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Perceptions of preschoolers and parents on forest pollution

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Introduction: An examination of preschool children's perceptions and attitudes towards the environment and forests has recently been conducted. However, little research has focused on preschool children's and their parents' perceptions of clean and dirty forests. Investigating these perceptions is essential to increase children's interest in and sensitivity to the environment, thereby fostering their development as responsible individuals who protect the natural world.

Methods: This study aimed to address this knowledge gap by examining the perceptions of clean and dirty forests held by 40 5–6-year-old students and 40 parents, randomly selected from two preschools: one attended by children from high socioeconomic families and the other by children from low socioeconomic families, in a Mediterranean coastal city in southwestern Turkey. A semi-structured questionnaire was used to collect sociodemographic information and perceptions of clean and dirty forests. Additionally, drawing sheets were distributed to the students to illustrate their concepts of clean and dirty forests.

Results: The results indicated that individuals with higher educational levels had more complex and conscious perceptions of clean forests. Children considered abstract concepts, such as supernatural forces and fossil fuels, while parents focused on awareness and conservation status. Conversely, parents and children with lower levels of education tended to concentrate on more concrete and everyday factors, such as litter and natural disasters. Individuals with higher socioeconomic status generally associated forest cleanliness with conscious behaviors and conservation, whereas those with lower socioeconomic status linked it more with polluting factors.

Discussion: This investigation provides valuable insights into the management and control of local forests by incorporating the perspectives of children and their parents, promoting responsible and sustainable tourism practices.

KEYWORDS

preschool education, child, parent, environment, clean forest, dirty forest

1 Introduction

Forests are vital to ecosystems because they support biodiversity, the carbon cycle, water regulation, and soil health. However, they also face numerous pollution and environmental threats today (Upadhyay, 2020; Kolawole and Iyiola, 2023). Several types of pollution, such as air, water, and soil, significantly impact ecological balance and public health (Livesley et al., 2016; Sadhu et al., 2018; Manisalidis et al., 2020). Understanding the perceptions of children and parents regarding forest pollution is crucial for enhancing environmental awareness and promoting sustainability (Ginsburg and Audley, 2020; Cengizoğlu et al., 2022; Say et al., 2022).

Rapid technological progress and information availability have considerably shaped societal perspectives on environmental matters in recent times (Roblek et al., 2019). Digital

media and internet usage have notably affected environmental consciousness (Wu et al., 2021; Shahzad et al., 2023). For example, technological advancements and educational approaches have changed how children and parents perceive forest pollution (Boca and Saraçlı, 2019; Wang et al., 2018).

Perceptions of forest pollution are linked to societal environmental awareness (Li et al., 2016; Frick et al., 2018). Children's awareness of pollution is vital to forming future environmental attitudes (Makuch and Aczel, 2020; Bala et al., 2023). Parents' attitudes and behaviors towards environmental issues directly shape their children's understanding of them (Vedechkina and Borgonovi, 2021; Tomczyk and Potyrala, 2021). Technology significantly influences how children and their parents acquire and assess their environmental information.

Türkiye's woodlands face pollution threats from industrialisation, agriculture, and urbanisation (Raihan and Tuspekova, 2022). Increasing air pollution in large cities negatively affects forest health, as chemical waste and exhaust gases contaminate soil and water and degrade ecosystems (Baltas et al., 2020). Understanding the knowledge and awareness of residents near forests regarding pollution is crucial for understanding the societal perceptions of the issue (Du et al., 2018).

Children aged three to five begin to understand and form opinions on environmental issues (Shortt and Ross, 2021). However, there is limited data on how they perceive complex issues, such as forest pollution (Madden and Liang, 2017). Parents play a key role in educating their children and fostering environmental awareness (Benoith et al., 2022). Consequently, parental perspectives on forest pollution can significantly influence their children's comprehension and attitudes (Masykuroh et al., 2022). Furthermore, these insights can potentially foster responsible and sustainable tourism practices that are beneficial to both the environment and local communities.

Forests are crucial ecosystems that preserve biodiversity, regulate the climate, and enhance social welfare (Mori et al., 2017). In Türkiye, forests face severe threats from industrialisation, urbanisation, and agricultural activities, leading to significant pollution that degrades air, water, and soil quality, thereby harming ecosystems and posing risks to human health (Günşen and Atmiş, 2019).

