanced relationships as experience. Thus, the experience can also provide a perspective to understand and transform human and nature relationship for a better cohabitation. Furthermore, sustainable design paradigms do not provide an approach to understand the relations between humans and nature in the complexity of urban settings.

As a theoretical framework of this thesis, NEX is a reciprocal process showing the collective wellbeing in the cohabitation of humans and nature. NEX is the derivation

of user experience design as a non-human centered version for cohabitation. NEX is dynamic and reciprocal in terms of its relationship with nature perceptions. Thus, NEX is transformative, formative, and subjective.

I infer that a positive and proficient nature experience is essential in cohabitation with nature in urban settings in order to connect people with non-human livings. This connection is a precondition of cohabitation with nature in urban settings. Nature experiences mediate between humans and non-human livings in the current cohabitation situations, which also result in the production of nature ideas. Therefore, nature experience is an instrument to understand and idealize and transform the cohabitation towards collective wellbeing.

Human and nature is an assemblage with their entangled livelihoods by cohabitating. Besides, humans and nature survive together due to their interrelations within the ecological-cultural system. Therefore, design for cohabitation with nature is a non-human centered and also a more-than-human approach which aims to design for the collective wellbeing of human and nature. Furthermore, the reciprocal effect of NEX brings the requirement of intelligence to grasp all these interrelations within these complex urban systems. This intelligence brings an analytical and critical approach to monitor and notice the reciprocal actors for humans. Thus, designers will design inclusive solutions for the assemblage of human and nature since they will see the world around themselves through an ethical, responsible, systemic, and multispecies perspective. However, conventional design methods are not functional to reflect these perspectives. Hence, designers can use the arts of noticing, foray, participatory design, and speculative design to gain knowledge and design for the cohabitation with other living beings. These methods help to build a non-human centered cohabitation through nature experience.

2.7. Further Discussions for Sustainability and Design

Sustainability that is an anthropocentric discourse, is an archaic concept. The non-anthropocentric approach abolishes the term sustainability. Even the performativity of sustainability includes the human-centered approach: Sustain-ability, but who will sustain? Sustainability is the management of natural resources for the wellbeing of humans.

In design education and profession, there is a fundamental way of thinking to create solutions, and this majorly depends on the definition of the design problem. Defining the correct problem is one of the significant principles in the design profession. However, the evolution of design for sustainability raises the question: Although the designers are known for their ability to ask the right question, those could not ask the essential question to reach sustainability? The design profession focused on what they designed to fix ecological degradation instead of why they design. Thus, the design failed to detect and position itself against these environmental crises. In other words, although the design discipline is very famous for its problem definition methodology through questions, it failed to ask the right question towards ecological degradation. The sustainability literature shows that there was an emphasis on the product or design solution with the methods like a life-cycle assessment for eco-efficiency of the products. However, instead of the assessment of what was designed for its environmental performance, there should be an assessment of the motivations and decisions to design.

CHAPTER 3

METHODOLOGY

"Designing for experience requires complex design knowledge from many disciplines." (Oppelaar, Hennipman & Veer, 2008, p.1)

In this chapter, I explain the methodological approach that I embraced throughout the research to explore the human-nature relationship in the context of city, nature experience, and design approaches to cohabitation. This research prefers a qualitative approach and adopts a small group interview methodology. Firstly, I present an overview of the research. Secondly, I continue with small group interviews as the research methodology. Thirdly, I explain how I accessed the professional experts and developed the research methodology, and then analyzed data.

3.1. Overview of the Research

The main aim of this thesis is to discover insights and interpretations regarding nature, nature experience, and cohabitation. I applied small interview groups and organized group interviews by inviting young people from professions that help to understand, transform, and idealize human and nature relationships in order to reach these understandings.

Nature is a broad term that interests many individuals from diverse professions, along with the everyday experiences of nature. Many professionals interact with nature, and they have a specialized discourse producing knowledge, methodologies, and practices for nature and our relationship with it. In order to cover that width of nature understandings, I planned to reach individuals whose profession is a mediator between

humans and nature to understand, transform, and idealize the human and nature relationship.

After that, I chose these practices to invite people from those: nature/ environmental activism, architecture, biology, city, and regional planning, environmental engineering, genetics engineering, industrial design, landscape architecture, urban planning, and veterinary medicine.

Before conducting the small interview groups, I conducted an initial study with individuals from the defined sample. I interviewed three professionals from two different practices. I interviewed two professionals in their offices, one through Skype.

In these single interviews, those individuals dominated the data through their knowledge, experience, and insights. Hence, this made the findings lack sufficient depth and width. In order to break this, I have chosen a small group interview methodology to reach data filtered by diverse backgrounds, disciplines, and experiences. In light of this result, I also included designers studying user experience, sustainability, or biomimicry. The goal was to increase the plurality of interactions between diverse practices, and how design professionals find a voice through their academic or practical background.

Thus, I conducted six small group interviews with a semi-structured question form from March 2016 to October 2017, which took one year and six months to finish the targeted number of group interviews. In the next title, I present the methodology and research stages in detail.

3.2. Small Interview Groups

A group interview is the organization of a planned interview, which is conducted by one or more interviewers who meet face to face with two or more respondents, and each group interview is mainly a data collection tool (Thompson & Demerath, 1952).

An interview group is a qualitative research method providing in-depth information for many research projects (Thompson & Demerath, 1952; Frey & Fontana, 1991). In these research projects, the participants "tend to be a collectivity whose 'common bond' is experience with a certain product, communication stimulus, or questionnaire, plus a more or less common orientation toward the interview itself" (Thompson & Demerath, 1952, p.149). Interview groups provide insights into how people think and provide a deeper understanding of the phenomena which are studied and not possible to gain through individual interviews (Frey & Fontana, 1991).

According to Nagle and Williams (2013), interviews conducted with only one individual are dependent on the researcher's questions and those related answers. Thompson and Demerath (1952) explain that in a setting with only two people, as the interviewer and an interviewee, there are minimal socializing relations since there is only one communication way when compared to interview groups. However, in a small interview group session with at least two interviewees, there are multiple communications constructed by the interactions between the interviewer and the interviewees, which provide more precise answers (Thompson & Demerath, 1952). Any answer or explanation of an interviewee can stimulate emotions and experiences or remind their expertise of other interviewees that the questions of the researcher could not succeed, stimulated by other participants, an individual may give a much more deep explanation about the issue (Fontana & Frey, 1994). Besides, in group interviews, the research question format might be varied among very unstructured, semi-structured, and structured (Frey & Fontana, 1991).

Besides, the most common group interview methodology is focus groups (Kitzinger, 2005). As group interviews; small interviews and focus groups have similar features; however, focus group methodology is more structured in terms of questions, and the group population (Frey & Fontana, 1991). While a small group interview is possible with two participants, the optimal number for a focus group is higher. Whereas Kitzinger (2005) indicates that the number of participants between four and eight is the ideal case, Nagle and Williams (2013) point out that the number between seven and twelve is optimal.

3.3. The Stages of Research

In this heading, I introduce the stages of the small interview group study.

3.3.1. Sampling

In this thesis, purposive sampling was applied to form a convenience sample to collect data (Given, 2008). Purposive sampling is the process of choosing participants according to the criteria set by the researcher, which is relevant to address the research question (Given, 2008). In the research sample, the purpose was to reach a convenient group of people to discuss nature, nature experience, and cohabitation by evaluating the current case and offering ideal cases for the sake of both humans and nature. This convenient group should have the proficiency to evaluate human and nature relationships, and this proficiency requires knowledge and experiences since human knowledge and experiences of nature are a mediator between humans and nature (Clayton et al., 2017).

While each human has experiences of nature, knowledge was most evident and available through professions studying nature or human and nature relationship. Some professions focus on nature and related work areas differently through natural or applied sciences. To illustrate, while ecology helps to understand ecological relations,

environmental engineering works for the management of natural resources for humans.

Decentralization of any approach

As Drenthen, Keulartz, and Proctor (2009) indicate, there is no one favored vision on nature; the multidisciplinary structure of the sample was also a critical factor in the research sample. Decentralization of any discourse on nature and cohabitation provided a multicentric approach to talk about nature experience and design for cohabitation with nature. In particular, young people from diverse disciplines were not the representative of their disciplines, but a representative of the plurality of ideas on nature, nature experience, and cohabitation because of its complexity. Furthermore, they brought the experiences of other human and non-human actors to the table to talk, parse, and compile for a better cohabitation along with their own both professional and daily experiences.

Hence, they will also bring their own theoretical and applied discourse on the table, which was the potential of these small interview groups in which the participants challenge each other's perspectives and professional, or personal values, even their biases. However, it was also essential to bring the discourse of designers to the table, although this profession is not one of the major ones related to nature. For designers participants, I defined two criteria: (1) designers studying sustainability or (2) studying or practicing user experience design.

Context of the sample

Concerning the research question (see Section 1), the urban settings were the context of the group interview participants. Urban setting was the context of the study and the sample group since urban settings have real challenges in terms of nature experience (Clayton et al., 2017) and cohabitation (Smith et al., 2017). Urban settings are the complex socio-technical systems having poor relations with nature, which is

promising to explore nature perceptions and experiences. Thus, designers can find domains to design for nature in urban settings.

All the participants inhabit the city Ankara, which also defined their context. In other words, the participants discussed nature experience and cohabitation mostly for this urban setting, along with their experiences in other cities.

Davies (1999) indicates the importance of making the participants feel comfortable; however, I also had hesitations about my self-confidency and sufficiency to execute a group interview as a fresh researcher without any experience of moderating a group interview. Also, any wrong impression on the participants might result in losing their interest through the group interviews. Thus, considering the comfort of the interviewer and the interviewees, power relations, and common ground, I decided to reach individuals who have some common aspects like experience, age, and lifestyle.

A particular group of participants

Hence, I defined a particular group of people as a sample through purposive sampling. The criterion was the proficiency to have both professional and personal knowledge and experiences of nature for urban settings. However, their proficiency was mostly situated as a lens for their interpretations of exploration and idealization of human and nature relationship through their NEX. Consequently, a collective understanding of ideal for nature, nature experience, and cohabitation was the aimed output of this research methodology instead of focusing on professional positions.

As mentioned before, individuals from practices relating to nature like *environmental activism, architecture, biology, city and regional planning, environmental engineering, genetics engineering, industrial design, landscape architecture, urban planning,* and *veterinary medicine* were the starting point to define sample.

I designed the sample with the premise about the nature perception and the nature experiences of the chosen disciplines. Those premises were for each background as follows:

- **Architects** were expected to talk about indoor and outdoor spaces and nature. They can position nature, NEX, and cohabitation from a spatial and psychological view.
- **Biologists** were expected to bring the account of nature, mostly biotic factors like plants and animals and ecological systems. They can give the most scientific nature manifestation.
- **City and urban planners** were expected to talk about urban space, mostly outdoor urban spaces, nature, and city.
- **Designers** were expected to introduce sustainable design or experience design
- **Environmental engineers** were expected to talk about the environment instead of nature. They can talk about abiotic factors
- **Landscape architects** were expected to talk about outdoor space and greenery in urban environments
- **Nature activists** were expected to bring ethics and responsibility for nature or the future of society.
- **Veterinarians** were expected to bring the account of animals by talking about animals' experience in urban environments.

Although I planned to include veterinary and landscape architects in the interview groups, they could not attend to any group session due to availability.

Exclusions

Concerning the defined context of participants, I did not choose specifically people from potential practices like a mountaineer, farmer, agricultural engineer despite their intense relationship with nature. However, any activist from these backgrounds could have participated in group interviews. What is more, I did not emphasize practitioners

who might relate to nature from city authorities like public administration since their relation to nature was not so obvious.

Group dynamics

I decided to form an ideal group with four people due to the diversity it would create. However, it varied due to the availability of and accessibility to potential participants. The smallest group consisted of 2 people, whereas the biggest group included 4 people. I also grouped these professional backgrounds to create diversity among the groups in terms of knowledge and approach. To illustrate, planners and architects were one group I called AP (Architecture and Planning), and people from biology, ecology, genetics were included as group BIO. Hence, I tried to choose one participant according to this list for each group and mostly created the groups which consist of biologist, planner, and environmental engineer due to availability.

Access to the research sample

After the description of the research sample, snowball sampling that is "efficient and cost-effective" (Naderifar et al., 2017, p.2) is applied to reach people from diverse specialties. However, its effectiveness worked after I reached several people from other disciplines. That is, the snowballing effect came when I reached a small network, including individuals from all disciplines. Since it took time to reach and gather professionals from other disciplines, I applied some other alternative methods to make the research visible to reach participants for the study.

In order to reach the sample, I used these methods:

- Poster design
- Visits to the departments in my university (Middle East Technical University)
- Meetings with informed participant candidates before the study

In order to draw the attention of people, I designed a poster (Figure 3.1) and spread through my university and social media. I hung the poster on the boards of the Faculty

of Architecture, Department of Environmental Engineering, and Biology in METU. I shared the poster with a calling message on social media platforms Facebook and Instagram. I contacted potential participants through the engagements on these social media platforms.

Figure 3.1. Poster to encourage people to the group interviews

I visited the Environmental Engineering department to meet with a participant who admitted to participating in a group interview. We made a short trip to the department building together. She introduced me to her friends, and I got the chance to invite them. Two of them responded and participated in the group interviews. Also, I visited the Biology Department to meet with assistants and hang posters to the walls.

I sent emails to the possible participants to whom my network and the group participants guided me. Although I was already in communication with some participants and informed them, I also sent an email to those familiar participant candidates to construct a professional relationship through the research method. The mails include an overview text explaining the study and why I invite them, the poster

and the *Informed Consent Form* (See Appendix). When any invited individual agreed to participate in the group interviews, I sent them another email with a link to *Doodle* (Figure 3.2), an online scheduling platform, to select available time options for the participants by giving them a user code formed with profession and number like *Biology 2*. I named all the participants with a code in order to prevent the other participants from getting an impression that might affect their participation decision negatively through these scheduling.

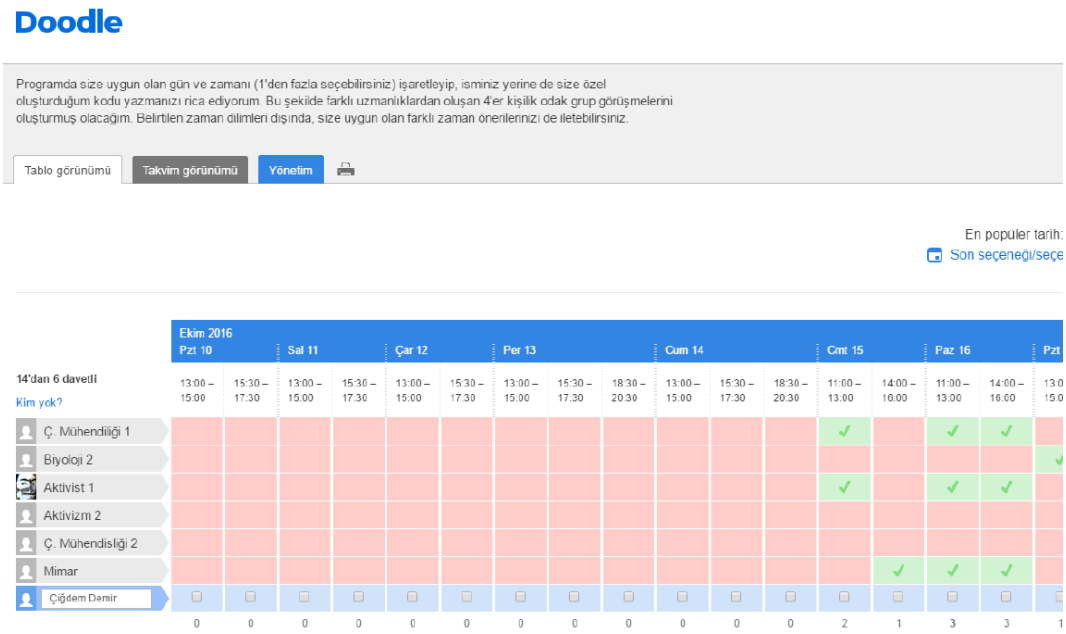

Figure 3.2. A screenshot from Doodle platform

I sent an email to 58 individuals to invite to the group interviews. 14 out of 58 people did not reply in any way. 30 people agreed to participate in the interview groups among the remaining 44 people. I realized that 3 out of 30 people who agreed to participate in the interviews were not eligible because of their age or position. Group interviews could not be arranged with 5 of the remaining 27 people due to the inability to set an appropriate time. The communication with 1 of the remaining 22 people was lost. After that, the appropriate time was set with the remaining 21 people. However, before

the arranged interviews, 4 people said that they could not participate because of their last-minute work. 1 person did not participate in the interview due to a communication misunderstanding. After the meeting hours were determined, 1 participant was found instead of 1 of these three people who could not attend the meetings. Briefly, I conducted 6 small group interviews with 18 people.

