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The Perceptions of the Children Attending the Preschool Education about Nature and Nature Pollution

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Abstract

The perceptions of 20 preschool children about nature and nature pollution were investigated. Data were collected through interviews and by studying the children's drawings. The results show that most children perceived nature together with living things. The children expressed that nature was most polluted with garbage and that all living things would be harmed in case of nature pollution. Children emphasized behaviors toward a sustainable environment to protect and not spoil it. Teachers should provide children with opportunities for environmental education through real-life experiences in nature-friendly settings and include their families in these educational activities.

Keywords:

Nature, Nature Pollution, Environment, Environmental Problems, Preschool Period

Introduction

Increasing environmental problems in our country and worldwide disrupt the balance of nature and cause negative effects on living things. It is crucial to be aware of our conception of the environment and our assumptions about the causes and consequences of environmental problems to prevent and solve them (Kışoğlu et al., 2010). According to Eroğlu (2017), the environment concept refers to nature and the system it contains. The main components of this system in nature are water, air, soil, and all living and non-living beings. To Engin and Demiriz (2022), nature provides raw materials for people to continue their lives. Moreover, it provides opportunities for education and permanent learning, and at the same time, it contributes to mental and physical health. In this regard, investigating the human-nature relationship and the evolution of this relationship over time will illuminate the understanding of the causes of environmental problems.

How people perceive nature forms the basis of the human-nature relationship. The relationship between human beings and nature has evolved (Hollstein, 2022; Hollstein & Smith, 2020; Kavaz et al., 2021). The industrial revolution in the 18th century considered nature a raw material in production. Several challenges followed it, i.e., the problem of global warming toward the end of the 19th century and rapid urbanization in the 20th century. Thus, humans moved

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away from the natural environment and continued to harm the environment with unconscious consumption and destruction (Engin & Demiriz, 2022; Karabıçak & Armağan, 2004; Kutgi 2016). As Önder (2016) suggests, "50% of the environmental pollution in the world has occurred in the last 35 years" (as cited in Kete et al., 2017, p.174). The rapid increase in the world population and the rise in welfare-related consumption caused unpredicted environmental challenges. Today, measures during the pandemic, like stay-at-home orders, less road traffic, and decreased economic activity, created positive effects, especially on the air, sea, and beaches. However, an increase in domestic and medical waste has existed. Although the ongoing destruction of nature has partially decreased during the COVID-19 period (Zambrano-Monserrate et al., 2020; Bashir et al., 2020), the destruction of nature and environmental problems continue to progress rapidly with the "normalization" process.

International steps have contributed to the formation of environmental education approaches and principles, and it has become essential to provide children with the necessary attitudes, values, and skills within the scope of environmental education in the countries' education policies (Doğan & Simsar, 2018; Fernández et al., 2019; Tanriverdi, 2009). The Turkish environmental education strategy aims at providing children with awareness, knowledge, attitudes, and skills to protect the environment and create environmental awareness (Kavaz et al., 2021; Soydan et al., 2013).

Preschool years are the most suitable period to inspire environmental education. These are the critical ages when children's language, cognitive, social-emotional, and psycho-motor developments are intense (Erkan et al., 2021). The awareness of creating a sustainable environment can be gained by providing experiences enabling children to see themselves as a part of nature. Providing educational experiences will also allow them to recognize and enjoy the environment and raise awareness about environmental problems while dealing with activities (Öztürk Samur, 2018). According to Aaron and Witt (2011), children's understanding and perceptions of nature affected their behaviors. Early childhood understandings and perceptions of nature substantially affect the lifelong development of positive attitudes and values toward environmental problems.

It is necessary to focus on the perception of nature in the studies on environmental education and in gaining positive attitudes and behaviors toward the environment for children, considering the effect of the human-nature relationship on environmental problems. Understanding children's perspectives on nature and the elements in the system they contain and providing environmental education focusing on real life and emotions in this direction are important to create highly environmental-conscious societies (Bolat, 2020; Karataş & Aslan, 2012; McNichol, Davis, & O'Brien, 2011; Phenice & Griffore, 2003).