It is vital to cultivate children's environmental awareness early to foster environmentally conscious individuals (Simsar, 2021). Preschool children, a key demographic in environmental education (Ardoin and Bowers, 2020), begin learning about their natural surroundings, understand environmental issues, and form attitudes towards these concerns (Türkoğlu, 2019). The primary goal of environmental education is to instill the significance of conserving natural resources and promoting sustainability (Kopnina, 2020). This education can enhance children's awareness of specific issues such as forest pollution and foster a sense of environmental responsibility (Turtle et al., 2015).

Parents are pivotal in their children's environmental education (Jia and Yu, 2021). They impart environmental values and model attitudes, significantly influencing children's environmental awareness. Parents' knowledge and attitudes about environmental issues, including forest pollution, directly affect how they communicate these topics to their children and shape their approach to environmental challenges (Spiteri, 2021).

Analysing parents' perceptions of clean and dirty forest images may significantly impact their children's environmental awareness and health perception, as parents are the primary sources of information about nature and the environment for their children, and their views

shape their attitudes towards forest protection (Chawla, 2015; Connolly and Houghton, 2017; Green, 2015). Moreover, parents' perceptions may reflect broader societal attitudes towards environmental policies and practices (Wang et al., 2021). Therefore, understanding parents' perceptions is crucial for designing effective environmental education programs for children and promoting social awareness of forest protection and environmental sustainability (Hsiao and Shih, 2016; Estrada-Vidal et al., 2020; Say et al., 2022; Marchand et al., 2024). Examining parents' perceptions can contribute to the development of more conscious and effective environmental policies for both children and society (Kiessling et al., 2017).

This study aimed to understand preschool children's and parents' opinions of forest pollution. Qualitative research is suitable for several reasons. First, it allows for an in-depth exploration of participants' experiences, emotions, and thoughts (Creswell and Poth, 2018). Preschool children may find it challenging to grasp abstract concepts, limiting their ability to express their perceptions of complex environmental issues (Gomes and Fleer, 2020). Techniques such as interviews, observations, and projections effectively reveal how children and parents think and feel about these issues and the factors that shape their perspectives (Knott et al., 2022). Qualitative research is well-suited for exploring participants' personal and internal worlds and collecting rich data (Tracy, 2013). Second, qualitative research effectively comprehends the diverse viewpoints and perceptions of different age groups and individuals (Gill and Baillie, 2018), which may vary significantly between preschool children and parents regarding forest pollution (Melis et al., 2020).

This method seeks to thoroughly understand the similarities and differences between children's and parents' perceptions of forest pollution by examining their knowledge, concerns, and attitudes in detail. Qualitative research is suitable for exploring abstract concepts such as forest pollution and provides valuable insights into individual perceptions of environmental issues. Open-ended questions and in-depth interviews are effective qualitative tools for understanding how children and parents perceive forest pollution, and their knowledge and attitudes about the issue. By analysing the relationships between children, parents, and the environment, along with social norms and cultural influences, qualitative research offers a comprehensive understanding of how perceptions of forest pollution are formed. Observations and participatory interviews can also reveal the effects of social dynamics and environmental factors on perceptions.

Numerous studies on early childhood have examined children's views on the environment, forests, and nature (Alexander et al., 2015; Ahi and Kahrman Pamuk, 2021; Liu and Green, 2023). However, research on preschool children and their parents' perceptions of forest pollution is limited. This study aims to fill this gap by evaluating these perceptions and offering insights for the development of nature-integrated educational programs. By exploring their perspectives, this study sought to foster positive attitudes and behaviors towards forests and increase awareness of forest pollution.

This study addressed the following research questions:

R.Q 1. How do preschool children and their parents perceive clean and dirty forests?

R.Q 2. How do children and their parents perceive solutions to forest pollution?

2 Materials and methods

2.1 Research design

This study aimed to assess attitudes towards forest pollution among preschool-aged children and their parents. Using a qualitative case study approach, the study examined children's understanding of forest pollution through drawings and interviews and captured parents' perspectives through interviews. A case study involves collecting detailed information about real-life events or situations (Creswell and Poth, 2024).