Table 3.1. *The table showing the demographic information of the participants*

Group No	Participant Number	Undergraduate Education	Graduate Education	Age	Sex
1	P1	Environmental Engineering	Environmental Engineering	26	Male
1	P2	Industrial Design	-	26	Female
1	P3	City and Regional Planning	Urban Policy Planning and Local Governments	26	Female
2	P4	Environmental Engineering	Environmental Engineering	27	Female
2	P5	Biology	Ecology Specialization Under Biology	28	Male
2	P6	City and Regional Planning	-	23	Male
3	P7	Philosophy - practice area Activism	-	23	Female
3	P8	City and Regional Planning	Urban Policy Planning and Local Governments	26	Female
3	P9	Environmental Engineering	Environmental Engineering	27	Female
3	P10	Industrial Design	Industrial Design	28	Female

Table 3.1. *Continued*

4	P11	Molecular Biology and Genetics	Biotechnology	28	Male
4	P12	Architecture	Urban Design	25	Female
5	P13	Biology	Molecular Biology	26	Male
5	P14	City and Regional Planning	Urban Design	24	Female
5	P15	Environmental Engineering	-	23	Female
6	P16	Biology	Ecology Specialization Under Biology	27	Male
6	P17	City and Regional Planning	Urban Design	25	Female
6	P18	Environmental Engineering	Environmental Engineering	24	Female

Participants consisted of 6 men and 12 women between the ages of 23-29 through 6 different specialties. I also prepared an illustration to help the audience to visualize the interviews (Figure 3.3).

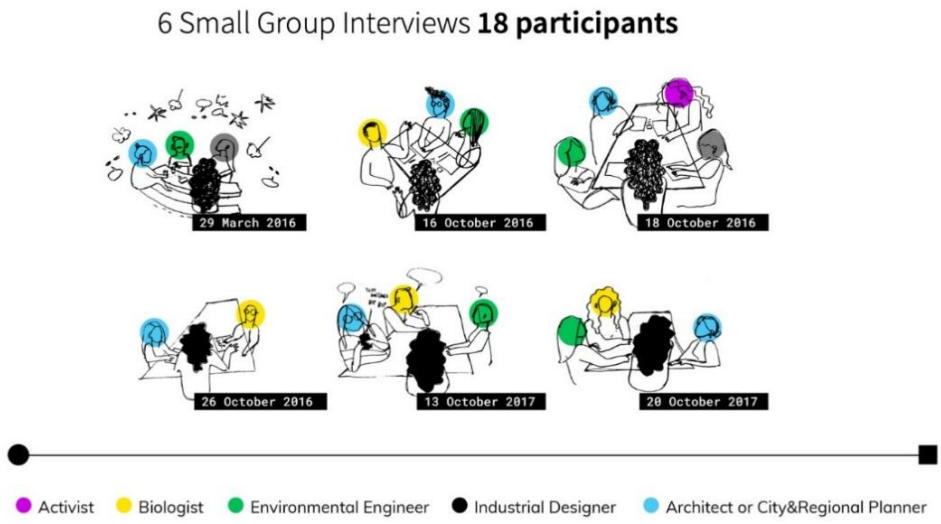

Figure 3.3. The illustration showing the timeline of the group interviews

The saturation point of group interviews

The small interview groups of this research mostly included people from the disciplines from biology, environmental engineering, and urban planning. After the 6th interview group, the data patterns were visible in terms of nature, nature experience, and cohabitation even without an initial thematic analysis. After the 6th interview group, I stopped the study.

3.3.2. Group Interview Questions

During the interviews, a semi-structured interview was held with the participants. Questions were asked within the framework of nature definitions, approaches, nature experiences, and living practices with nature. Also, participants were shown some selected design applications and were asked to evaluate these design practices.

The interview structure contains three sections in which I put prompt questions for the participants. These sections are *A-City and Life, B-Designing Nature, Designing for*

Nature, C-The Cities of Future, and also additional comments. Some questions have a bulleted list to check whether the participants mentioned some specific subjects. Otherwise, I prompted them with questions. The questions are listed:

A - City and Life

1. How does the urban person meet nature in urban life?
    i. Animals (domestic animals, wild animals)
    ii. Plants/green areas (built environment, trees, plant breeding, going to / being in nature)
    iii. Air, sun, water
    iv. The distinction between nature/organic and urban/organic-inorganic
    v. Problems
    vi. Benefits (Individual, Societal, Ecological)
    vii. Is there any new nature definition proposed within the professional view?

2. How does the living creatures except for humans adapt the everyday life?
3. How should our relationship be with nature in urban life?
    i. Indoor nature (home, school, office)
    ii. Outdoor
    iii. Visited Nature

B-Designing Nature, Designing For Nature

4. What kind of instruments that improve your relationship with nature in urban life?
    a. Digital or physical products, services
    b. Organizations, events, and places
        i. What kind of solutions do inhabitants produce for collective life in urban life?
        ii. Do you know any people who are a part of these services and solutions?
        iii. Are there any solutions that seem functional but do not work? Why?
5. Could it be designed for nature?
6. What kind of contributions the product designers make?
7. Do they know the product designers?

8. Where does the technology stand in our relationship with nature?
    a. Intersections between nature and technology
    b. Does technology reform relations?
    c. Synthetic biology
    d. Biodesign

C-The Cities of Future

9. How will nature and human beings live in the future of cities?
        i. Does this association have a meaning?
    b. Design
    c. Technology

In order to monitor whether the participants addressed some specific topics under each question, I put items related to the question theme. I remarked when the participants referred to any of these items. If they do not relate these topics in their conversations, my strategy was to ask questions.

In *Section B,* I showed images of some solutions (Figure 3.4, 3.5, 3.6) for the human-nature relationship to participants to learn their approaches to the designed works for human-nature relationships. I also gave brief information about each image to the participants. While choosing these images, I focused on choosing examples covering the interactions for the everyday nature experience, the instrumental value of nature, empathy for nature.

Visuals as prompter

Visuals "can be used as a stimulus that is provided by the researcher to act as a prompt or as a focus of discussion" (Given, 2008, p.619). Thus, I wanted to give prompts to the participants to make them talk about design and nature instead of specifically make them talk about these products. I aimed to learn their interpretations of design and nature. While choosing these images, I focused on the presentation of nature in these images. Besides, I differentiated those by coding them with keywords. I used these keywords to define what are the issues I wanted to make the participants talk. While submitting the images, I did not follow an order; on the contrary, I randomly spread

the images on the table for each time. Then, I waited for their reaction to the images. Furthermore, the participants gave reference to these images while talking about other concepts throughout the interviews.

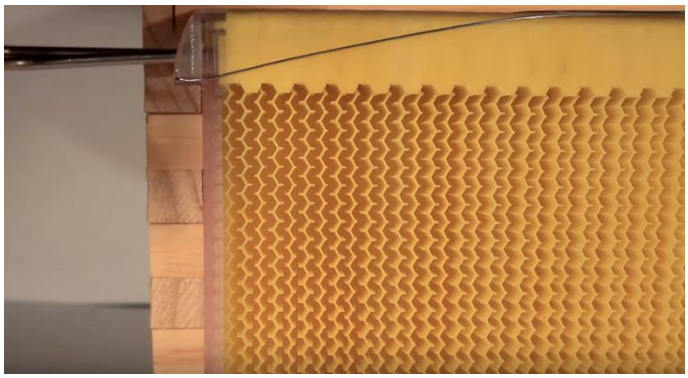

Figure 3.4. HoneyHive

https://www.honeyflow.com/

In Image 1 (Figure 3.4), there is a functional relationship with nature, and nature is applied as a resource here, and this design artifact constructs a utilitarian relationship with nature and human. Hence, I aimed to encourage the participants to produce discourses around a utilitarian nature perspective.

Keywords: Nature as a resource, animals, animal rights, ethics, the role of the designer, design process

Figure 3.5. IKEA gardening product kit

https://www.dezeen.com/2016/05/03/ikea-indoor-gardening-hydroponic-kit-krydda-vaxer/

In Image 2 (Figure 3.5), there is an IKEA gardening product. In the period when these interviews were conducted, these kinds of indoor gardening products were popular, and those were mostly proposed as a new nature experience.

Keywords: nature, direct nature experience, the role of the designer, design process, nature as a resource, indoor context, scaled, symbolic. Indoor nature ideas were also questioned through interview questions along with this image.

Figure 3.6. VR Headset titled *In the Eye of an Animal*

https://arstechnica.com/gaming/2016/07/laser-feast-eyes-of-the-animal-vr/

In image 3 (Figure 3.6), The primary aim was to get reactions to design objects designed for nature experiences with different contexts, which might initiate conversations among the participants and enrich data.

Keywords: experience design, technology, indirect nature experience, digital nature experience, fiction

3.3.3. Venue and Interviews

Through my research methodology, I conceived a small interview group as a workshop, and this perspective defined the methodological approach of the fieldwork. Since a group of people is asked to be in a defined place and time, this shows a similarity with a workshop organization. Hence, this is a good way to design a group interview session like a workshop by considering each detail. My professional background and previous experiences as a designer also helped me to organize a small interview group since workshops are common methods in design discipline with diverse aims. Furthermore, in order not to forget any task to complete before the interviews, I always prepared a checklist (Figure 3.7) before each interview.

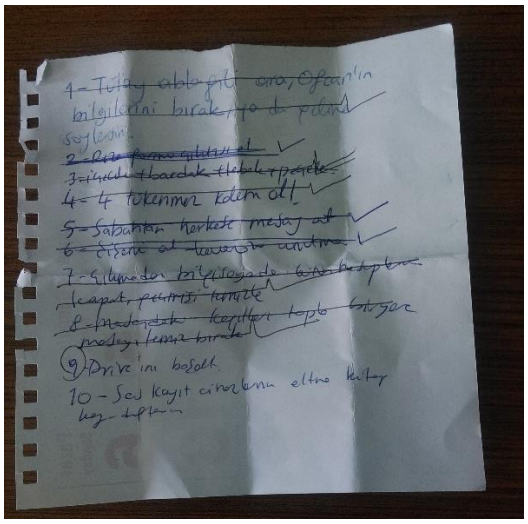

Figure 3.7. My checklist

I prepared the interview venue to create a talkative atmosphere. The image (Figure 3.8) belongs to one of the rooms in which I organized for the interviews. I conducted all the interviews at Middle East Technical University. I used three different rooms due to the availability of the places through the research.

Figure 3.8. A view from the interview venue

I put the form on the table for them to sign and also a paper and pen if they want to take notes and share (Figure 3.8). Some of them used these papers to take notes and provided reasonable interpretations (Figure 3.9).

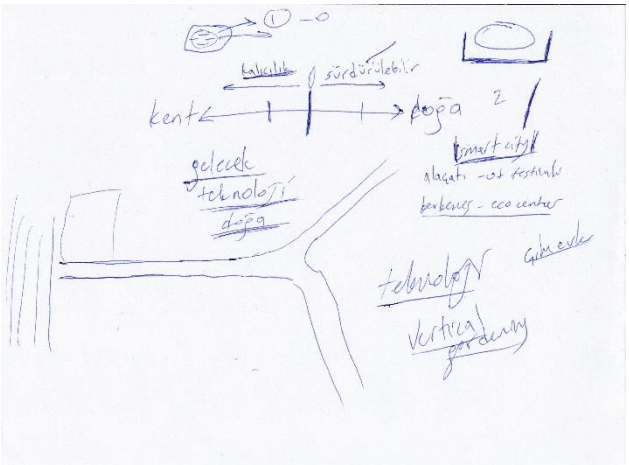

Figure 3.9. Notes and sketches of a participant

I also took notes on the interview sheet. After the interviews, I also wrote down some notes for each group in order to remember the dynamics of the groups. There were also small presents for the participants after the interviews to thank them. Additionally, I sent a thanks email that asks the participants to inform and encourage their friends for this study.

3.3.4. Data Analysis

The analysis of data was an iterative process with three cycles of codification (Figure 3.10). First, I made the transcriptions (Figure 3.12) of all the group interview recordings and prepared the documents for coding (Saldana, 2009). The duration of each interview was between 60-120 minutes, and I analyzed data that which is 555 minutes in total.

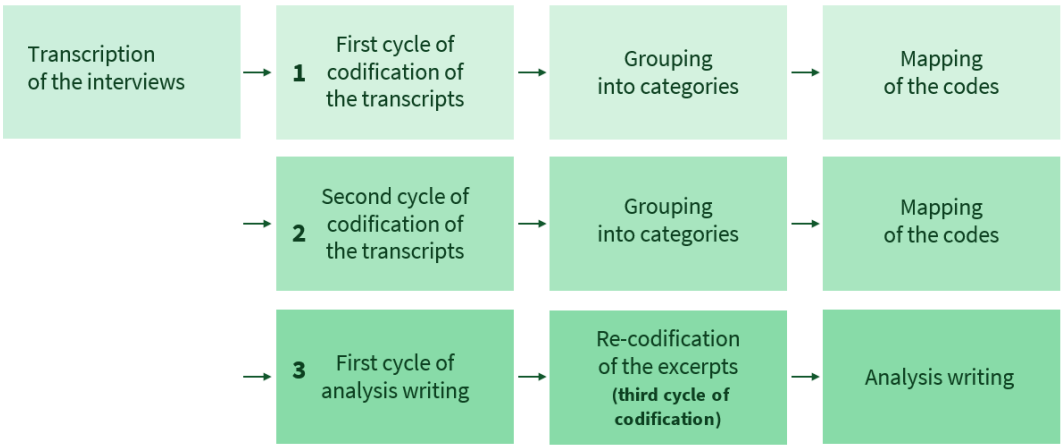

Figure 3.10. Data analysis process

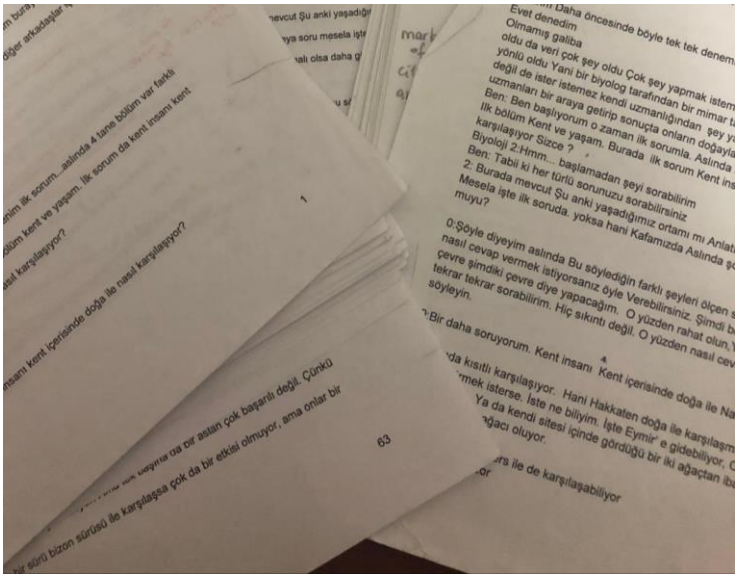

Figure 3.11. Some of the transcripts

After the transcription, I made a thematic analysis of the data through the codification of the participants' discussions (Figure 3.13). In the thematic analysis, data is coded, and patterns are discovered along with the emergence of themes (Saldana, 2009).