When we look at the studies on the nature perceptions of preschool children, they seem limited (Keliher, 1997; Phenice & Griffore, 2003; Tillmann et al., 2019; Mol, 2019; Köşker, 2019). Keliher (1997), in her study on nature perceptions of 6–7-year-old children, stated that children have well-formulated perceptions of nature, and school and out-of-school experiences affect their perceptions of nature. Phenice & Griffore (2003) stated in their research with 32–72-month-old children that children partially understand the human-nature relationship and build new understandings with their educational experiences. In their research investigating how rural Canadian children define, experience, and perceive the benefits of nature, Tillmann et al. (2019) concluded that children conceptualize nature as a "whole community" and know about nature's health benefits. Mol (2019) examined the nature perceptions of preschool children through drawings and found that the children included nature figures, natural events, animals, people, vehicles, objects, planets, cannibals, and giants. Köşker (2019) conducted a study to investigate how preschool children perceive nature. She concluded that children perceive nature as an environment where animals and plants exist outside human life. She also emphasized that children without a sufficient level of perception about the fundamental relations in nature have a more object-oriented understanding of nature.

Based on the studies above, we can say that a need exists for in-depth studies investigating the perceptions of children about nature, components of nature, and nature problems in the preschool period. Our present study can be seen as a crucial contribution in this direction.

The Purpose of the Study

This study aims at revealing the perceptions of children attending preschool education about nature and pollution. We will seek to find answers to the following questions:

1. How do children define nature?
2. According to children, how is nature polluted?
3. According to children, how are living things affected by nature pollution?
4. According to children, what can be done to protect nature?
5. What kind of nature do children want to live in?

Method

A qualitative case study design was used to investigate the children's perceptions of nature and pollution in detail through interviews and by studying their paintings.

Our research study group comprised 20 children aged 60–72 months attending a preschool education institution. The convenient sampling method, one of the non-random sampling methods, was used to determine the study group. Easy access and time factors were considered while choosing the working group. Necessary permissions were obtained before the study. Preschool teachers and school administrators were informed about the study. The parents' permission of the children participating in the study was obtained. Children with parental consent and willingness to participate were included in the research process. 50% of the children in the study group were girl, and 50% were boy.

Data Collection Tools

Data were collected through semi-structured interviews and by studying the children's drawings. The first part of the study involved presenting open-ended questions to the children and obtaining their opinions on nature and pollution. The related literature was reviewed, and seven questions were prepared to investigate the children's perceptions of nature and pollution. The prepared questions were presented to three faculty members for expert opinion. Based on the feedback from the experts, one question was removed from the form, and the final version comprised six questions. Before the main study, the clarity of the questions was checked by conducting a preliminary study with five children. Then, open-ended questions were updated, and the questions were finalized.

In the second part of the study, the children were asked to explain what kind of nature they wished to live in through the pictures they drew. Children's drawings reflect the content and how they think (Yavuzer, 2009). Drawings are used as a method to help the children express their opinions and experiences (Fargas-Malet et al., 2010). We talked with the children about the drawings they made to avoid problems in the interpretation/analysis of the drawings of children (Leonard, 2006). Therefore, each child was interviewed to interpret the drawings from the children's perspectives, and they were asked to describe their drawings. The interviews with children and their descriptions of their drawings were recorded.

Data Analysis

Content analysis is "a systematic and repeatable technique in which some words of a text are summarized with smaller content categories with coding based on certain rules" (Büyüköztürk et al., 2013, p. 240). The content analysis method, a qualitative data analysis method, was used to analyze the interview data and children's drawings. According to Yıldırım and Şimşek (2018), similar data are compiled in content analysis within the framework of certain concepts and themes, and these are organized and interpreted such that the reader can understand.

The recordings of the interviews with the children were converted into written text (transcript). The written texts were read repeatedly, and categories were determined accordingly. The data were arranged according to codes, categories, and themes. The data were coded, aligning with the information obtained from the children. The themes related to the categories were created. Moreover, tables were created to explain the codes, and the findings were interpreted. The data were analyzed, and research findings were presented.