2.2 Participants

This study was conducted in a Mediterranean city in Türkiye, and involved students from both affluent and disadvantaged socioeconomic backgrounds. Ethical standards were maintained by obtaining approval from the Provincial Directorate of National Education and parental consent (see Table 1).

In a recent study, 55% (22 person) of 40 participants were female and 45% (18 person) were male. The lower male participation rate may be due to the voluntary nature of this study. Among the parents, 87.5% (35 person) were female and 12.5% (5 person) were male, possibly influenced by cultural factors and working conditions affecting male parents. Most parents worked in "Tourism" or "Agriculture," representing over half of the occupations. When examining the education levels of the parents, it is observed that 22.5% of the participants (9 individuals) are primary school graduates, 12.5% (5 individuals) are middle school graduates, 40% (16 individuals) are high school graduates, 10% (4 individuals) have an associate degree, and 15% (6 individuals) hold a bachelor's degree. In our study, we defined primary and secondary school graduates as having a low level of education, while high school, associate degree, and bachelor's degree graduates were classified as having a high level of education (Nettles, 2017). Socioeconomically, 52.5% (21 person) were in the upper level and 47.5% (19 person) were in the lower level.

As of 2024, Türkiye's economic level is generally categorised as follows (Bozbulut and Turanlı, 2024):

- Upper socioeconomic level: High-income group with monthly incomes of 40,000 TL or more, typically including high-income professionals, senior managers, and business owners.
- Middle socioeconomic level: middle-income group with monthly incomes ranging from 15,000 to 40,000 TL, comprising mid-level managers, mid-level business owners, and professionals with stable incomes.
- Lower socioeconomic level: Low-income group with monthly incomes below 15,000 TL, including low-paid workers, pensioners, and low-income households.

2.3 Data collection

Data for this study were collected via semi-structured interviews (Creswell and Poth, 2018) using a two-part interview form. The first section gathered participants' demographic information, including gender and parental education levels. The second section featured

open-ended and semi-structured questions to capture the participants' thoughts and experiences regarding forest pollution. Face-to-face interviews were conducted in the kindergartens involved in the research. The interview questions were developed after a thorough literature review and finalised following an external audit by specialists in measurement, evaluation, and curriculum development.

Data for this research were collected using a combination of picture drawings and interviews with the children. Participants received a large sheet of paper divided into two sections and were asked to draw a clean forest on one side and a dirty forest on the other using crayons. After the drawing, the interviewers questioned the participants about their pictures and recorded their responses. Drawing took approximately 30 min, and the interviews lasted for 10 min. Parents were interviewed separately for 30 min. This method aimed to efficiently and effectively gather the required information from the participants.

2.4 Validity and reliability

According to Merriam (2009), qualitative research requires credibility, confirmability, transferability and dependability. This study aimed to meet these standards. For credibility, it provided a detailed description of the participants, the data collection process, and the social context. Confirmability was ensured by presenting the analysed data to three participants, who confirmed their accuracy in representing their experiences. The interview questions' understandability was verified with five 5-6-year-old children and three parents. To validate the interview form's content and face validity, the data were shared with another researcher to identify common themes and subthemes. The consistency coefficient of both analyses was calculated using Miles and Huberman's (1994) formula: "Reliability level = Agreement / (Agreement + Disagreement)", resulting in a consistency coefficient of (0.94).

2.5 Data analysis

This study utilised content analysis, a qualitative data analysis method that organises data into themes and concepts to improve comprehension (Creswell and Poth, 2024). Data collection involved interviews with children and parents as well as children's forest drawings. The children were asked about their drawings and their responses were carefully recorded. The parents answered the open-ended questions. The drawings and interview transcripts were organised systematically for analysis. The citations, references, and in-line citations remained unchanged, with numbers in the text unaltered. The analysis was conducted in British English, strictly adhering to spelling, terms, and phrases.

This study employs the inductive method of Corbin and Strauss (2015), which involves data coding. The researchers analysed children's interpretations of forest pictures and parents' comments and categorised them into themes. Initially, they examined the interview transcripts and children's drawings (Gillett-Swan, 2018) before recording explanations of their pictures. The coded data were then analysed to identify the categories and themes, highlighting common patterns. The results are displayed in tables, with frequencies to show the significance of each theme and category. We associated the

TABLE 1 Demographic characteristics of the participants.