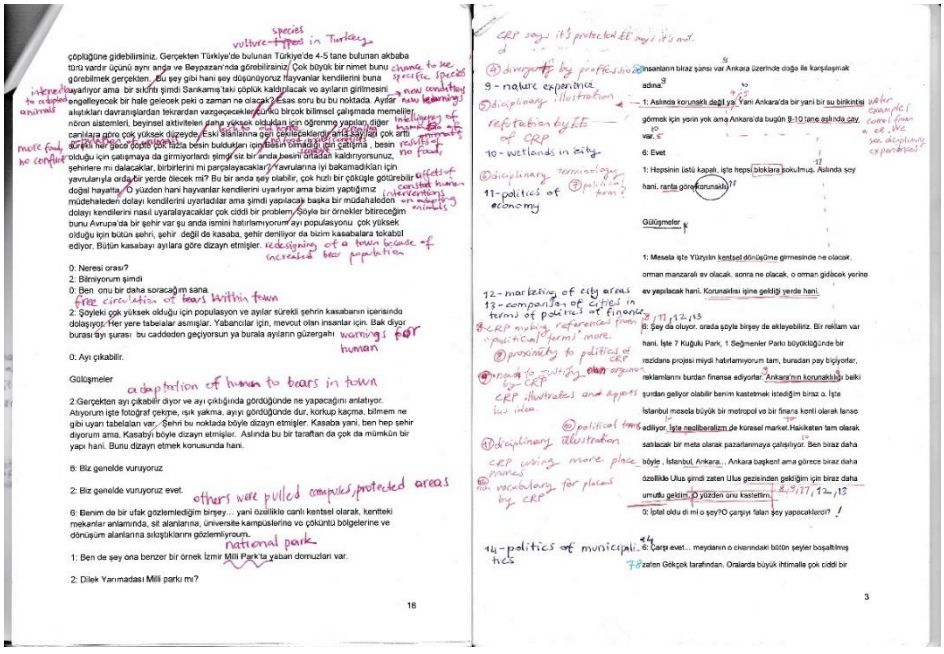

Figure 3.12. The coded transcript sheets

While coding, I also benefited from sketching in order to analyze the data. The visualization of the statements (Figure 3.13) also helped me while coding.

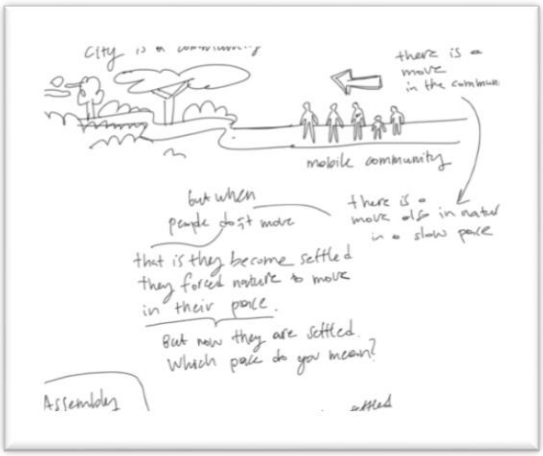

Figure 3.13. Visualization for coding

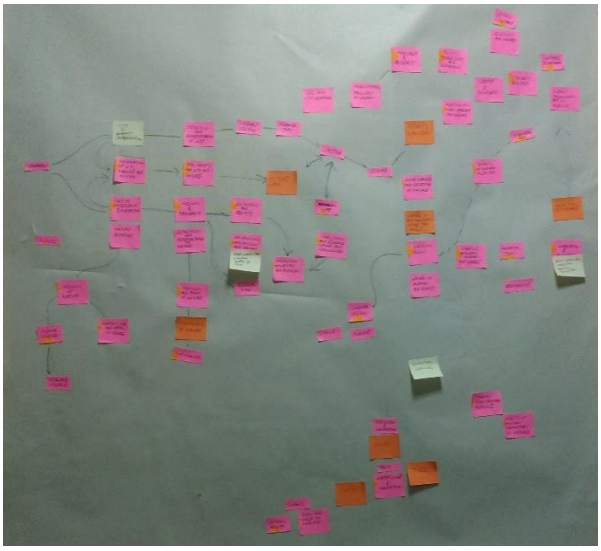

Figure 3.14. The first mapping of the themes and codes

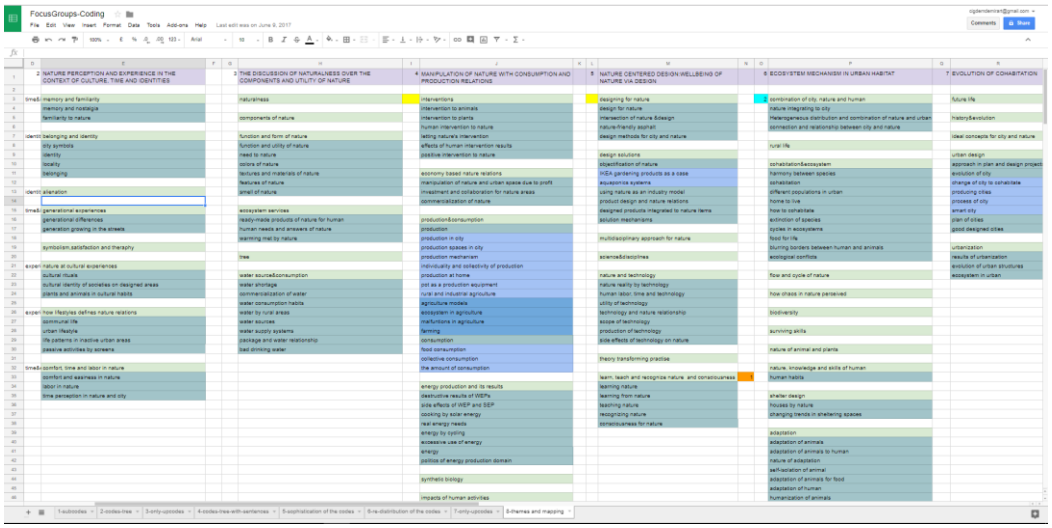

Figure 3.15. The codes to themes

In the thesis, I finished the coding process of the transcripts in three cycles to cover all the similarities and differences. Saldana (2009) explains that the first time coding rarely happens correctly:

> Qualitative inquiry demands meticulous attention to language and deep reflection on the emergent patterns and meanings of human experience. Recoding can occur with a more attuned perspective using First Cycle methods again, while Second Cycle methods describe those processes that might be employed during the second (and third and possibly fourth ...) review of data. (Saldana, 2009, p.10)

The data as an output of small interview groups included a large group of quotations, which was one of the struggles I encountered to find patterns through the data analysis process. I made two iterations of grouping data to find patterns. After these iterations, I wrote an initial analysis chapter. However, this also showed that the data was not ready to discuss. Hence, I made the third cycle of coding and reached a coherence thanks to the familiarity with data I gained through these iterative processes.

CHAPTER 4

FINDINGS

The findings of the small group interviews are presented in this chapter. The analysis has four main themes. Firstly, I explain how the sample group defines nature. Secondly, I review the nature experience in terms of factors, results, and ideal case. Thirdly, I discuss the current cohabitation situations in urban settings. Lastly, I confer the suggestions of the participants for an advanced cohabitation.

Through this thesis, I do not situate those young people as the representative of their professions; on the contrary, I benefit from their professions to identify groups of people who have diverse nature experiences (see Section 3.4). Thus, any interviewee cannot be regarded as the representative of their profession about the nature of this qualitative study. As a qualitative research, the findings also ensure this decision since the participants shared their personal stories more at the group interview rather than professional experiences.

While using the statements of the participants, I present them with a code, which is the abbreviation of participant numbers like P5 (Participant No) in this thesis. The given numbers for each participant are presented on the table in the Methodology section (see Table 3.1).

4.1. Perceived Nature

In the interviews, the participants' discourses were followed to catch any effort to describe nature. When the absence of a nature description has been noticed, those were asked to describe what is nature. While the participants tried to share a nature

definition, they emphasize the difficulty of making a definition. Upon this, I encouraged them to talk about what is not nature since the participants of the first and second interviews demonstrated that there is a tendency to define what is not nature. Therefore, I applied this tactic through the small interview groups in case of the need to prompt the participants for their definitions of nature.

Concordantly, they submitted the attributions of nature for themselves. However, they also criticized the public vision of nature. They remarked that there is a lack of a comprehensive definition of nature in society. They evaluated public visions of nature as trimmed and narrowed. According to P5, the narrowness of nature definition was a problem caused by the disconnection to nature:

> P5: Most fundamentally, there is a problem in our definition of nature. Moreover, that's really about the break of the human relationship with nature.

The participants also emphasized the necessity of a comprehensive definition of nature, framing how people relate to and live with nature:

> P5: But now people should have a definition of nature, which will influence the architecture, urbanization, and design.

The participants mostly stated what they perceive as nature instead of making a solid nature definition. The participants' statements demonstrated the aspects attributed to nature for this sample of young people from different professional backgrounds. The presence or absence of these attributions was used to indicate what is nature or not by the participants. They also discussed the quality of some entities as nature by using the word *natural.* However, in this chapter, the quality of nature is mostly described with the word authenticity to qualify nature definition.

In this heading, calling as *perceived nature,* I discuss the aspects which influence nature perception. First, I submit the attributions of nature for the participants of the small group interviews, and these attributions are largeness, multispecies life, and pristine nature. Pristine nature explains how this research sample sees the lack of human touch as nature authenticity. Concerning human touch, I also discuss the city and nature duality, which the participants intensely applied to describe nature. After these attributions, I consider social context as a factor for the perceptions of nature.

4.1.1. Largeness as Nature

While the participants tried to describe nature, they talked about spaces and focused on whether the area is large enough or not. Therefore, *largeness* was a prominent concept which the interviewees shared with the keywords of *big, boundlessness*, and *boundaries* to qualify any entity as nature.

Not giving a qualification of largeness, P11, and P17 both shared what they accept as nature in terms of largeness. P11 illustrated his argument by pointing out the sufficient magnitude for an urban park:

> P11: So instead of saying nature must be this or this...That question was beautiful, and I've been thinking ever since: what we should accept nature and what we should not? For example, if *Seğmenler Park* (a popular urban park in Ankara, Turkey) is large enough, Seğmenler is a part of nature.

Similar to P11, P17 also explained largeness as a nature attribution by talking about a park. However, she emphasized the boundaries of parks by seeking for the boundlessness she found in nature:

> P17: But our parks are not big, they all have a limit. However, you can see that no limit in nature, you can see boundlessness when you look at the horizon. Now you can't see it in the urban environment, which makes me question whether there is a natural environment or not.

The statements demonstrate that these participants ascribe nature with great scales and without limits, which makes it more inclusive. They qualify the spaces as nature when they see an acceptable largeness. However, what this acceptable largeness is not given by the participants, but represented with some places they are familiar with.

4.1.2. Multispecies Life

Multispecies life is the form of life consisting of organisms from diverse species. While the participants sought for the plurality of organisms at first, they mostly focused on the diversity in this plurality to qualify any space as nature. This qualification was mostly manifested by the co-occurrence of animals and plants in space:

> P4: You (referring to another interviewee) said that this definition of nature, you plant a tree and it grows, you know, is it easy to grow a forest? It was probably the life in it that made it nature. Not only plants but also animals there.

P4 refers to how a plant brings others to describe nature. She qualifies the co-occurrence of animals and plants as life, which is nature. In other words, the multispecies life is nature. Slightly different from P4, P11 emphasizes the coexistence of the interrelated species by soil:

> P11: And think of being a part of a place that is just a tree, for example. There is soil, but there is no grass, but there is only a tree. That is a very artificial thing, and you don't feel like you're in nature there. Because it's not natural there, and you don't feel there. So to feel ourselves belong there, there must be other residents of this place. At first, these residents are the people who play guitar. Then, for example, when you hear bird sounds in an area, you'll notice it later, and you'll like it.

He has a perception regarding the integrity of nature. According to him, any lack of this integrity makes anything as artificial. This perception of integrity includes an

interrelation with other species. Thus, he defines the lack of any of these interrelated species in the soil as an aspect that makes the space as artificial. Then, he indicated that the coexistence of others that human or other species brings the attachment to that space for an individual. According to him, one feels a connection to that space when there are other lives.

However, the existence of other inhabitants might not be an aspect of nature and authenticity for some others. P10 evaluates the presence of many other human inhabitants as a crowd preventing her from feeling to be in nature. According to her, serenity due to fewer people brings authenticity to that space.

> P10: I don't feel like I'm living with nature when I go to Seğmenler Park while sitting on the foliage and touching because it's too crowded. A little calmer, more natural.

As an attribution of nature, multispecies life was also defined, which makes a built environment appear as genuine, in other words, authentic. P12 indicates a multispecies life evolved from and around a seed hides the *human touch* behind a built environment:

> P12: It doesn't look human-made, but it's human-made. One of its reasons is that someone is throwing a seed somewhere, and then he sows another plant that is compatible with it. Furthermore, they begin to multiply by themselves in the process. As they multiply, they begin to become a forest. There are other, not only human beings, and we are animals, yes, but there are other animals like us. Here, whether fox, beetle, rabbit, swan, etc. and the plant habitat there, according to their species, actually other animals that are compatible with them begin to live there. Living things that are compatible with those plants are starting to live there like puzzle pieces.

These statements demonstrate that they qualify any entity as nature when it matches the perception of nature have. However, this perception includes a society of species, which let them define anything as authentic.

4.1.3. Pristine: Untouched

The human touch in an environment was a key concept which indicates the authenticity of an environment along with the *largeness* and *multispecies* life for the sample. The lack of human touch is described as *untouched,* and the designed environments were questioned in terms of their value as nature.

Middle East Technical University (METU) was one of the prominent places that the participants applied in their statements to illustrate their views along with *Seğmenler Park* and some other places. This might be related to that the research was conducted in that university (see Section 3.4) or the sample consists of mostly the students and graduates of METU, and interviewees are familiar to METU. The METU is known for its green campus owning a large area of forest in the city Ankara in Turkey. The forest was created mainly by the students and graduates in the treeless field in years.

Although METU forest is *large enough* with *multispecies life*, P10 interrogated the METU forest as nature:

> P10: What is nature in people's eyes now? In my eyes, whether the trees in METU are nature now a question mark. Yes, now we have built a building here, yes there is a bird's nest across the street. There are magpies, pine trees, several different kinds of trees. Is this nature first we need to talk about this one.

Similar to P10, P5 questioned the quality of the METU forest as nature. His emphasis was on the fact that METU is a human-made forest that was created in the center of a steppe. Ankara is a city called steppe due to its climate and flora. He specifies the difference of the METU forest as a human-made forest by comparing it with the forests which are at the periphery of Ankara.

> P5: What is the definition of nature here? When we look at the METU forest today, what we call Ankara's single forest is really nature? At this point, in the middle of the steppe, can you define a forest that you created with human power as nature? Is this nature here, not even 100, 100, but in the same status as another natural forest 50 km away?