The emerging themes were noted in this process by examining the children's drawings. Children's sentences were read repeatedly, and the elements in the children's expressions of the drawings were evaluated.

The two researchers coded the data separately, and the percentage of agreement was calculated as 90% using a formula developed by Miles and Huberman (1994).

Abbreviations and coding indicating the number of sequences (C1, C2...) were used for presenting the descriptions and children's drawings.

Findings

Findings Regarding Nature Perceptions

This section evaluated children's perceptions of the natural environment (nature). Accordingly, Table 1 presents the findings regarding the themes, categories, and codes of children's perceptions of the natural environment.

Table 1
Themes, Categories, and Codes for Children's Descriptions of Nature

Theme	Categories	Codes
Living elements	Plant	Tree, flower, leaf, greenery, grass
	Animal	Animals
	Human	Human being name
Non-living elements	Natural	Soil, mountain, forest, fresh air, snow, seasons
	Human	Where we live, outdoors

The findings suggest that most children (*n* = 9) perceived nature together with living elements, considering the children's definitions of "nature." Those children perceiving nature and living things included words such as "trees, flowers, greenery, leaves, and animals" in their definitions. Some children (*n* = 4) perceived nature with inanimate elements such as "soil, mountain, forest, fresh air, snow, seasons, and outside, where we live." Interestingly, none of the children perceived nature as a place where humans, animals, and plants lived together. Per the definitions of nature, only one child (C17) used expressions about nature and relationships. Some children (*n* = 4) reported that "they did not know." Some of the expressions of children about nature were as follows:

> *C17: "Animals and nature are important to all of us because we cannot breathe without nature. Trees are part of nature. We would die if it were not for the trees."*
>
> *C20: "It is the living space of human beings. We should not consume everything in nature."*
>
> *C8: "A friend's name. Greenery is just like nature."*
>
> *C12: "Outside, where the animals are."*

Findings Regarding How Nature is Polluted

Children's perceptions of how nature is polluted were evaluated, and the findings show that majority of the sample (*n* = 16) used the expression "with garbage, by littering." A few (*n* = 3) expressed that nature is polluted with "mud." Some children's expressions of pollution and how nature is polluted were as follows:

> *C1: "It is damage to trees and flowers."*
>
> *C8: "When mud gets on the tree, and when rain and snow fall on it, it becomes polluted. Nature becomes polluted when papers are thrown on the ground."*
>
> *C11: "By littering. There are masks and bottles on the ground. I want to collect them when I see them. People are constantly littering."*
>
> *C16: "It becomes polluted if not washed a lot."*
>
> *C17: "Nature gets polluted when you do not throw garbage in the trash. People should not litter."*
>
> *C20: "If we throw litter in nature, it will harm animals and humans. If our nature is polluted, we will not be able to live long in our world."*

Findings Regarding Soil, Water, and Air pollution

Table 2 presents the findings regarding the children's perceptions of soil, water, and air pollution.

Table 2

Themes, Categories, and Codes for How Soil, Water, and Air are Polluted

Theme	Categories	Codes
Soil pollution	Natural	Mud and water
	Human	Garbage, batteries, glass bottle, plastic, harmful substance, mask, paper, explosive materials, bombs, robot wheels, dirty glass, dirty things, and poisonous seed
Water pollution	Natural	Soil, mud, stone, and moss
	Human	Pet bottles, glass and plastic plates-cups, garbage, waste, paint, and toxic-harmful substances
Air pollution	Natural	Darkening of the sky and clouds, rain, smoke, steam, flames from the volcano, wind, storm, and tornado
	Human	Dirty gases, car gas, harmful gases, and foul odors

As depicted in the table, only a few expressed that the soil is polluted by natural objects such as "mud" and "water." Some think the soil is polluted with "garbage, batteries, glass bottles, plastics, harmful substances, masks, paper, explosive materials, bombs, robot wheels, dirty glasses, dirty things, and toxic seeds." Some of the children's expressions were as follows:

> *C5: "When we do evil."*
>
> *C11: "If there is no grass, the soil becomes polluted when someone litters."*
>
> *C20: "The soil becomes polluted if we dispose of a toxic seed."*

More than half of the children (*n* =15) mentioned household wastes such as "pet bottles, glass- plastic plates- cups, garbage, waste, toxic - harmful substance, and paint," considering the perceptions of how and what the water is polluted. At the same time, some children (*n* = 7) mentioned that the water is polluted with natural substances such as "soil, mud, stone, and moss."