Code	Gender	Parents' gender	Parents' Job	Parental education level	Socio-economic level
C1	Female	Female	Tourist operator	High school	Upper
C2	Female	Female	Tourist operator	High school	Upper
C3	Male	Male	Contractor	High school	Upper
C4	Female	Male	Hairdresser	Associate degree	Upper
C5	Female	Female	Tourist operator	High school	Upper
C6	Male	Female	Tourist operator	High school	Upper
C7	Male	Female	Pastry shop operator	High school	Upper
C8	Female	Female	Tourism operator	Bachelor	Upper
C9	Female	Female	Market worker	Primary school	Lower
C10	Female	Female	Teacher	Bachelor	Upper
C11	Female	Female	Civil engineer	Bachelor	Upper
C12	Female	Female	Hairdresser worker	Middle school	Lower
C13	Female	Male	Tourist operator	High school	Upper
C14	Male	Male	Market operator	High school	Upper
C15	Male	Male	Tourist operator	High school	Upper
C16	Male	Female	Teacher	Bachelor	Upper
C17	Male	Female	Optician	Associate degree	Upper
C18	Male	Female	Tourist operator	Bachelor	Upper
C19	Female	Female	Pastry shop operator	High school	Upper
C20	Female	Female	Tourist operator	High school	Upper
C21	Female	Female	Tourism worker	Primary school	Lower
C22	Male	Female	Agricultural worker	High school	Lower
C23	Male	Female	Tourism worker	High school	Lower
C24	Female	Female	Hairdresser	Associate degree	Upper
C25	Male	Female	Agricultural worker	Primary school	Lower
C26	Female	Female	Retired	Primary school	Lower
C27	Male	Female	Tourism worker	Middle school	Lower
C28	Female	Female	Agricultural worker	Primary school	Lower
C29	Male	Female	Agricultural worker	Primary school	Lower
C30	Male	Female	market worker	Middle school	Lower
C31	Female	Female	Agricultural worker	Primary school	Lower
C32	Male	Female	Agricultural worker	Middle school	Lower
C33	Male	Female	Teacher	Bachelor	Upper
C34	Female	Female	Agricultural worker	Primary school	Lower
C35	Female	Female	Tourism worker	High school	Lower
C36	Male	Female	Tourism worker	High school	Lower
C37	Female	Female	Agricultural worker	Primary school	Lower
C38	Female	Female	Hairdresser	Associate degree	Upper
C39	Male	Female	Tourism worker	High school	Lower
C40	Female	Female	Agricultural worker	Middle school	Lower

perceptions of parents and their children with selected questions related to the theme of clean forest transformation.

Parent interviews were recorded and responses to open-ended questions and comments on drawings were coded to identify emerging

themes. These data are also presented in frequency tables. Two researchers compared the data and revised the analysis methods after resolving discrepancies. Conflicting data were reanalysed and coding criteria were reviewed for clarity and consistency (O'Connor and Joffe,

2020). Alphanumeric codes were used to organise the data for the children (C1, C2, etc.) and their parents (P1, P2, etc.). While alphabetic codes (C/P) indicate Children and Parents, the numbers indicate that children and parents are from the same household. The data analysis was thorough and discrepancies were addressed to ensure accuracy and reliability.

3 Results

This study evaluated the perspectives of five- to six-year-old preschool children and their parents regarding forest pollution and personal hygiene. The findings obtained from the research data are as follows:

3.1 Theme 1.1. Children's conception of clean forest

To gather students' perspectives on a clean forest, the question "What is a clean forest?" was posed. Analysis revealed that twenty-two students emphasised avoiding litter, nine highlighted human maintenance, three mentioned water for cleaning, three noted the presence of animals, 2 stressed the importance of water in the forest, and 1 cited the role of chickens in maintaining cleanliness. The identified themes, sub-themes, and quotations are organised in the [Table 2](#).

This information provides valuable insights into how 5-6-year-old children perceive clean forests, which is crucial for assessing their environmental awareness. Analytically, the absence of garbage was a significant factor in their understanding of the cleanliness. Statements such as "Because there is no garbage, people throw their garbage in the garbage bin" (C17) and "Because dirty things are not thrown away" (C13) show that children primarily associate cleanliness with waste management. This indicates that they believe that a clean environment can be achieved through effective waste management.