The prominent attributes to define the nature and its authenticity were *largeness*, *multispecies life,* and state of *untouched.* While the state of being *untouched* was commonly accepted as a sufficient attribution to describe nature alone, *multispecies* life is found by some others as insufficient while making a nature qualification. The sufficiency of *largeness* as a nature attribution was mostly discussed over METU and other green known places. These statements suggest that the state of being *untouched* is a more predominant attribution than two others.

Unlike P10 and P5, P12 used the METU forest as a reference to nature qualification by indicating *the feeling of being in the METU forest* which was similar to *the feeling of being in nature* narrated by P10 previously:

> P12: Now, there is something like this; when you look at, Seğmenler Park is actually ascribed as an urban park. Actually, Güvenpark used to be, too. In other words, there is a street right next to the city, but when you enter the park directly from the street, you start to feel as if you are in the METU forest.

Similar to the previous statements, P4 drew attention to human-made environments. She indicated that excessive afforestation destroyed steppe recently. According to her, this new space was still a piece of nature and providing *the feeling of being in nature.* However, she described this piece as the built vegetation, which was intended to be shown as *untouched.* Upon this, she divided the city and nature by suggesting a duality over the counterfeit vegetation.

> P4: But I think especially now that the steppe has been eliminated with much afforestation, now it is still a city, how much nature is that you are in nature, it is part of nature. However, you think that there's something that's not planted there, but it's the greenery that pretends to be planted spontaneously. This

> makes me ask the question of which part is the city and which part is nature. I guess I answered your question with a question.

All these discussions might suggest there is a given significance to the integrity of nature resulting from the interrelation of all biotic and abiotic attributions like flora and climate. This significance was prominently observed at the young experts who are from biology and environmental engineering.

Back to the latest discussion, P4 suggested a nature and city duality over the statement of *untouched.* Similarly, P17 and P18 suggested the same duality differently. While P17 implied the border between nature and city, P18 argued about the conflict between nature and city that results in the death of nature:

> P17: Does nature begin where the city ends?
> P18: So, the city is something that kills nature.

The latest discussion raised around the question of P4 seeking for the scale between nature and city for counterfeit vegetation. In her statement, nature and city were represented as two poles: " what is the amount of nature or city?". Similar to P4, P11 also inserted nature and city into a scale as the poles of this scale. P11 suggested that this scale can be used to describe any space as close to nature or close to the city:

> P11: If we take the city here, the park or nature here. When we define a region, a region from city to nature, such as this gender scale, we can do something as if we are closer to nature or in the city. We can put specific parameters into it.

This closeness to nature or the city might offer the convergence of nature and city. In other words, this illustration of scale (see Figure 3.9) proposes an array of spaces, both consisting of nature and city in different amounts. This array of spaces includes a diversity of nature. While *untouched*, the lack of human touch was ascribed as nature through the discussions, P15 stated that "the city is human". When this statement is

used to replace the related pole of this scale, it turns into a scale of human and nature. Hence, this scaled duality promises a diversity in nature that is both human and nature.

4.1.4. Social Context

This array of varied comprehensions of nature brings diversity in what perceived as nature, and this might be due to the physical and social living environment of people, as remarked by the participants. It is stated that how familiar people are to nature by their experiences frames what they describe as nature. Consequently, the social contexts of people were reviewed as an agent influencing their nature description. Some participants emphasized the differences in these social contexts:

> P10: It is different. Even when looking at the house, people can imagine that if there are even two trees on the site, the ratio is more intertwined with nature. However, for someone who has already grown up with it, the site is full of buildings.

According to P10, familiarity with nature leads to make different assessments for space. P10 stated that while *two trees* might be evaluated as integration with nature for some, a person who had a growing environment to which nature was penetrated only sees the lack of nature. Similar to P10, P8 stated that social context brings a change in nature perception:

> P8: Maybe it will not be easy to go to live in the countryside for someone who has grown a fruit and vegetable, for someone who lived in a very urban area. It would be like going to an extraordinary place when compared to a metropolis life, which is the normal of urban people. I think the definition of nature will change for these people.

P8 stated a person whose social context has changed, also gains a new vision of nature. According to her, change in social context also brings difficulty for the embracement of new conditions in that new context. This is similar to the diversity of nature perception among people with different social contexts.

To sum up, I discussed how the participants defined nature and what were the attributions they applied. They stated there are a lack and a need of a comprehensive nature definition. The participants shared diverse perceptions of nature by qualifying what is nature what is not for them. However, there were patterns among the participants for nature qualification. They shared *largeness, multispecies life,* and *the state of untouched* as the key concepts to qualify any entity as nature or natural.

4.2. Nature Experience

In this heading, I discuss how young people from diverse practices related to nature define the interaction with nature as an experience and qualify this experience. During the interviews, the participants did not directly define their interaction with nature as an experience. It was observed that they mostly called their relation to nature as a relationship instead of experience.

The significant findings of the small group interviews present that nature experience is reshaped by the *accessibility* and *effort* factors, and different proportions of accessibility and effort mainly result in the *attachment* to or *alienation* from nature. The interviewees also suggested the *ideal nature experience* along with the *attributions of nature experience*.

4.2.1. Accessibility

This thesis researches how people construct their relations with nature in urban settings from a viewpoint reclaiming this interaction as a nature experience. The participants emphasized the lack of experience due to urban life. How nature is experienced in urban was discussed around accessibility, which provided the emergence of these discussion topics: the lack of proper nature and filtered accessibility. In this heading, I will present the findings through these emerging topics.

It was stated that there is a lack of experience, and this lack of experience is caused by the accessibility problems and relatedly effort given to access nature or nature experience due to the lack of proper nature in urban settings. Urban life was assessed as a formative factor defining the relations to nature:

> P8: After all, there is not a single person in nature, but we can experience many of them by going. We don't know many living things. We have seen a deer on television, we have seen a fox, but we have never seen them in their natural environment or have seen them alive. Therefore, urban life affects our communication and interaction with nature differently.

P8 denoted that there is a lack of interaction with animals and observation of some in their natural habitat along with the lack of knowledge. In her experience, this lack of interaction is replaced by motion pictures of those animals instead of real interaction with non-humans. Nature experience becomes accessible by *going to nature.* This form of experience is related to urban life influencing the interaction with nature. It was suggested that this influence is based on the planning of the city.

During the interviews, the participants were asked how they encounter nature in urban settings. While they suggested that public areas, but most parks as the meeting spaces along with the METU forest, they stated the lack of proper nature in urban settings. They mostly specified the places to encounter nature in the urban environment by stating these are the most accessible options for nature experience. However, they specified differences in terms of accessibility to these places:

> P15: People can't meet nature in Ankara. So the only environment we can meet in Ankara is the university campuses Hacettepe, METU... Seğmenler. Then, you know, Kuğulu, on a tiny scale. You know we can't. You know it's unfortunately open to a specific group, you know.

P15 indicated that there is a lack of nature to encounter in Ankara. He suggested that university campuses are the major options to encounter nature, while minor one is

Kuğulu Park that is an urban park in Ankara due to its small scale. He states that these options are only accessible to a definite group of people.

> P18: So, there is no escape environment. Who can escape, some can escape, who goes to Eymir?
> P16: Lucky people.

Similarly, P16 proposes the same accessibility type to nature in his conversation with P18. Calling going to nature as an escape, P18 stated that there is a lack of proper nature to go, which is accessible. P16 called the people who can access to Eymir as lucky ones.

These examples demonstrate that there is an accessibility type in which nature is only accessible to a specific group, along with the lack of proper nature. There might be some filters that define access to these places. It might be said that Kuğulu Park and the Eymir Forest have a social filter for its visitors due to the neighborhoods' social context around these two places, while the university campuses are only allowed to people who have an official relationship to them. This discussion shows that there is filtered accessibility that might be managed by social or institutional powers, enabling the pass of the specific groups' access to nature.

4.2.2. Effort

The accessibility is mostly possible by giving an effort to access natural areas. Participants shared how the factor of effort affected their relationship with nature and nature experience.

In another example, P5 talked about how general expectations about nature does not include the effort while in nature. According to her narration, even a conscious individual might expect nature without effort but including a type of comfort. When nature becomes accessible for an individual changing his social context, his

expectations and knowledge might not comply with the realities of nature due to the faulty image of nature:

> P5: People who moved to the countryside settle after urban life say that they did not tell that nature is harsh. They said that everything would be great. To illustrate, a man who is one of the old trade unionists gone to an eco-farm after his 50. The guy fell after running behind for his chicken and broke his leg. He says nobody informed me about that. Nobody said I'd deal with this. I thought that every day in the morning I'll get up and open the curtain, a magnificent nature will enter into the house.

P5 denoted how to access food shows the difference between nature and a non-nature space, a market. He states that enthusiasm to access food from nature brings the necessity to embrace to give the effort to succeed it:

> P5: But that's not how things go in nature. If you're going to pick up that pear, you're going to go up that hill, friend, and it's not like the market.

While P5 indicated the necessity of embracement of effort to access nature, P8 illustrated the refusal of nature experience due to the lack of enthusiasm caused by the effort in nature:

> P8: Because we also do. When we have a weekend gap, we are more likely to sit or watch a show. Or we say should I go out, walk or get some fresh air? Mostly we live in our home and spend time in front of the television, in front of the computer.

P8 implied time and effort relation, which makes nature experience time-consuming in terms of accessibility. She also shared that she replaces her free-time activity with an indoor activity: watching TV or spending time in front of a computer at home. Similar to P8, P4 exemplified the refusal of a genuine nature experience through a virtual nature experience:

> P4: In such a beautiful natural environment, bees and butterflies passed through our noses. You like it (Figure 3.6) because it can present it to you in the environment you live in, so you cannot easily experience it because of this also.

She drew attention to the appreciation of this virtual experience due to its capacity to provide comfort through remote access to virtual nature. According to P4, the appreciation of this nature experience prevent the individual from experiencing genuine nature.

All these examples show that nature experience requires effort regardless of the accessibility level of nature. However, the reality of effort in nature experience might not be expected or recognized by people.

4.2.3. Reconfigured Nature Experiences

In this heading, I discuss how young people from diverse practices related to nature define the interaction with nature as an experience and qualify this experience.

4.2.3.1. Scaled Nature Experience

The participants stated there is a reconfiguration of space in the city, which provides different but limited opportunities to access nature. P5 emphasized the insufficiency of proper nature in the city by using three or five trees, P5 questioned the validity of the access to these insufficient areas in terms of reaching nature in the city:

> P5: Are 3-5 trees, the right of the people to move within the boundaries, the right to access to nature? You need to question that.

P5 interrogated that being allowed to stroll within the borders, which were designated as the right to access to nature. His questioning shows that there is an arrangement of nature that has boundaries defined by others.

Similar to P5, P12 drew attention to an arrangement of nature that has clear boundaries. She clarifies the strategy behind the Central Park which is an urban park in the center of New York City, U.S. According to her, and nature is compressed to the city center to make space for streets and skyscrapers which surrounded that nature:

> P12: It's coming from the Central Park idea. However, there is a contrast in the idea of Central Park. It's like let's make one park in the middle of the city and its all outside skyscraper streets etc. you know, but all the nature there, there is a recreational point, but all the things around are not related to it.

These arguments suggest that there is a nature which is a different but scaled version of nature due to the boundaries. When compared to nature without boundaries, this definition of nature provides a scaled version of the original one. In other words, nature in urban settings is scaled nature, which might provide a limited and allowed nature experience.

4.2.3.2. Symbolic Nature Experience

The participants stated that nature is presented with varied scales nowadays, a park as an urban scale to a home gardening product on a small scale. It was stated when the scale gets smaller, and nature transformed into a representation of a natural environment:

> P12: I think this will increase in cities we call metropolitan areas. That is, how I can say… The value of spaces is increasing. Houses are shrinking. Square meters are becoming more valuable. So people start to trade every space they can use. As a result, parks with less return and so on, nature begins to decrease. As such, people are trying to produce small-scale solutions. This IKEA product (Figure 3.5) seemed to me as an example of this.

P12 articulated the reason of why there are small-scaled nature experience solutions like IKEA did. According to her, there is a trend in metropolises to commercialize

each space, which is utilizable. This trend results in a decrease in the size of houses or parks. The decrease in parks means a decline in nature in urban areas. Thus, the inaccessibility of nature on a big scale in urban settings encourage small-scaled home solutions for nature experience.

According to P1, these gardening products of IKEA is only functional to present the complexity and the source of grown plants and food to a child. However, he prefers this experience outdoor since the product does not provide seasonal information through experience, and these products will not inform children about the season of that food items:

> P1: Maybe it's good to see how it grows. Moreover, it shows it's a complicated process. I don't know… To show how it grew up so hard about to a kid, something like that. If that's the case, maybe you do. However, instead, if he knew how it grew up in the garden, he saw its self-growth. A child can care for it for each season at home, rather s/he can see the which season, what is the natural process.

However, P1 affirmed these products due to their potential to produce home-grown healthy food which is pesticide-free:

> P8: I support it in this respect. Because everything we eat is contaminated by chemicals, at least in my house, without any pesticide contamination, I can produce my food, maybe something beautiful in terms of health.

While P1 found these products functional, P13 stated that those are nonfunctional during his interaction who favors these gardening products to integrate human with nature and popularize it:

> P13: But from a general point of view, it doesn't do much anyway (pointing to the IKEA product).
> P14: This may be to bring nature and humans together, maybe to popularize green.
> P13: Completely for the show, IKEA's tricks. I love IKEA.

(Laughter)
P13: It is separate but, it's just tricks!

All these examples show that there is an experience of nature that is scaled but the function of which is controversial in terms of their capacity to act like nature outside. Its origin was reclaimed as a solution to decreased accessibility to reach nature on an urban scale. While it was acceptable to build knowledge for children but its capacity to grasp the integrity of nature was assessed as insufficient. It was also favored for its potential to enable chemical-free food. This experience is symbolic as a nature experience, and its capacity is representative but not sufficient for nature experience.

4.2.4. Alienation from Nature

In this heading, I will discuss the findings of the alienation that is the phenomenon of losing familiarity to nature and becoming indifferent to it due to the lack of nature experience, which is caused by accessibility and effort factors.

P11 stated that today's children perceive milk as a good the source of which is the market due to the lack of knowledge for its origin:

> P11: But the current generation doesn't even know the source (of food). They think of it as a supermarket. Here is where to get milk? From the market! Common humor.

P11 points out that there is a disconnection between today's children and nature. Thus, they do not have basic ecological literacy to know what is the source of their nutrition. They have the image of the markets as the source of food instead of nature. According to her, this alienation from nature as a resource is dramatic. Similarly, P4 denoted that she had an image that wild boars are aggressive creatures due to the depiction made by the documentaries:

> P4: I thought that wild boars are the creatures attacking and running around like mobs by documentaries. I was so scared, how? However, there is an extraordinary harmony there. I had more difficulty than them. They know how to approach us, but we don't know how to approach them. They're very timid animals, harmless.

She pointed out that this knowledge built a fear against those animals. However, when she interacted with those animals, she observed that wild boars are harmless and timid while realizing their capacity to know how to interact with her. She drew attention to the difficulty which she encountered through this experience. The confusion due to the difference between she knew, and she experienced was the reason for that difficulty. P5 also shared a similar case regarding the snakes:

> P5: But I remember this. When I lived with my grandmother in the village, there was a snake in the field, in the wheat field, and when my grandmother saw a snake, I was startled, and my grandmother said: "Don't be afraid, it's the snake of our field".

In a moment with his grandmother, he stated that she calmed him for not being scared for a snake in their field when he jumped upon seeing the snake. This shows the familiarity and knowledge of the grandmother to the snake, which is probably resulting from her everyday experience in the field. He compared the knowledge that the snake is harmless by his grandmother an the other at society, traditional literature and motion pictures:

> P5: Can you think how snakes had been told in society, stories, and tales? Stories and tales describe snakes more appropriately. However, how the snake is introduced to us in documentaries, TV series, and cinema?