> *Some of the children's expressions were as follows:*
>
> *C2: "It gets polluted with soil. Sometimes people are careless and add paint."*
>
> *C4: "If we put soil in it, if we put toxic substances, it will become polluted. The animals run away."*
>
> *C13: "When we litter the water, its color changes. It would have a very dirty color."*
>
> *C16: "If the water becomes polluted, it becomes clean again."*

A considerable number of children (*n* = 8) believed that the air is polluted by natural events such as "darkening of the sky and clouds, rain, wind, storm, tornado; smoke, steam, and flames from the volcano," considering the perceptions of air pollution and with what the air is polluted. Furthermore, half of the group (*n* = 10) believed that the air is polluted by factors associated with people, such as "dirty gases, car gas, harmful gases, and bad odors." Some of the children's expressions about air pollution and with what the air is polluted were as follows:

C3: "It gets polluted if there are storms, tornado messes everything up as it spins."

C6: "It gets polluted if the sun shines. When the sun comes up, people litter on the ground."

C13: "It gets polluted when something like oil, water, etc., is spilled."

C17: "When it is out of breath, it gets polluted. Breath comes with the wind and clouds. If we do not breathe with the clouds, we will be out of breath and die."

C19: "It gets polluted with the bad odors. The air will be polluted if people are not clean."

Findings Regarding the Effects of Nature Pollution on Living Things

Children's perceptions of the effects of nature pollution on living things are rather diverse: Some (n= 5) had a perception that life would end. Some children (n=3) believed that living things would be offended in case of nature pollution. Others (n= 6) believed that living things would be harmed, they would get sick, and the plants would wither because of nature pollution. Three expressed that living things would "escape to their houses or the zoo" because of nature pollution. Another group of three children reported that "they did not know."

Some expressions of children about the effects of nature pollution on living things were as follows:

C1: "The world would be destroyed; we would die. The amount of honey would decrease."

C5: "They might faint."

C6: "Animals would die. People would live, but they would be polluted."

C11: "The plants would wither. Animals would not find food. Both human beings and animals would be upset."

C12: "They would run away to another nature, to a clean zoo."

C19: "There would not be trees. Animals would die."

Findings Regarding the Effects of Soil, Water, and Air Pollution on Living Things

Table 3 presents the findings regarding the perceptions of the children participating in the study on the effects of soil, water, and air pollution on living things.

Table 3

Themes, Categories, and Codes for the Effects of Soil, Water, and Air Pollution on Living Things

Theme	Categories	Codes
Soil pollution	Human being	Their feet would get muddy; their hands would be dirty.
	Animal	Ants would get sick; insects would die.
	Plant	Flowers cannot grow; we cannot plant plants.
Water pollution	Human being	They would become dehydrated, get sick, get poisoned, become polluted, and die.
	Animal	They would get sick, die, and leave.
	Plant	They would become dehydrated and die.
Air pollution	Human being	They cannot breathe; they would die and should wear masks.
	Animal	Birds would get poisoned; they could not breathe and die.
	Plant	Plants would not bloom.

Considering children's perceptions about the effects of soil pollution on living things, some children (*n* = 3) believed that animals would be affected. In contrast, some (*n* = 4) believed that plants would be affected in case of soil pollution. Some (*n* = 7) believed that soil pollution would affect humans. Five believed that all living things, such as humans, plants, and animals, would be affected. Few (*n* = 3) expressed that "they do not know." Some expressions of children about the effects of soil pollution on living things were as follows:

C1: "Ants would get sick. We should throw the empty glues in the bin. If we throw it on the ground, the world will become lifeless."