Children emphasise the role of individuals in the cleaning process. Phrases like "Garbage was collected, the child cleaned it up" (C20) and "Children cleaned the forest, they collected the garbage" (C26) show that children believe cleanliness results from human effort and recognize the importance of proactive measures. This is a crucial stage in the development of children's environmental responsibility.

Children also highly value the cleaning capabilities of water. Statements such as "It was washed with water" (C14) and "Because it was cleaned with water" (C29) suggest that water is essential for cleanliness and that natural water resources are critical for maintaining hygiene.

The children state that animals live in clean forests. Statements such as "Animals feed in the forest" (C10) and "In a clean forest there are lions and tigers" (C22) indicate that children believe that clean forests should be healthy enough to accommodate a variety of animals. This indicates that children have a basic understanding of the ecosystem balance and biodiversity.

Water significantly influences children's perception of clean forests, as seen in comments such as "The trees are green, the air is good, there is water" (C2) and "There are blue waters" (C6), linking water resources to forest health. Children's observations and creativity are also evident, exemplified by the comment

"Chickens clean the forest' (C36), demonstrating their innovative thinking about environmental issues. Key themes shaping 5- to 6-year olds' views on clean forests include waste management, human actions, water, animals, and creativity. They see waste management and human actions as crucial for cleanliness, view water as vital, and recognise the importance of animals in clean forests.

The educational background and socioeconomic status of the parents were influential factors in shaping their children's environmental perspectives. While the offspring of more highly educated parents tended to possess a more comprehensive understanding of environmental issues, there were distinctions based on socioeconomic status. Children from more affluent backgrounds often prioritise environmental conservation (C1, C3, C7, C11, C13, C17, C18, C19, C20), whereas those from less privileged backgrounds typically focus on practical cleaning approaches (C22, C29, C36, C37, C40).

3.2 Theme 1.2. Parents' conception of clean forest

To ascertain parental perspectives on the concept of clean forests, the question "What constitutes a clean forest?" was posed. Evaluation of responses revealed that 13 parents attributed it to the absence of pollution, 7 parents emphasised the importance of conscientious individuals, 7 parents associated it with refraining from littering, 7 parents highlighted cleaning efforts by people, 2 parents considered forests as inherently natural environments, and 2 parents pointed to effective protection. [Table 3](#) lists the identified themes, subthemes, and representative quotes.

Parental perspectives on clean forests are crucial for understanding children's environmental consciousness and family attitudes towards conservation. This analysis was based on the following parental comments.

Parents highlight that clean forests depend on environmental awareness, as shown by remarks like "Our forests are always clean when we have conscious parents" (P7) and "It is clean when we use the forest consciously and take away the garbage we collect after our trips" (P17). These comments demonstrated the role of environmental awareness and education in maintaining forest cleanliness. Therefore, fostering environmental awareness among children and stressing individual responsibility are essential for preserving pristine forests.

Parents often stress the importance of avoiding litter and keeping forests clean. Statements such as "The forest remains unspoiled because individuals who picnic do not leave any refuse in the environment" (P3) and "It remains pristine because no rubbish is discarded" (P23) highlight how effective waste management and regular cleaning contribute to forest health. They emphasised that teaching children proper waste management is essential for maintaining clean forests.

Parents emphasise preventing pollution and urging individuals to not desecrate their environment. Statements such as "If people do not pollute" (P4) and "Should the forest remain pristine, people will keep the environment immaculate" (P30) highlight the link between human actions and forest cleanliness, showing how parents' views of pristine forests are influenced by human behavior.

TABLE 2 Students' views on the clean forest concept.