While he implied the traditional literacy as a more accurate source of knowledge, he interrogated the accuracy of motion pictures like documentaries that provide a comfortable but virtual nature experience. The statements of P4 and P5 suggest that

documentaries might provide faulty knowledge regarding nature and alienate people from the realities through speculation. However, it seems that interaction is a better source of knowledge to prevent alienation from nature.

These examples demonstrate that knowledge is not enough to prevent alienation and connect people to nature since it might be speculative and provide faulty knowledge about nature. As being the virtual sources of knowledge, documentaries might be responsible for this kind of relations about the non-human others. However, knowledge by experience might be a better solution to interact genuinely with nature.

The participants stated that the alienation from nature also brings the perception that nature is only accessible by effort. P5 indicated that there is an idealized nature outdoors, which is only accessible by a financial effort. In other words, there is an idealized nature that is only possible to reach by paying for it. However, the participants stated that reaching to nature is idealized as an opportunity. This example suggests that there is a desire to access to this idealized but other nature than the genuine one.

> P5: We are in an indoor area right now. There is also an idealized nature. We see it as a blessing to access this nature. It is idealized because it loses its reality, you know, becomes something which is gained by paying money and exerting effort.

In summary, alienation is a situation where people are disconnected from nature and its characteristics. The lack of nature experience causes alienation from nature since experience brings knowledge about nature. Alienation from nature results in ecological illiteracy in urban settings. Thus, the current generation is insufficient to recognize ecological realities and also, they are exposed to the faulty image of nature, which causes misconceptions about non-human livings. According to the small group

interviews, although media is a source for the knowledge of nature, they also implicated creating misconceptions about nature.

4.2.5. Attachment to Nature

In this heading, I present the findings of attachment, which is the reversed phenomenon of alienation. In other words, while familiarity with nature might create an attachment, the lack of this familiarity due to different reasons to nature results with the alienation from nature. During the small group interviews, the participants emphasized the importance of intimate experience in nature, which brings familiarity and so attachment to nature.

P4 states that how nature experience differs for people who have experienced nature, which brings sensations and memories. According to her, the memories make them familiar to nature, which creates an attachment to nature for them.

> P4: But it's different for them. People touched those trees. They had something underneath. Birds are flying there, and there's a more emotional connection. Because you have that in your memory now, you're living that.

Similarly, P17 discussed attachment to nature through her own experience. She stated that she is attached to nature due to her diverse experiences in a small city which was integrated with nature, with her family while he was a child:

> P17: Oh, yes. It's from childhood, childhood. Actually, the reason why I loved nature, my father was a soldier, and we saw many places. I have never lived in a city like Ankara until now. For example, we lived in Kırklareli. It was a tiny city. We were in nature, and we went to picnics every week. There were beautiful trees in our backyard to play with. There were a lot of trees and mushrooms to hold. So I find nature very impressive.

These examples illustrate that regular experiences related to nature might make people attached to nature by creating a bond due to their memories. While participants discussed human-nature relationships, they recalled their own or other people's memories. These two examples illustrate this tendency to talk about experiences. Furthermore, many participants positioned themselves as "children grown at the street" while remembering their past experiences and being nostalgic:

> P11: I mean, so we talked as we are the generation grown at the street, we know that nature is the resource of what we have. However, the people who are born after 1995 don't know.

All these examples suggest that this sample of young professionals have an attachment to nature. They have past experiences of nature, which make them familiar. Their attachment to nature makes them being nostalgic about the nature they were familiar with since they do not experience the same nature in urban settings. They also experience nature less when compared to their early experiences. According to these young people, they have a proficient ecological literacy from childhood. They also differentiate themselves and their experiences of nature by identifying themselves as the children grown in the street.

4.2.6. Ideal Nature Experience

In this heading, I demonstrate the findings related to the nature experience favored by these young group of people. The participants shared that there are some nature experiences they favor and find the ideal experience of nature. First, I present the ideal nature experience described by the interviewees and the attributions by the sample. The participants defined their ideal nature experience by ascribing some qualifications to it during the interviews.

4.2.6.1. Active Experience

The participants define the ideal nature experience as an active experience. That is, they expect to actively participate in practices in natural environments, and be in direct, hands-on interaction with natural things and processes.

> P12: Berkin Elvan community garden. There is direct production there. For example, in my opinion, there is communication with nature. That's because it is an active process.

P12 exemplified that Berkin Elvan vegetable garden, a community garden, is a place providing an active mechanism by enabling direct (food) production. According to her, this is a method of interrelating with nature.

P4 stated that there should be a way of life that makes humans a part of a cycle in mature through production. According to her, this is possible with living within nature, which includes not only consumption but also production.

> P4: We can say that we are going there, consuming and coming back, that is... Not only with consumption, but also with nature, we have to be in production, so that we are not only going to nature but living in nature, not only to consume but also to take part in the production.

In this statement, P7 pointed out the importance of production along with closeness to the rural area by city and awareness to collect apple from tree together with purchased apples within this city. According to her, these aspects prevent alienation from nature:

> P7: If there is something that we produce directly from nature, if there is a city that is closer to the countryside, if we do not forget to collect the apple from there, not only the apple with the label but if we know how to collect it from the tree, we are not alienated.

The participants gave importance to production within nature, which is a participatory and engaging experience. The practice of producing (food) in nature was described as an interrelation with nature as one of the examples.

In this heading, I present the aspects the participants sought for in their ideal nature experience apart from *producing* within nature, which previously presented.

4.2.6.2. Outdoor Experience

During the interviews, the participants asked for their interpretations about nature indoors. They also mostly used the term *going to nature,* along with *being in nature*. The participants associated nature experience with different spaces, but mostly with outdoors:

> P5: It's sure we're not going out. For example, who said once, come on, let's go to the countryside and walk, for example.

P5 indicated the lack of enthusiasm for going out to encounter with nature. He criticized people for not preferring outdoor activities. According to him, experiencing nature is possible through outdoor.

> P8: Example from us, when we were little, we were people who spent more time outside, playing with the soil, trying to make something from them.

Similarly, P8 also highlighted being outdoors for nature experience. She correlated the reduced nature experience with the preference of indoors over outdoors different from their early experiences from childhood. P8 also emphasized the interaction with soil, which is an aspect related to outdoors along with the making practice with soil.

These examples demonstrate that nature experience is coupled with outdoors. I infer that they were not in favor of experiencing nature indoors.

4.2.6.3. Hands-on Experience

The participants referred to the sense of touch many times while defining their ideal nature experience. They emphasized the direct interaction for their favored nature experience.

P2 shared her feelings about planting at home. She compared this experience with her own experience at the community garden in her neighborhood. According to her, the experience in a community garden is better than one at home with a pocket of seed including a guide to plant:

> P2: And in the other (Berkin Elvan community garden), it's better since, yes, you touch the soil, you touch the plant. You feel like you're in nature. However, the other (indoor gardening) is a little artificial.

She found her experience in a community garden more qualified in terms of the integration with nature due to its capacity to provide more hands-on experiences. She emphasized the touch to soil and plant while talking about her experience in the garden. However, she described her other experience at home as artificial. Although both experiences include soil and plants, she might care for the possibilities of touch in the garden. Similarly, P9 emphasized the importance of physical interaction through touch with nature:

> P9: I think if there is water, we should be able to touch it. It's not like a stream separated from a stream bed, like Göksu Park or something. A little more natural, landscaped. You can touch it, and you go into it. At least I think it means interacting with it is being able to touch it, being in touch with it.

She stated that there should be wetlands that can be touchable and swimmable. However, she also prefers human intervention in the settings with wetlands, called as landscape design. I infer that she approve human intervention to make those areas more accessible and desirable for these kinds of physical interactions.

These examples show that there is a demand for hands-on experiences with nature. The experiences which provide the touch to nature might make people feel integrated with nature. However, P12 states that touch is not the only aspect of nature which builds the nature experience:

> P12: What IKEA does is a contribution to nature. In fact, on the one hand, we don't necessarily see the contribution as concrete, touchable, because nature is not so limited, there is also the smell of it. Because it's so versatile, we need to consider this at the product designs that we do.

While talking about the IKEA gardening products, P12 stated that along with the sense of touch, other senses are enabling to sense nature since nature has multisensory integrity. She stated that product design relating to nature experience should be considered in terms of this multisensory integrity. Similar to P12, P4 argues multisensory integrity of nature through a design:

> P4: You said that VR (Figure 3.6). You see, but you can't smell it. There's no (wind) blowing.

According to her, a virtual nature experience through a VR headset might provide to see nature virtually; however, it is not sufficient to grasp the integrity of nature as a whole. While that VR set enables us to see nature, it does not allow us to feel the wind there or smell it. Hence, she also emphasized the multisensory sensation along with the sense of touch.

Those examples demonstrate that hands-on experience is one of the attributions which are sought in ideal nature experience along with multisensory aspects. I inferred that there is a tendency to make a physical interaction with nature. However, the participants looked for the multi-sensory aspects of the designed objects. This might be due to the concerns about those products for their capacity to capture all the features of nature.

To sum up, I discuss nature experience in terms of the factors affecting it, and participants indicated: accessibility and effort. While the lack of nature experience results in alienation, the opposite might bring an attachment to nature. Furthermore, the participants defined their ideal nature experience majorly attributing it with active experience along with outdoor and hands-on experience.

4.3. Cohabitation

In this heading, I discuss the experience of living together with nature in urban settings. Then, I qualify the significance given to non-humans in the city. This is followed by the experience of animals for cohabitation. Then, I discuss the problems which participants described regarding cohabitation.

4.3.1. Acceptance of Familiar Animals for Cohabitation

When the participants were questioned regarding their opinions about cohabitation with nature, they questioned their perspectives towards cohabitation and discussed the possible inhabitants with which they can cohabitate. They discovered the other beings they can cohabitate through their reasonings as a group.

In a conversation, while P1 questioned the possibility to live together with bears and horses, P3 stated that it is possible to live with familiar animals:

P1: So can we live together with animals? I don't know. If the bear lives here (Ankara), the horses run...
P3: We can live with the animals we are used to in the same city.

P1 interrogated the possibility to live together with animals like bears and horses in an urban setting. However, those animals are not ordinary animals that people are familiar to see in this urban setting. In particular, P1 first questions the viability of living with wild animals in an urban environment. Upon this, P3 responded that cohabitation with familiar animals is possible. Also, she indicates that familiar animals for a cohabitation should be from the same urban setting of humans. Similarly, in a conversation between P16, P17, and P18, they discuss how the animals and people live together changes according to the regions:

P16: In America and Australia, etc., people domesticate snakes

P18: They're feeding spiders or something.

P16: I've seen an alligator in a lap (meaning the TV).

(Laughter)

P18: Iguana or something.

P17: But for example, there are dogs and cats in my friends' house, but there is nothing extra at all. Therefore, what I'm used to seeing might affect what I expect to see.

P16: It might affect.

P18: As a result, both are living beings.

P17: So people don't consider that they're all living beings, but It's more like getting a cute cat from a pet shop.

The participants drew attention to the differences between pet animals in different regions like their city, and the U.S. and Australia. This example shows that the familiar animals in an urban setting also changed from region to region. While an animal is acceptable to live together within Australia, it might not be the case in Turkey. That

is due to the differences in familiar animals by the geographical factors in these regions. Besides, P17 points out that the importance of the cuteness of animals to be preferred by people. Then, P18 explains this cuteness factor in detail:

> P18: There is also something like that that people instinctively prefer the animals that look to them cute and beautiful. Why? For example, cats and dogs. If people went and saw a bird that had fallen on the road, they would care less about the birds when compared to a dog. Know what I mean? They would only say something with a broken wing. That is to say, and people are more attentive to the animals that come more cute and sweet. The others aren't. Who would do anything if he went and saw a snake dying there? Think about it. Nevertheless, the cat and the dog have a separate place. That's why the cat and the dog are lucky.
>
> P17: Do we think they're cute because we can tame them?
>
> P18: But imagine you can domesticate the snake!
>
> P17: It has been domesticated already.
>
> P18: But very rarely so.
>
> (Laughter)

According to P18, cuteness and beauty are essential factors for the attitudes and behaviors of people towards animals. Therefore, they do not care about animals, which they do not find cute and beautiful. Besides, she points out that there is the exceptionalism of cats and dogs due to these factors. As a result, P18 denotes that this exceptionalism as luck for the cohabitation of animals with humans. P17 interrogates that this exceptionalism might be related to the human ability to domesticate cats and dogs. However, P18 does not favor the domestication to explain the exceptionalism of some animals over other animals.

Similarly, P5 describes the city over the animals he is accustomed to: "This is a question that I have in my mind. When we say the city, we think it as the cat and dog".

According to P5, the city represents cats and dogs, which implies that there are possibilities in the city to observe or interact with these two species. Besides, this representation might cause due to his experiences mostly include cats and dogs concerning animals in the city. Therefore, he is already aware that he cohabitates with cats and dogs.

These examples suggest that people tend to cohabitate with the animals that they are familiar with it. I infer that this familiarity comes from observation and experience with other living beings in the city. These familiar animals do not include wild animals but domesticated animals like cats and dogs. Also, domestication is likely a factor for the human to accept others to cohabitation. Domestication is a term that is related to the cultural processes of humans; it is the ability of the human to culturalize other living beings. Therefore, I infer that humans accept culturalized beings into their life. The different cities and urban settings also provide different urban contexts for people to accept other living beings to the cohabitation, which is an environmental context. Besides, there is criticism towards the exceptionalism of some living beings due to their cuteness and beauty. In parallel this, cats and dogs are the primary co-inhabitants that share the city with the human.

4.3.2. The Significance of Animals and Plants in Urban Settings

The participants of the group interviews discussed the positions of non-human living beings in urban settings. There was an agreement among the participants regarding that humans do not give significance to other living beings to care in cities. In this heading, I discuss this significance in the urban context. Concerning the animals, P3 points out the place of animals in urban life through the planning of the city:

> P3: Considering the city life, it ignores the animals altogether. The city is planned without thinking about them, and I think they don't even think of it.

P3 points out that there is no reference to the lives of animals in urban settings. She articulates that there is an urban habitat design from which animals are excluded or refrained from noticing. Thus, there is an unawareness of the life of animals in urban settings and the design of those. Similarly, P1 argued for the non-prioritization of non-human living beings in cities:

> P1: After all, we have been fighting nature since our very existence, since our first appearance. However, unfortunately, this (nature) is not the priority of anyone in the cities of the future that I predict. Nobody prioritizes to protect a plant, animal, or a tree. You know, the priorities are entirely different. Already, it continues to differentiate from time to time. Thus, unfortunately, being environmentally friendly turned into a method like this: making a house for the birds, or making the design compatible with birds. It's more of a visual. Nevertheless, I don't know if it's functional or not.

While he defined the significance given to nature as protection of those, he stated there is no prioritization of protection of animals and plants. According to him, the applications for cohabitation aims to be nature-friendly, which still positions nature as an object instead of a subject. P1 claims that this perspective only brings a responsiveness to include others in the current system with non-structural but aesthetic concerns. He exemplified this with a birdhouse design that is designed to be nature-friendly through an aesthetics only fitting the environment.

P13 shared that people encounter cats, dogs, and birds in the city, mostly. He also implies that insects are animals that are likely to be encountered:

> P13: Of course, the most encountered living beings in the city are cats, dogs, birds… as animal. However, we don't count insects in animals in a big way. Insects are one of the keystones of biological diversity and order. These are important from bees to flies.

However, he articulates that insects are not regarded as an animal. He reports that all the insects are significant for the biodiversity and the balance in nature. Therefore, he implies that insects are as significant as the dominant encountered animals. Accurately, he describes the significance of insects for biodiversity, not for directly humans, and justifies their significance for cohabitation with scientific knowledge.