C9: "Our feet would get muddy."

C12: "Children cannot play; their hands would be dirty and dry."

C13: "The soil would become very polluted. It would become dark black. The soil would smell bad, and the living things would run away."

C15: "They cannot plant anything."

Almost half of the children (*n* = 11) believed that all living things, including humans, plants, and animals, would be affected by water pollution. Almost one-third of the children (*n* = 6) believed that animals would be affected while some (*n* = 4) believed that plants

would be affected in case of water pollution. Another small group (n = 4) believed that water pollution would affect humans.

Some expressions of children about the effects of water pollution on living things were as follows:

C4: "Human beings would get poisoned."

C8: "The creatures that can get out of the water would be saved. Fish would be affected because they cannot get out of the water. We can put the fish in the aquarium or a bucket and raise them there."

C10: "Living things will leave if the water gets polluted."

C14: "If living things drink water, they will get sick."

C17: "Water becomes evil water. It will become dark. Fish do not like muddy water; they would die. All animals living in water would die."

C18: "We would get dirty when we got into the water."

Findings related to the children's perceptions about the effects of air pollution on living things reveal considerably diverse views: some children (n = 3) believed that animals would be affected. Conversely, one child (n = 1) believed air pollution would affect plants. Four believed that human beings would be affected in case of air pollution. Almost one-third of the group (n = 7) believed that all living things would be affected in case of air pollution. A few (n = 3) reported that "they did not know." Some expressions of the children about the effects of air pollution on living things were as follows:

C2: "We cannot breathe; we would die."

C3: "If the air were polluted, it would become dirty. Living things would smell bad odors and have bad breath."

C6: "Gases would pollute the air. Animals would die. Plants would not bloom."

C12: "People cannot go out; the air would stink. It would be necessary to wear a mask because of the bad odor."

C15: "Living things would be scared and leave."

C19: "Living things would get sick."

Findings Regarding What Can be Done to Protect Nature

When we look at the children's expressions about what should be done to protect nature, more than half (n = 13) expressed that "garbage should be collected and thrown into the bin." Only a few (n = 2) said that "they did not know." Some of the children's expressions were as follows:

C7: "We should collect the garbage."

C8: "I wear gloves and put all the garbage in the bin with my mom. We should tell people that they should throw the garbage in the bin."

C14: "We should throw the garbage in the wastebaskets. I do not litter."

Findings Regarding What to Do to Protect Soil, Water, and Air

Table 4 presents the findings regarding the children's perceptions of what can be done to protect soil, water, and air.

As seen in the table (Table 4), most children (17) used behavioral expressions about what should be done to protect and not pollute the soil. Some are as follows:

Table 4

Themes, Categories, and Codes for What Should be Done to Protect Soil, Water, and Air According to Children

Theme	Categories	Codes
Not to pollute the soil	About behaviors	Protect the soil, not litter, not step on the grass, not create mud, plant trees, protect trees, and not pollute the environment.
	About explaining the reasons	When you pour water constantly, the soil melts and becomes mud. We will plant the seeds and water them. Then, they will grow.
Not to pollute the water	About behaviors	Mud and soil should not be poured into the waters, should not drop litter, should clean toxic waste, and should not waste water.
	About explaining the reasons	If the fish wear a mask, they will not get the virus. Garbage in the water should be collected to protect aquatic animals.
Not to pollute the air	About behaviors	Should not use toxic gases, should be careful when starting a fire, should keep the forests clean, should not drop litter, it should not rain; tornadoes should be prevented.
	About explaining the reasons	Tree leaves clean the air. Toxic gases are dangerous. If it does not rain, the air will be polluted. We should wear a mask to prevent the steam from coming out of our mouths. If we do not pollute the forests, the air will remain clean.

C2: "To protect the soil, we should not plant and detonate bombs. We should not throw away food or drink."

C5: "We need to use it cleanly. We should not step on the grass."