4.3.3. The Experience of Animals

This heading presents the observations of the participants concerning the animals' experiences to survive in urban settings. The participants elaborated on how animals in urban settings react to the human environment.

P7 shared her observation she encountered in the city center for animal behavior. She states there was a dog that was aware of using the underpass to reach the opposite side of the street safely in the city center of Ankara.

> P7: I'll tell you an example I encountered. A few days ago, it was for one week. Güvenpark, Yüksel and Güvenpark's underpass, a dog was using the underpass to cross the subway and the dogs are typically forbidden to use the subway underpass, otherwise chased by police to get the dog out. Nevertheless, what I'm saying is that the dog knows that it has to cross the street, that he can be run over by the car. He discovered the underpass and used it. So he had to learn to live under these conditions. It learned and continues his life.

Her statement demonstrates that dogs are not welcomed in that underpass, and a police officer might take the responsibility to chase the dog. She emphasizes the awareness

that the dog has acquired for its safety and ability to use the underpass. She specifies that the dog adapts to benefit from human-made structures to survive in the city. According to her, this is its adaptation to survive in the city. Similarly, P8 relates another topic regarding the changing behaviors of animals:

> P8: There was a cartoon. You must have seen it. A doctor was doing a test on the seagull. According to the test, there is a deficiency of Omega 3. The doctor says you're a carnivorous animal, how does that happen? The seagull says we're eating bagels now.

P8 illustrates how the nutrition habits of animals transformed in urban settings through a cartoon. Her example demonstrates that animals consume the same food with humans. However, that results in a deficiency for the health of the seagulls. The doctor in the cartoon is a figure that represents scientific knowledge that helps to know the nature of seagulls. Thus, this statement shows that seagulls' nutrition conditions in urban settings are not suitable for their wellbeing.

In Turkey, it is so common that people feed birds with bread and pastry. Turkish bagel is a widespread food that people consume all day along but mostly for the mornings. Many Turkish people use stale pastry to feed the birds. What is more, while Turkish bagel is a cultural pastry, feeding the birds with Turkish bagel has been turned into a cultural habit in terms of human and nature relations.

To sum up, these examples show that the urban environment causes animals to gain new behaviors, unlike their nature, to survive in the city. Animals act like human beings to survive by learning and benefiting from the human environment. Hence, human has a transformative effect on the inhabitant animals in the city. The actions like using an underpass to cross the road or taking nourishments as pastry belongs to human civilization and culture.

4.3.4. Problems of Cohabitation

The participants defined two significant issues that create problems in cities for cohabitation. These are the permeability between nature and human worlds and human behaviors.

4.3.4.1. Permeability

Permeability describes how human and natural world penetrate each others' world. The participants declared this penetration might create some problems through their own experiences and observation. In this heading, I share some examples for the permeability:

> P18: So in the city, for example, we see foxes, foxes are animals that generally stay away from humans. There are foxes in our house. Because we are, in fact, on their territory
>
> P16: It's their habitat
>
> P18: Our habitat. Because we destroyed their habitat, they cannot find another place to go. So we meet.

P18 shared her personal story as a permeability observation. She indicated her observation for foxes around her house, even though the foxes are the animals that stay away from humans. P17 evaluated the foxes' distance to humans as a typical case. She articulated why foxes became visible around her house. In particular, she describes their presence on this territory as a penetration to fox habitat, to the natural world. There is an awareness that human habitat replaces animal habitats in the urban environment. According to P17, human habitats are built through the destruction of the fox habitat. Thus, humans and foxes encounter. These encounters by permeability provide surfaces for the reciprocal experiences of humans and animals. For another permeability example:

> P3: There was an example. If I remember correctly in a dam in Ankara, there were deers, and the deer fell into the water and drowned.

P3 shared a permeability example, which has a fatal effect on the natural world. In her example, some deers drown in a dam. The deers which permeated to the human-made environment might encounter fatal experiences. This example refers to the issues above about the non-inclusion of non-human living beings in urban planning. This case might be due to the lack of multispecies or an inclusive approach for urban design. P16 indicates another permeability example which also might be fatal:

> P16: Birds are particularly adaptable in some way. Though it's also in Turkey. Pigeons live on roofs and nest. You know, birds making their nest using twigs. They use nails in the city. They're using whatever they find. This time it's hurting animals, but nature is already finding itself in every way.

P16 emphasizes the birds' ability to adapt to the human environment. Birds claim roofs as a place to live in urban settings. In her example, birds use human-made objects, nails, for their nest instead of natural materials. These birds might be not able to find natural materials to build a nest in an urban environment, or this might be due to its similarity to other natural construction materials in terms of shape. Being another permeability example, which has fatal effects on animals, it shows permeability might be one of the problems for cohabitation. It is also a paradox that birds use a construction material to construct their nests with their method.

4.3.4.2. Human as an Ecological Threat

During the interviews, the participants stated that human cruelty, human population, and human intervention through technology are the prominent problems for cohabitation.

Human Cruelty

The participants articulated the human attitudes and behaviors of animals. According to them, human cruelty also transforms other living beings. P15 stated that animals get aggressive due to the cruel behaviors of human-beings:

> P15: They (cats, dogs) become aggressive because of the bad behaviors of people. You know, because they treat them bad. We're talking about people putting nails into bread and throwing them in front of them. You know, they act like they're doing something aggressive.

P15 indicates there are some practices people specifically apply in order to harm non-human others. They use the basic needs of animals like food to give harm to them. Due to encountering these kinds of treatments, animals get aggressive. P13 states that human beings are the only creature on the world-destroying the biological needs of other species and making mass killings. However, he points out that human performs these actions deliberately or not.

> P13: There is no other creature on earth that can destroy another creature and dry its water in some way. Moreover, we don't just destroy one species, and we destroy many species. Here the cats killed the dogs, all right — some kind of gone. Nevertheless, cats didn't kill 1,000 species, but we're a mass murderer since we existed. From the monkeys, if you've read Homo Sapiens, maybe there's more or less some of the things that it's talked about regarding the literature. Unfortunately, the massacre is embedded in our genes. Whether we want it or not, we destroy it.

The Unsustainability of Human Actions

Human performs like a possible threat to other species through cohabitation. Regarding the latest statement, P13 also declares that human existence will always

bring the destruction of nature: “Destruction will occur as long as a person lives.” This statement makes the human impact a phenomenon to be accepted along with the other statements:

> P5: So no matter what we do, no matter how much we reduce or increase our intervention process, this is our nature. They say we shouldn’t touch nature. How? How you will live with what. We need glucose and oxygen. Where will you get it? You’re breathing today.

P5 denoted that interventions are the nature of humans in order to provide their biological needs from nature. According to him, any effort to maximize or minimize this will not work. He also shared that no-intervention practices are not feasible due to human’s biological dependence on nature. Similarly, P7 also points out to accept the human impact on nature:

> P7: But we also need electricity. After all, we’re going to warm up. It’ll be freezing. We want to hear from each other. As we will want to use the Internet, such as a life that we have minimized them more like, the fact that I’m trying to say that... morning sports by turning a bike in a very nice neighborhood can produce its need for electricity is very easy. For example, in Japan, what it was called, the rail system, for example, there is no something as recycling.

She articulated the acceptance of intervention due to some human needs like communication, along with biological needs. However, she indicates that minimization of these needs might work through sustainable solutions like producing energy from cycling. There is a conversation between P11 and P12, in which they discuss the permanence of human-made materials:

> P11: In other words, the things that people make, like things, have the permanence feature and disrupting nature, it degrades nature.
> P12: I don’t think it’s permanent.

> P11: Permanence is something like nature. You exemplified fox...Digging from the leaves and soil from the thing. In those seasons, in the rain, maybe that fox makes its nest is again for next year. You know, it's the sustainability of nature in itself. However, there's no such thing in humans. We're building buildings, but then we have to demolish it again, so I don't know much, but I guess it's more or less. I understand what you're saying. However, when it comes to permanence, it's like degrading nature, degrading the environment.
> P12: I think nature is actually permanent.
> P11: But that's the permanence like...Hard, direct.
> P12: Destructive?
> P11: So there's a flow. That thing I drew (Figure 3.9). There's a flow. You're making a scratch on that flow. You might imagine that it as a building.

P11 indicated that human-made materials have permanence feature which degrades nature; however, P12 opposed this statement. P11's account states that human-made materials are mostly not sustainable throughout their life cycle. Sustainability is the quality of anything in terms of its effect on nature, the depletion of natural resources, and, consequently, support of long-term ecological balance. Regarding the sustainability issue:

> P18: In fact, the villages are the most meaningful ones as the place where the city meets nature. Because people make stone houses of mudbrick, stone houses, from stone. These are the materials that come from nature, and you use what comes from nature, not something different. We need to use nature's blessings. When you're at home, cooking, otherwise different artificial things will eventually hurt us.

P18 offers that villages are the best places for the integration of city and nature. She justifies this due to the vernacular practices in villages while making a building and related practices for life. She points out the use of natural materials due to their sustainability over human-made materials. She emphasizes the necessity to use natural materials while building anything for sustainability.

These examples demonstrate that the impact of human intervention is an inevitable reality. However, its unsustainability is a problem to tackle.

Overpopulation

Along with all this impact of the human world which is unsustainable, there are also risks caused by overpopulation. According to P13, there will be a loss of green areas in 100 years due to overpopulation.

> P13: Already 100 years later, the green areas will disappear. Because we cannot limit population growth, that's what we can't limit.

The human population was firmly declared stated by the participants as the reason for ecological degradation:

> P4: But you can't block the human population, so it's going to increase too much, and the damage will come.

To sum up, humans cause problems in terms of three issues: cruel treatment towards animals, the unsustainability of human interventions, and overpopulation. Those create ecological problems and imbalance due to their transformative and permanent impact.

4.4. Advanced Cohabitation

In this heading, I discuss the suggestions made by participants for a better cohabitation that was described as *advanced cohabitation* in this thesis. The participants made four prominent suggestions for a better cohabitation: *non-human centered approach, cultural change, system/service change, and use of technology.*

4.4.1. Non-Human Centered Approach

Although the inclusion of non-human living beings for a non-human centered approach in urban planning is the prominent concept, building borders between humans and nature also proposed by three participants. While one insisted on the isolation of humans and nature for the sake of nature, the other two emphasized the slight borders between nature and humans. For an advanced cohabitation, P9 proposes a non-human centered approach. P9 describes:

> P9: Prioritizing humanity is not enough; maybe we should plan by prioritizing living things instead of planning for humans, money, competition. Instead of defending living together, foreseeing living together. You know that there are undoubtedly many stakeholders we can not foresee: disabled, women, children, the elderly, there are a lot of disadvantaged, now defined groups. It is necessary to do such planning by getting their participation in the work and asking for their opinions.

According to P9, there should be an approach defending cohabitation and including all the stakeholders in the city instead of financial competition. She also emphasized the disadvantaged groups in the city by their participation in the planning. Thus, she specifies an approach that is inclusive and participatory. Similar to P9, P7 shared her support of non-human centered approach also by adding: “Actually, I mean, what we do for nature is actually the design we do for human beings”. P7 highlighted the interrelation between design for nature and design for humanity. According to her, any design which targets nature also affects human due to their interrelation. Hence, design for nature is another way of designing for humans.

4.4.2. Awareness Building

The participants highlighted the importance of creating awareness for a better nature experience and cohabitation. P14 offered awareness along with nature experience,

which will bring familiarity. She stated that the frequency of their experience also leads to an enthusiasm to protect nature:

> P14: I think that people should be conscious and people who need to be more intimate, because the more they see, the more they want to protect nature.

P13 stated that cultural change brings closer nature and humans. He specifies the intellectual accumulation for a better experience of nature for cohabitation:

> P13: But for closeness with nature, culture is also very much involved. Even the seeing or researching or reading or listening work to connect with nature. There must be open-minded people.

P7 shared her own experience for creating awareness. She stated that being exposed to any media or activity regarding nature results with pro-nature behaviors due to the gained awareness:

> P7: Sounds like something to me. For example, we (she means the activist group she worked with) do many activities. We sit, we do documentary screenings, we do action, article discussion and so on. So even if we actually sit at this table and talk too much at that table, when you argue a lot, the communication between you starts to change and it's about what you call nature. I don't know how people throw garbage changes, how people touch to the leaves of a tree changes.

Thus, any intellectual exposure to nature discourse might bring a difference to humans' mindset. Intellectual efforts to understand nature might be transformative for cohabitation due to the built awareness. I infer that awareness for nature develops through intellectual efforts and increases the human's ability to notice the other lives around.

4.4.3. Systemic Change for Urban Relations

Participants offered a systemic change for many problems, which they defined through the interviews for nature experience and cohabitation. The participants emphasized the change of how the city operates for different relations of production, consumption, and waste issues around these processes. P5 stated that:

> P5: We need to construct cities like this. Cities are now becoming severed from the net production relationship. They are particularly severed from fundamental production relationships. Basic food, especially in food.

According to P5, there should be a new city construction that enables the city to produce since cities are disconnected from the significant production relations in terms of food. P18 claimed that awareness does not work without a system of waste management by government or other organizations:

> P18: But there is a situation. My mother still throws the waste oil into the sink, and I get angry every time, and I want to collect the paper, metal, plastic, all of the glass separately, but it is so difficult for me to take it after that I collect it. A little bit of this, governments, organizations should do. In other words, when people have awareness and education…
>
> P16: Will they also demand these services?
>
> P18: Yes. How many times I wrote to the municipality. For God's sake, put a waste bin there.

P18 wants to recycle the used materials in order not to harm the natural environment. She also specifies how she is not able to prevent her mum from pouring oil to the sink. In this statement, her emphasis was on how her profession and knowledge are not enough to stop her mum. Since she points out how her effort is not enough when the municipality does not provide the required management system in urban. P18 reports

that although she forwards her demand to the municipality, she could not get any response from the municipality in Ankara. Similarly, P4 was not happy with the current state in Turkey in terms of relations with nature:

> P4: I'm not hopeful for Turkey; however, there are foreign examples behold. In these examples, some people haven't touched the city in years, so everything is the same. Men do not build, make nothing, and some countries are trying to improve the existing system, make it more ecological, more environmentally friendly. Especially Northern European countries have exceeded these things. There is a region in Italy, and I have just learned. So many things are completely reduced to almost zero damage to the environment. Furthermore, all systems are in peace with nature. These kinds of applications are implemented.

P4 compared the current state of Turkey with foreign countries in terms of cohabitation. She supports the systemic change, which focuses on making the system more ecological instead of adding new designed things to the system. In these systems, she emphasizes the action of no intervention to nature or nature-friendliness of systems. According to her, the implementation of these systems in other countries also makes those feasible.

To sum up, the participants propose an urban system that is ecological for cohabitation. Thus, they argue for a systemic change in urban settings for a connection with nature.

4.4.4. Use of Technology

The participants stated that technology is the *savior for* better cohabitation; however, its use is also harmful to nature. They pointed out the purpose of using technology.

P5 evaluated the technology as the only solution to construct a better relationship with nature. However, he specified the applied perspective for the use of technology. According to him, technology not being the real ability of humanity is the only solution in the case of overpopulation.

> P5: At this point, we have only one thing left: technology. It's technology. However, this is again about perspective. If humans say, I will continue to evolve again. No, if they say that my population will grow steadily, the only refuge remains technology if that's a real refuge.

While finding both harmful and beneficial, P13 highlighted the purpose of technology as important:

> P13: There is harm. What I know about radio stations is that those deflect bird migration routes. Then, do it with virtual reality, it is helpful.
> P15: The power we have, depending on how we use it.

P4 also indicates that technology might be used for some other things instead of mitigation of human impact. He criticizes that technology mostly used for time, comfort, consumption and more production.

> P4: Actually we can use for healing, but we don't. Actually, we use advanced technology. However, this is more to accelerate our time, to consume more, to produce more things on top.