C14: "We should not throw batteries. We need to throw the battery in the waste bin."

C18: "We should protect the trees. We need to plant trees. We will plant the seeds and water them. Then, they will grow."

C16: "I do not set foot on the ground. The soil is cleaned with water, but we should not mud it."

Similarly, most (17) used behavioral expressions about what should be done to protect and not pollute the water.

Some of the children's expressions about what they should do to protect and not pollute the water were the following:

C3: "We should not spill food coloring or throw garbage."

C6: "We should not waste water."

C9: "We need to get the dirty water."

C10: "I pick up the garbage with a net and throw it in a wastebasket."

C17: "To protect aquatic animals, divers can collect garbage from the water. Marines can collect, too."

C18: "We should not throw mud; we should not throw dirty things."

Furthermore, almost half (11) used a similar behavioral expression about what should be done to protect and not pollute the air. Some (n=3) reported that "they did not know."

Some of the children's expressions about what should be done to protect and not pollute the air were as follows:

C1: "We use the leaves of trees; we protect the air. The leaves should be intact; the dried leaves have holes. Therefore, they do not clean the air."

C5: "We should not create steam. The steam coming out of our mouths in the cold pollutes the air. We need to wear a mask."

C10: "We take the bad air and throw it in the wastebasket. The bad weather disappears."

C13: "Forests clean the air. If we do not pollute the forests, the air will remain clean."

C15: "I would go up to the cloud and put the bad smell in the air in a bucket."

C20: "When there is a tornado, it stirs the bad things around into the air. The air becomes polluted when it rains badly. We should prevent the tornadoes. There will not be a tornado unless there is a very strong wind."

Findings Regarding Elements in Children's Paintings

This section evaluated the drawings made by children (n= 20) aligning with "What kind of nature would you like to live in?" and the elements in their expressions about their drawings. Table 5 presents the findings regarding children's drawings' themes, categories, and codes.

The items included by children in their paintings were studied under the themes of living things, non-living things, and descriptions. Almost the entire group (*n* = 19) included drawings of human beings, animals, and plants under the theme of living things. Most (*n* = 15) included natural and humane elements under

Table 5

Themes, Categories, and Codes for What Kind of Nature Children Want to Live in

Theme	*n*	Categories	Code	*n*
Living things	20	Human being	My mother, my father, myself, my daughter, Atatürk, and human beings	9
		Animal	Fish, butterflies, birds, ladybugs, rabbits, pigs, and dogs	7
		Plant	Tree, apple tree, grass, flower, daisy, orange, grape, apple, blackberry, and carrot	16
		Other	Virus	1
Non-living things	15	Natural	Sun, cloud, black snow, wind, rainbow, earth, and dry leaf	13
		Human	House, treehouse, hut, stairs, balloon mailbox, umbrella, pop-it, colored ball, bird shoes, scarecrow, and police car	13
Description	12	Place	Zoo, forest, underwater, a colorful world, and endless greenery	4
		Emotion	Hearth, a loving place, beautiful, colorful, and clean	5

the theme of non-living things. However, nearly half (*n* = 12) had elements of space and emotions in the "description" theme.

The children (*n* = 9) expressed the elements coded in the "human beings" category under the theme of living things as "my mother, my father, myself, daughter, Atatürk, and human beings." They (*n* = 7) expressed the elements coded in the "animal" category "fish, butterfly, bird, ladybug, rabbit, pig, and dog." The children (*n* = 16) stated the elements coded in the "plants" category as "tree, apple tree, grass, flower, daisy, orange, grape, apple, blackberry, and carrot." One child included the "virus" element in their statement. The researchers evaluated this element under the "other" category. Some expressions of the children about the theme of living things were as follows:

> *C1: "I would like to live underwater to see the fishes. There are viruses and light fish underwater. The light fish scares the small fish at night. The light fish caught the samba virus. There are three samba viruses here."*
>
> *C3: "There are trees, flowers, butterflies, clouds, and sun. I run to get flowers and give them to my mom, dad, and older sister."*
>
> *C8: "There are colorful grasses made of pop-it. I drew Atatürk in the sun. There are beautiful clouds, beautiful weather, colorful rainbows, colorful umbrellas, and a beautiful pop-it house."*
>
> *C11: "There are trees, flowers, and grass in the forest. A girl is wandering in the forest."*

Considering the "natural" category within the theme of non-living things, the elements coded by children (*n* = 13) were "sun, cloud, black snow, wind, rainbow, earth, and dry leaf." Regarding the "human" category, the elements coded by children (*n* = 13) were "house, hut, stairs, balloon mailbox, umbrella, pop-it, colored ball, bird shoes, scarecrow, and police car." Some expressions of the children about the theme of non-living things were as follows:

> *C4: "I would like to live in a nature where black snow falls, silvery flowers, a house with eyes, and stairs leading to my room."*
>
> *C9: "There are clouds and sun: Grape, orange, blackberry, apple-colored balls, ladybug, and bird. The bird has shoes."*
>
> *C19: "There is a setting sun, clouds, trees, plants, and carrots. The tree has a trunk and dry leaves. There is also an irrigation system. The sun raises the trees. There is a pink pig on top of the trees. There is no mud because it is not raining."*

In the category of "place" within the theme of descriptions, the elements coded by children (*n* = 4) were "zoo, forest, underwater, a colorful world, and endless greenery." Under the category of "emotions," the elements coded by children (*n* = 5) were "hearth, a loving place, beautiful, colorful, and clean." Some expressions of the children about the theme of descriptions were as follows:

> *C12: "There is a sun and clouds. There are rabbits, scarecrows, and human beings in the zoo. Here, I love the bunnies and feed them with carrots."*
>
> *C19: "There is a sun and clouds. There is a small cottage and an endless amount of greenery."*
>
> *C20: "Everywhere is clean: A place with beautiful, loving hearts and daisies."*

Discussion and Conclusion

This study evaluated children's perceptions of nature and pollution. Interviews were conducted with 20 children attending preschool education institutions, and they were asked to draw pictures of what kind of nature they would like to live in.

Evaluating how children perceive nature and how they position themselves within the system of nature is essential concerning nature education (Keliher, 1997). According to Çelik (2009), the evaluation of the balances in the ecosystem with an objective point of view contributes to creating sustainable environmental awareness in education about the environment and nature. In line with the interviews to evaluate children's perceptions of nature, we found that many children in our sample (*n* = 9) perceived nature together with living things. Conversely, some children (*n* = 4) perceived nature together with non-living things. Littledyke (2004) and Haktanır (2020) also concluded in their studies that young children described the environment as living things or as a place including both living and non-living things. According to Halmatov (2012), children perceive the environment as a place at an early age, while they assess it as a medium in which living and non-living things interact in later years. In our study, some children (*n* = 4) similarly defined it as "the place where we live." However, the children did not use expressions for the integrity of the systems in nature. According to Halmatov (2012), children perceive the concrete objects they encounter in their lives and independently consider them. Therefore, children included descriptions of the items they discovered, such as trees, children, flowers, and birds. Our findings show that children similarly expressed nature with objects they could observe. In a study, Phenice and Griffore (2003) concluded that young children could partially describe the place of humans in nature. In another, Shepardson et al. (2007) reported that almost half of the children considered the environment a place where animals and plants lived. Contrarily, the perception of the place where humans, plants, and animals lived together was the least common perception among others. Our findings reveal that children partially perceived the nature-human relationship (C2: The place where we live. C19: We should not pollute nature. C20: It is the living space

of human beings. We should not consume everything in nature).

According to a study by Özkul (2018), the children's primary environmental problem is environmental pollution based on behaviors. Similarly, Taşkın and Şahin (2008) conducted a study. They reported that children's perceptions of nature included objects such as trees, children, flowers, and birds. However, they could not express the relationships between these objects or elements. Concerning their perceptions about how nature is polluted, most children (*n* = 16) used the expression "with garbage, by littering." Only a few expressed that nature is polluted with mud.