The examples show that technology is accepted as the solution for nature experience and cohabitation; however, the participants mostly highlighted the purpose of technology for cohabitation.

4.5. Summary

In this chapter, I presented the findings of my fieldwork, small interview groups conducted with young people who have expert knowledge and experiences of nature through their professions. I discussed the findings of the study under four headings: perceived nature, nature experience (NEX), cohabitation, and advanced cohabitation.

All these discussions suggest that there is a plurality of nature perceptions. I infer that there is a variation in what we have and what we perceive as nature. This variation in nature perception is due to the social context of people. However, the participants emphasize the necessity of a comprehensive nature definition, which is inclusive in terms of the features of nature to guide people for their relationship with nature. In particular, the participants associate some aspects with nature quality: largeness, multispecies life, and the lack of human touch. They mostly qualify a natural entity as nature in the case of one of these aspects. When the presence of human touch or intervention is evident, they do not qualify anything as nature. Besides, the presence of other species is an aspect to ascribe any place as nature.

Although there is a plurality of nature definitions and experiences, the participants tend to define a preferred nature experience, which provides an ideal case. Their ideal nature experience includes active and hands-on nature interaction. There is a preference for being integrated with the ecological cycle of nature. I infer that the experiences they feel they are in nature instead of going into nature are the ideal cases. Although nature has diverse representations for them, the urge to experience nature in an ideal way is the coexistence with nature within ecological cycles.

However, there are factors of accessibility and effort, which decrease the enthusiasm towards nature experience, and any nature experience includes accessibility and effort

factors, which are not obvious for many city residents. Thus, these factors make the participants have less enthusiasm to experience nature. I infer that this is due to less or no familiarity with natural environments. The inaccessibility causes these, and lack of experience also creates a connection problem to nature and its reality. Hence, the lack of knowledge and experience of nature reflect as alienation, while the reverse is the attachment to nature. When people have positive experiences of nature, they feel attached to nature and care for nature. Furthermore, enthusiasm to access nature might result in the embracement of nature experience or refusal of this experience. Nature experience, which was stated to be performed outdoors, might be replaced by indoor activities due to the benefits for the participants: comfort and time-saving.

The interviews demonstrate that non-human living beings are not significant in the urban context, and young professionals criticize this lack of significance. This lack of significance comes from the fact that cities were built for humans; however, any urban setting includes animals. Thus, there is a demand among participants to include non-human living beings as the subject of the city along with people. There might be some efforts for the sake of animals in urban settings; however, those do not provide functional but superficial applications due to the lack of approach which cares for animals. I infer that those applications are responsive, not adaptive. That is, they notice the other living beings in the setting; however, this notice only results in a response, not in an adaptation to other living beings.

Animals are exposed to human culture in terms of their nutrition and other living habits. Thus, urban settings culturalize animals, which results in that we have more similarities than ever before. However, human culture also might be a threat to animals' wellbeing. I infer that the preference of cohabitation with familiar animals is essential since there is an increase in the interaction of nature and humans, and this will bring the acceptance problem. Furthermore, urban settings also provide a

socialization ground with non-human livings. Daily or unusual encounters with other living beings create social relations. This socialization might be voluntary or not for both sides.

Permeability and humans as an ecological threat are considered as the main problem of cohabitation. The permeability consists of the incidents in which humans and nature encounter unexpectedly. I infer that this unexpectedness is due to the lack of significance and notice towards the other lives. Besides, humans cause problems in terms of three issues: cruel treatment towards animals, the unsustainability of human interventions, and overpopulation. Those create ecological problems and imbalance due to their transformative and permanent impact.

For an advanced cohabitation with nature, the participants proposed a non-human centered approach, awareness building, systemic change, and use of technology to mitigate the effects of humans. The non-human centered approach is the inclusion of other living beings as stakeholders towards a better cohabitation in urban settings. It demolishes the human exceptionalism and prioritizes the participation of other living beings. The participants propose an urban system that is ecological for cohabitation. Thus, they argue for a systemic change in urban settings for a connection with nature through better relations in urban settings. Any intellectual exposure to nature discourse might bring a difference to humans' mindset. Intellectual efforts to understand nature might be transformative for cohabitation due to the built awareness. I infer that awareness for nature develops through intellectual efforts and increases the human's ability to notice the other lives around.

CHAPTER 5

CONCLUSION

In this chapter, I present the conclusions of this research. Firstly, I give an overview of the research. Then, I discuss the main conclusions obtained from the findings chapter concerning the current literature. Lastly, I conclude the chapter by discussing the research limitations of the study, recommendations for future research and the contributions of the study.

5.1. Overview of the Research

This thesis aims to suggest an approach to design for human and nature cohabitation. Concerning this aim, I focused on the academic, professional and personal experiences of young people from diverse professional backgrounds with the pre-acceptance that those all have intensive and diverse NEXs. I challenged the diversity of nature perceptions and nature experiences of the participants by employing a small interview group methodology. Thus, I would be able to collect rich data by composing the perspectives of these young people in terms of nature, nature experience, and cohabitation.

I looked for answers to these research questions in this thesis:

Main Question

What are the nature experiences of young people from nature-related professions toward urban cohabitation?

Sub Questions

1. How do these young people define the ideal nature experience for a better cohabitation?
2. How do these young people perceive nature?
3. How can design discipline act to construct a better relationship with nature?

In *Chapter 1,* I make an introduction to the thesis by presenting the background of the study in terms of Anthropocene, human-nature relationship, nature experience, and cohabitation. I articulate that humans and nature are interconnected due to Anthropocene, which makes them inseparable. Then, I introduce the main research and sub-research questions.

In *Chapter 2,* I introduce the related works about the manifestations of nature, the position of nature in design for sustainability, user experience design and NEX, and cohabitation. Firstly, I discuss nature as resource, perception, and culture. Secondly, I review the design for sustainability, which presents the evolution of design from a product-based approach to a system-based approach, which underlines a systemic approach for sustainability, which is complex and ambiguous. Then, I discuss experience design as a sustainable design due to its dematerialization and focus on relations over products. I discuss experience design as the theoretical origin of NEX. I review the related woks about nature experience by defining and qualifying it as a transformative, formative and subjective process. Then, I assemble a set of emerging approaches and methods for cohabitation with nature after reviewing the non-human centered design.

In *Chapter 3,* I explain the methodology which is small interview groups conducted with young people whose professions are related to human and nature relationships. I introduce group interview methodology, purposive sampling and discuss the

reasonings of the selection of this sampling method. Then, I present the research process and data analysis.

In *Chapter 4*, I discuss the findings of the fieldwork under the titles of *Perceived Nature, Nature Experience, Cohabitation, and Advanced Cohabitation*. In *Perceived Nature*, I analyze the attributions of nature of the research sample and introduce them as largeness, multispecies life, and the lack of human touch. In *Nature Experience*, I discuss accessibility and effort which affect nature experience along with the alienation from nature and attachment to nature. Then, I introduce ideal nature experience which is associated with active, outdoor and hands-on experiences. In *Cohabitation*, I analyze the current experiences of cohabitation in terms of acceptance of non-human livings and significance given to them in urban settings along with the problems of cohabitation which is caused by permeability and human behaviors. In *Advanced Cohabitation*, I share the suggestions of young professionals for better cohabitation, which are the non-human centered approach, awareness building, systemic change and use of technology.

In *Chapter 5,* I present the conclusions. The main conclusions of this study are presented in the following section.

5.2. Conclusions

This thesis has five main conclusions concerning its aim, the fieldwork, and the literature review.

5.2.1. Nature as a Socio-Ecological-Cultural System

Nature had been a living and complex system of ecological relations, sub-systems, and entities, along with humans. However, it turned into another entity beyond an ecological system due to the transformative, unsustainable, and excessive human

interactions. Being called Anthropocene, this impact of human transformed nature into a socio-ecological-cultural system.

The biological dependence on nature evolved into industrial dependence through modernization and urbanization. These relations turned into interrelations due to the reciprocal impact of the interaction between humans and nature. Thus, interrelations formulate human and nature assemblage into a society. Humans and nature are connected through these social relations. In the urban environment, our social relations with nature are more visible than ecological relations. We live with cats and dogs, and we have plants to water in front of our indoors and some other encounters with non-human livings in urban settings. Hence, we are in a social relationship with nature, and it is a socio-ecological system.

Anthropocene explains how technology transformed nature into a product of culture. Technology is the mediator between humans and nature. Nature has been culturalized by human activities, which makes it hard to talk about pristine nature since human touch is evident in the so-called natural environment. Thus, it is not viable to speak of human and nature duality instead of the assemblage of humans and nature. Consequently, nature is a socio-ecological-cultural system.

Our relations to nature form our ideas about it. There is much perception of what nature is since people have different relations with and reasonings of nature, which affect their understanding of nature. These relations are built through diverse interactions with nature. These diverse interactions are performed through social, ecological, and cultural relations, which have transformed nature into a socio-ecological-cultural system. While nature is already a complex system, its complexity increases due to these social and cultural relations along with ecological ones. The complexity of nature unfolds new surfaces to interact and experience new relations between humans and nature. Whereas nature is complex, humans and their experience are diverse. These experiences create knowledge, experiences, meanings, and

understandings to perceive nature as people develop different understandings of nature due to various psychological, emotional, and cognitive abilities and social contexts along with knowledge of nature. And their experiences of nature transformative and formative for nature. Besides, nature perception and nature experience are two reciprocal phenomena. Both have transformative effects on each other. They reproduce each other continuously. Therefore, there is a multiplicity of nature perceptions in response to this socio-ecological-cultural system. These perceptions situate nature as a subjective reality along with its complex property as a socio-ecological-cultural entity.

5.2.2. Nature Experience as Reciprocal Processes for All Species

Nature experience (NEX) is a process since it is not a single contact with other living beings. Conversely, it is a series of direct and indirect interactions with a system of relations and entities. All the species are interrelated within these systems of nature through survival. Nature, as a systemic whole, consists of many ecological connections between humans and non-humans. Therefore, any action can not be seen in isolation in terms of its impact within the system. The effect of any action by species at the system affects the cohabitation from end to end.

Human and non-human living beings are two majorities that cohabitate. Our habitat is our common ground for our collective living. Thus, each interaction at the system influences the actors and the interrelations for the evolution of the socio-ecological-cultural system gradually. Nature experience is a reciprocal process for all species. This mutual process was the unnoticed human impact, which showed itself with ecological degradation. Therefore, any wellbeing problem of any species cannot be seen as discrete from others. Nature experience reflects the health of the collective wellbeing of all species by being a reciprocal process.

5.2.3. Non-Inclusive Nature Experiences in Urban Settings

In urban settings, nature experiences are non-inclusive in terms of their capacity to present ecological reality and accessibility. Urban settings provide reconfigured nature experiences that are scaled and symbolic, which exclude several aspects of nature. While largeness, multispecies life, and the lack of human touch were the aspects of nature perception for the participants, largeness is an indicator of the inclusivity of these aspects in urban settings. Hence, this non-inclusive NEX heads people to a managed experience which might make possible the inclusion of any exclusion. These managed experiences of nature are mostly performed through *going to nature* that is outside of the city. Thus, it shows that the experiences are also scaled by two significant factors: accessibility and effort. While there are no accessible natural areas in the city, those are accessed through an effort.

Urban experiences are non-inclusive since some people might be excluded from accessing the natural environment in urban settings. In other words, access to some natural environments in urban settings is exclusive to some people due to their social context, while others should give the effort to access this natural area. Thus, urban experiences are also non-inclusive due to the exceptionalism of some people to access nature. The non-inclusive nature experiences result in alienation since people do not develop connections to a comprehensive nature perception, which brings knowledge about nature and pro-natural behaviors.

5.2.4. Ideal NEX as Participatory

The ideal nature experience for young professionals is the involvement of people in the production processes in nature through active participation and hands-on experiences, which brings engagement with nature. This engagement with nature means being in nature by contributing to the natural processes instead of consuming and depleting natural entities. Participatory and engaging experiences of nature bring the involvement of people and the responsibility towards nature.

5.2.5. Cohabitation Intelligence as a Design Approach

Human beings have been transforming nature for their needs and desires from the birth of life, just like any other living beings. However, human activities exploited nature, and those resulted in ecological degradation which is called the ecological crisis now. Although human is explained as the primary force behind these crises, this threatens all living beings on the Earth. Concerning the exploitation of nature by humans, it has a limited capacity to perform for human needs. The performance is a term from *Human Factors,* which studies human capacity to perform and eliminate human errors. Likewise, the capacity of this living system can be described as *Nature Factors*. *Nature Factors* are always neglected from the very beginning of the Industrial Revolution until the prominence of ecological degradation. Upon this, the design discipline responded to this with sustainable design. Sustainability concerns operate through the system and things to some extent; however, it is not easy to fix anthropogenic *nature errors* like human errors. The reason is that nature is a complex system that contains millions of interrelated biotic and abiotic factors. Thus, the reciprocal effects of humans are not apparent in the environment due to its complexity.

Concerning the ecological degradation, what humanity has missed is that we live in a system of ecological, economic and social subsystems and interrelations. In other words, the society on the Earth is not only human beings, but the entanglement of nature and humans. Human beings built direct or indirect interactions with nature through diverse acts and artifacts. Likewise, nature also has reciprocal interactions like ecological crises. However, most of the humans are not aware enough of the impact of their interactions and how ecology functions in this socio-technical system. Hence, there should be a change in how we live on Earth.

Designers should understand that they work in a complex system with thousands of social, economic, and ecological relations and their politics. In this complex system, it is vital to understand the system and develop a system intelligence along with an

ethical framework. However, designers are not educated to have the related ethical values and analytical skills to design for cohabitation. This shows that designers should have critical and philosophical abilities. The current socio-technical system shows that we need philosopher designers for complex and ambiguous problems like cohabitation.

This thesis aimed to suggest an approach to design for human and nature cohabitation. Therefore, I conclude that *Cohabitation Intelligence* (CI) helps designers to design for the cohabitation of humans and nature. I derived the term by combining *Cohabitation* and *System Intelligence* to emphasize the requirement of a new understanding of our entanglement with nature. In the complexity of this socio-technical system, this study suggests that designers may be able to design better by having a *Cohabitation Intelligence* for preferable futures.

Cohabitation Intelligence is a non-human-centered approach that requires systems, critical and ecological thinking with ethical awareness to notice all the reciprocal experiences of humans and nature for collective wellbeing. *Cohabitation Intelligence* implies that humans are the part of a complex, systemic and multispecies whole. Thus, they are beyond being an individual in their right, but an entangled entity who has have an ethical responsibility for the wellbeing of other species.

Cohabitation Intelligence uses NEX as a tool to understand human and nature cohabitation and transform it by design since the design of NEXs for cohabitation can convert our sporadic interactions into responsible experiences in terms of collective wellbeing. Designers apply advanced technology to explore the entanglements of humans and nature.

In *Cohabitation Intelligence*, it is essential to formulate design problems as a systemic problem, not only as a discrete human problem. There should be an assessment of each problem for their performance in collective wellbeing. Designers, mostly industrial

product designers, should be investigative for their decision to design in terms of the necessity to respond to any human need.

5.3. Limitations of the Study

Through the research process, there were two significant limitations to the thesis. Firstly, it was too hard to reach eager people to participate in the group interviews from related professional areas and arrange a viable time and location to conduct an interview.

Secondly, there was not enough diversity among the participants of small group interviews in terms of social context since young professionals were the most convenient sample to manage small interview groups for this thesis. The participants were the young professionals who live in Ankara and who study or studied at Middle East Technical University, or Hacettepe University, or Ankara University. Therefore, the participant's nature experiences were mostly dependent on Ankara's natural and built environment. Furthermore, the nature experience of this sample might vary with another sample aged younger or older. In other words, age and background might bring different biases about nature experience, which might affect the findings.