Our study's results were similar to those of Keliher's (1997), in which children believe garbage causes pollution. Only a few children included fog or oil spills in their pollution definition. Considering children's perceptions of what pollutes nature, they listed human factors as the most expressed factors. In line with children's perceptions, the primary things polluting nature are the problems related to human behavior.

For children's perceptions of the effects of nature pollution on living things, some children (*n* = 5) believed that life would end. A few (*n* = 3) believed that living things would be offended in case of nature pollution. Others (*n* = 6) believed that living things would be harmed; they would get sick, and the plants would wither due to nature pollution. Few (*n* = 3) expressed that living things would escape to their houses or zoos because of natural pollution. Ayvacı et al. (2021) investigated preschool children's metaphorical perceptions and opinions on environmental problems and obtained similar results. They reported that children had five metaphors for the concept of environmental problems: bad smell, crying plant, black cloud, unhappy animal, and nausea.

Considering children's expressions about what should be done to protect nature within the scope of our study, more than half (*n* = 13) reported that garbage should be collected and thrown into the bin. Ayvacı et al. (2021) disclosed that children mostly suggested setting rules, punishing, and educating people to prevent environmental problems. In our study, only one child (C8) mentioned the importance of education to protect nature by saying, "we should tell people that they should throw the garbage in the bin."

Children were observed to emphasize behaviors toward a sustainable environment in their statements about what should be done to protect and not pollute soil, water, and air. Similarly, Grodzinska-Jurczak et al. (2006) reported that almost all the children participating in their study were respectful to animals and plants, cared about the cleanliness of their environment, attached importance to saving water, saved energy and paper, and helped animals in the winter season. Furthermore, Ertürk Kara et al. (2015) reported that children generally had environmentally-centered attitudes toward paper consumption, environmental protection, recycling, and living habits.

Within the scope of the research, children were asked to paint a picture of what kind of nature they would like to live in. The items they included in their paintings were examined under the themes of "living things, non-living things, and descriptions." Almost all children (n=19) included drawings of humans, animals, and plants under the theme of living things. Similarly, Keliher (1997) conducted a study by asking children to make a drawing of what they considered nature and concluded that 6–7-year-old children perceived nature as flowers, trees, and animals. Phenice and Griffore (2003) reported that children found it relatively easy to identify trees and animals as a part of nature. In contrast, only a few children perceived humans as a part of nature. In our study, as in the studies conducted by Keliher (1997) and Phenice and Griffore (2003), only a few children (*n* = 9) included the human element in their paintings.

Teachers in early childhood classrooms must offer environmental education programs supporting a positive view of nature and the environment and allowing children to explore their environment at their own pace. According to Ertürk Kara et al. (2015), children can acquire nature-friendly attitudes and behaviors on sustainability, recycling, respect for living things, and environmental protection with environmental education in early childhood education institutions. Based on the nature awareness that children have already had, the vitality of the programs to be prepared on subjects such as nature, ecosystem, and sustainable environmental education in the preschool period should not be overlooked. Moreover, considering that the family's perception of nature affects the child's perception, families should be included in the environmental education at school and be guided on how to spend time with their children in nature (Erol & Ogelman, 2021; Haktanır, 2020; Kahriman, 2020). According to Bolat (2020), the aim of environmental education is "not to be fully in nature, but to belong to nature" (p.1).

Recommendations

In line with the results of this study:

- Teachers are recommended to provide children with opportunities for environmental education through real-life experiences in nature-friendly environments, including nature, ecosystem, and sustainability issues in science and nature studies aligning with the development, interests, and needs of children and involving families in these educational processes.

- School administrators should be innovative about environments where children can engage with nature, such as nature trips and school gardens, and support an environmental education program in their schools.

- Researchers wishing to work on children's nature perceptions and environmental education can conduct studies aiming at investigating the effects of demographic characteristics of children and families on nature perception. Furthermore, longitudinal studies can be conducted on the childhood nature perception levels' effects on future attitudes and behaviors.

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