Thus, this sample makes it challenging to transfer the findings to another group (Given, 2008) due to the elitism of the sample in terms of class, background, age, and prejudices, instead of the diversity of these aspects. However, it was functional for the exploration of NEX and cohabitation.

The language was also a limitation for the findings of the fieldwork. During the group interviews, participants used many idioms and sentences to share their arguments and experiences. However, the translation from Turkish to English has resulted in losing some valuable reasonings. Hence, this affected the richness of the findings.

Due to the scope of the study, further developments regarding *Cohabitation Intelligence* were not provided. *Cohabitation Intelligence* is an approach to diverse knowledge and skills. Unfortunately, these knowledge and skills are not provided by this thesis due to the scope of this study.

5.4. Future Work and Recommendations

Cohabitation Intelligence and NEX are two concepts that operate together. However, both concepts have possibilities to be applied by designers to design not only alternative futures but also viable every day. However, there should be various methods and a set of knowledge to train design students or designers with *Cohabitation Intelligence*.

The related knowledge and skills can be explored with many professionals from diverse areas like social and natural sciences, and applied sciences. However, I think fieldwork experience with more nature experience is essential for these professionals. In order to develop the *Cohabitation Intelligence* guide and a manifest, participatory design and speculative design can be applied along with the arts of noticing and foray.

Furthermore, it would be interesting to see *Cohabitation Intelligence* as a graduate design course which equips design students with essential knowledge and skills in order to transform them into the ethical and philosopher leaders of preferable futures.

5.5. Contributions of the Study

This study contributes to the design literature by proposing a framework to understand human and nature relationship (NEX), and Cohabitation Intelligence (CI) which is an approach which helps to design for *cohabitation* for designers.

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APPENDICES

A. Methodology

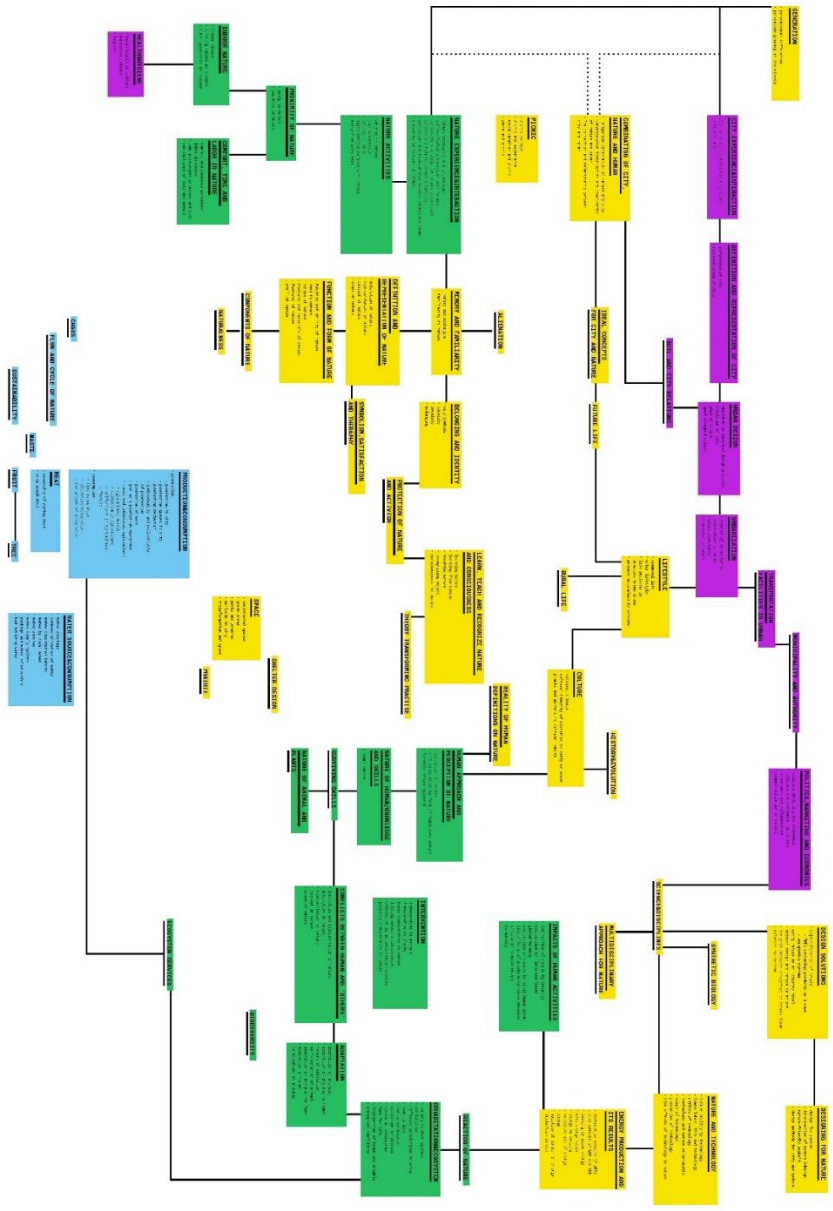
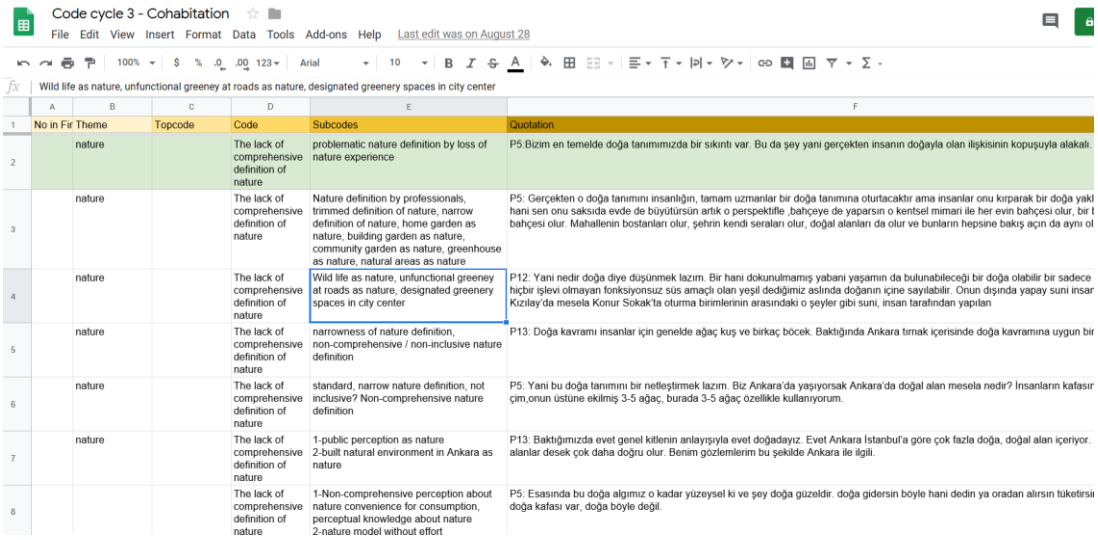


Figure A.1. Second cycle coding map

B. Methodology



Code cycle 3 - Cohabitation

File Edit View Insert Format Data Tools Add-ons Help Last edit was on August 28

Wild life as nature, unfunctional greeney at roads as nature, designated greenery spaces in city center

No in Fir	Theme	Topcode	Code	Subcodes	Quotation
	nature		The lack of comprehensive definition of nature	problematic nature definition by loss of nature experience	P5:Bizim en temelde doğa tanımımızda bir sıkıntı var. Bu da şey yani gerçekten insanın doğayla olan ilişkisinin kopuşuyla alakalı.
	nature		The lack of comprehensive definition of nature	Nature definition by professionals, trimmed definition of nature, narrow definition of nature, home garden as nature, building garden as nature, community garden as nature, greenhouse as nature, natural areas as nature	P5: Gerçekten o doğa tanımını insanlığın, tamam uzmanlar bir doğa tanımına oturtacaktır ama insanlar onu kırparak bir doğa yakl hani sen onu saksıda evde de büyütürsün artık o perspektifle ,bahçeye de yaparsın o kentsel mimari ile her evin bahçesi olur, bir b bahçesi olur. Mahallenin bostanları olur, şehrin kendi seraları olur, doğal alanları da olur ve bunların hepsine bakış açın da aynı ol
	nature		The lack of comprehensive definition of nature	Wild life as nature, unfunctional greeney at roads as nature, designated greenery spaces in city center	P12: Yani nedir doğa diye düşünmek lazım. Bir hani dokunulmamış yabani yaşamın da bulunabileceği bir doğa olabilir bir sadece hiçbir işlevi olmayan fonksiyonsuz süs amaçlı olan yeşil dediğimiz aslında doğanın içine sayılabilir. Onun dışında yapay suni insar Kızılay'da mesela Konur Sokak'ta oturma birimlerinin arasındaki o şeyler gibi suni, insan tarafından yapılan
	nature		The lack of comprehensive definition of nature	narrowness of nature definition, non-comprehensive / non-inclusive nature definition	P13: Doğa kavramı insanlar için genelde ağaç kuş ve birkaç böcek. Baktığında Ankara tırnak içerisinde doğa kavramına uygun bir
	nature		The lack of comprehensive definition of nature	standard, narrow nature definition, not inclusive? Non-comprehensive nature definition	P5: Yani bu doğa tanımını bir netleştirmek lazım. Biz Ankara'da yaşıyorsak Ankara'da doğal alan mesela nedir? İnsanların kafasır çim,onun üstüne ekilmiş 3-5 ağaç, burada 3-5 ağaç özellikle kullanıyorum.
	nature		The lack of comprehensive definition of nature	1-public perception as nature 2-built natural environment in Ankara as nature	P13: Baktığımızda evet genel kitlenin anlayışıyla evet doğadayız. Evet Ankara İstanbul'a göre çok fazla doğa, doğal alan içeriyor. alanlar desek çok daha doğru olur. Benim gözlemlerim bu şekilde Ankara ile ilgili.
			The lack of comprehensive definition of nature	1-Non-comprehensive perception about nature convenience for consumption, perceptual knowledge about nature 2-nature model without effort	P5: Esasında bu doğa algımız o kadar yüzeysel ki ve şey doğa güzeldir. doğa gidersin böyle hani dedin ya oradan alırsın tüketirsi doğa kafası var, doğa böyle değil.

Figure B.2. Third cycle of coding

C. Informed Consent Form in Turkish (Continued)

Sayın katılımcı,

Bu belge, Orta Doğu Teknik Üniversitesi, Mimarlık Fakültesi, Endüstri Ürünleri Tasarımı Bölümü'nde, yüksek lisans tezi çerçevesinde yürütülen "**Kentte Doğa ile Birlikte Yaşam için Tasarım**" başlıklı araştırmada gönüllü olarak yer almanız durumunda sizi bilgilendirmek ve onayınızı almak için hazırlanmış bir formdur.

Bu projenin ana amacı**, tasarımcılar için, bugünün ve geleceğin kentlerinde birlikte yaşam için tasarım kriterleri ve örnekleri için bir referans kaynağı** oluşturmaktır. Bunun için gerekli olan bilgiyi biyoloji, ekoloji, kent yaşamı, hayvanlar, bitkiler veya tasarım ve mimari konusunda çalışmalar yapmış, çalışmalarına devam eden kişilerle yapacağımız yüzyüze görüşmelerle elde etmeyi umuyoruz. Bu yüzyüze görüşmeler farklı uzmanlık alanlarından 4 kişi ile odak grup çalışması yaparak gerçekleştirilecektir. Bu görüşmelerde katılımcılardan beklediğimiz, kenti beraber paylaştığımız diğer canlılar ve doğa ile oluşturulan birlikte yaşama dair bilgi ve değerlendirmelerini bizimle ve birbirleriyle paylaşmalarıdır.

Yapacağımız görüşmeler, sizin ayırabildiğiniz zamana göre ayarlanacak, ancak tahmini olarak 2 saatten daha uzun sürmeyecektir. Görüşmelerin zamanı birlikte belirlenecektir. Görüşmede, araştırma için kayıt tutma ve analizinin daha sağlıklı yapılabilmesi amacıyla ses ve gerekli görüldüğü durumlarda görüntü kaydı yapılacaktır. Birden fazla katılımcı ile beraber bu görüşme yapılacağından ve ses kaydının sağlıklı bir şekilde yapılabilmesi için ODTÜ Mimarlık Fakültesi mekan olarak belirlenmiştir. Araştırmaya katılmayı kabul etmekle, ses ve görüntü kaydı alınmasını kabul etmiş bulunuyorsunuz. Bununla birlikte, görüşme sırasında gerekli gördüğünüz herhangi bir durumda mülakatı durdurabilir, araştırmanın herhangi bir yerinde ya da sonrasında söylediklerinizin ve yaptıklarınızın tamamının ya da bir

D. Informed Consent Form in Turkish (Continued)

kısmının kayıt dışı kalmasını, silinmesini isteyebilir, süreç sonrasında bizimle iletişime geçerek bilgi talep edebilirsiniz.

Araştırmaya katılım, gönüllük esasına dayanmaktadır ve sizlerden bu katılım karşılığında hiçbir bedel istenmeyecektir. Yapılan tüm ses ve/veya görüntü kayıtları yalnızca araştırmacılar tarafından analiz amaçlı olarak dinlecek ve/veya izlenecek, üçüncü bir kişi ve kurumla paylaşılmayacak ve yalnızca bilimsel amaçlarla kullanılacaktır. Sağladığınız bilginin kimliğinizle eşleştirilmesini istemediğiniz ya da gizli tutulmasını istediğiniz bir kısmı olduğunu belirttiğiniz takdirde, bu bilgi ancak anonimleştirildikten sonra kullanılacaktır.

Araştırmaya katılımınız bir risk taşımamaktadır. İstediğiniz takdirde araştırmanın sonraki aşamalarında bilgi alabilirsiniz. Araştırmaya katılmaya karar verdiğiniz takdirde bu belgeyi imzalayarak bir kopyasını saklamanızı rica edeceğim. Ancak, izin belgesini imzalamak sizin için bağlayıcı olmayıp, istediğiniz zaman araştırmada yer alma konusundaki kararınızı değiştirebilirsiniz. Böyle bir durum olduğunda ya da araştırma süresince herhangi bir konuda sorunuz ve/veya şikayetiniz olursa çekinmeden benimle iletişime geçebilirsiniz.
Zaman ayırdığınız için teşekkürler.

Araştırmacı:

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E. Informed Consent Form in Turkish (Continued)

Tez danışmanı:

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Tel: 312 210 2231

Katılımcının okuması ve imzalaması gereken bölüm: Bu formu imzalayarak, yapılan "**Kentte Doğa ile Birlikte Yaşam için Tasarım**" başlıklı araştırma konusunda size verilen bilgiyi anladığınızı ve araştırma yapılmasını onayladığınızı belirtmiş oluyorsunuz. Formu imzalamış olmanız yasal haklarınızdan vazgeçtiğiniz anlamına gelmemektedir; ayrıca araştırmacının, ilgili kişi ve kurumların yasal ve mesleki sorumlulukları sürmektedir. İstediğiniz zaman mülakatın durdurulmasını talep edebilirsiniz. Mülakatın başlangıcında veya herhangi bir aşamasında açıklama yapılmasını veya bilgi verilmesini isteyebilirsiniz.

Mülakat sırasında ses kaydı yapılmasına, verdiğim bilgilerin bu proje kapsamında hazırlanan yayınlarda kullanılmasına izin veriyorum.

Evet: ___ Hayır: ___

Mülakat sırasında görüntü kaydı yapılmasına, görüntülerin bu proje kapsamında hazırlanan yayınlarda kullanılmasına izin veriyorum.

Evet: ___ Hayır: ___

Katılımcının adı soyadı İmza Tarih

Bu formun bir kopyası katılımcıya verilecek, imzalı kopyası araştırmacıda kalacaktır.