Theme	Sub theme	Sample comments
Clean forest	No littering (C3, C4, C5, C7, C8, C9, C11, C12, C13, C15, C16, C17, C19, C23, C24, C25, C27, C28, C32, C33, C34, C39)	No garbage dumped. Having water (c3).
		There is no garbage. The forest is green, there are flowers (c7).
		Because there is no rubbish (c11).
		Because dirty things are not thrown away (c13).
		Because there is no garbage, people have thrown their garbage in the garbage bin (c17).
		Because dirty things are not thrown away (c19).
		Because clean forest is particularly good. it protects us from diseases. the sun shines, the rains come, the trees grow. it is clean if people do not pollute it (c25).
		It will be clean if people do not litter (c34).
	Human cleanup (C1, C18, C20, C21, C26, C30, C31, C35, C38)	Because it has kept clean (c1).
		Because they are clean. because their leaves, their mud, their trees are clean (c18).
		Because the garbage was collected, the child cleaned it up (c20).
		We will pick up the garbage, it will be clean (c21).
		Because the children made the forest clean. They picked up the garbage with their hands and threw it in the trash (c26).
		Because we clean forests, we do not pollute them. If we pollute the forest, we cannot enter the forest. We cannot have a picnic. And the animals go to other countries (c30).
		Because a clean forest is clean (c31).
		Because there is no garbage (c35).
	Water washing (C14, C29, C37)	Washed with water (c14).
		Because it is cleaned with water (c29).
		Because they washed it. they washed it with water from the stream (c37).
	Presence of animals (C10, C22, C40)	Because animals feed in the forest (c10).
		Because in a clean forest there is a lion, there is a tiger, there is a river (c22).
		Because animals live in it (c40).
	Cleaning by chickens (C36)	Chickens clean the forest (c36).
	Water availability (C2, C6)	They have water, the trees are green, the weather is good (c2).
		Because it is a pink storm. because there's sun there are blue waters (c6).

TABLE 3 Parents' views on the perception of clean forests.

Theme	Sub theme	Sample comments
Clean forest	People being conscious (P1, P7, P13, P17, P19, P32, P36, P39)	When we have conscious parents, our forests are always clean. Trees are not cut, and garbage is not thrown on the ground (P7).
		We can have a clean forest because our people consciously benefit from the forest and leave the forest clean by taking the garbage they collect after their trips (P17).
		Forest cleanliness reflects people's care (P32).
		People take good care of forests. Using the air cleanly, not burning fire in the forest, not throwing garbage (P36).
		Because we are careful about keeping our environment clean (P38).
	No littering (P3, P23, P27, P28, P31, P37, P39)	Oxygen-rich. The forest has remained clean because people who visit the forest for picnics do not throw waste into the environment (P3).
		It is clean because we do not throw garbage on the ground (P23).
		Because people do not throw garbage because cars do not drive in the forest (P31).
		Because it is used cleanly, because garbage is not thrown on the ground, because of the beauty of nature, garbage should not be thrown on the ground (P39).
	Cleaning by humans (P2, P5, P8, P15, P26, P32, P33)	People use forests regularly and cleanly (P2).
		The environment is clean, garbage is collected (P8).
		The cleanliness of forests depends on the people. The cleaner people keep the forests and the cleaner they stay (P32).
	Not to be polluted by humans (P4, P10, P12, P18, P20, P21, P22, P24, P29, P30, P34, P35, P40)	Because people do not pollute (P4).
		It is clean because garbage is not thrown on the ground, and people keep it clean (P18).
		Because people do not pollute (P22).
		It stays clean if people keep it clean. It depends on people. If people keep their surroundings clean when they go on picnics, forests will remain clean (P30).
	Being natural environment (P5, P9)	Trees, everything being natural, agricultural areas, plenty of water (P5).
		Because there is greenery, flowers and trees (P9).
	People do not visit the forest (P11, P16)	Forests that are less frequent by people are cleaner. Fewer people causing harm means that the forest remains clean (P11).
		Places that people cannot reach stay clean (P16).
Good Forest Conservation (P14, P25)	Because it is well protected (P14).	
	It is clean because everyone pays attention and follows the rules (P25).	

The parents stressed the importance of preserving the forests in their natural state. Remarks such as “Natural vegetation, an abundance of water” (P5) and “Greenery, blossoms, and trees” (P9) underscore the role of natural elements in the perception of clean forests, which is crucial in shaping this notion.

Parents generally prefer forests with minimal human activity as they are cleaner. Statements like “Places with fewer inhabitants are more pristine” (P16) and “Less human disruption keeps the forest pristine” (P11) illustrate the adverse impact of human presence on forest cleanliness, stressing the need to reduce human influence. Additionally, parents emphasise the role of effective protection measures in maintaining forest cleanliness. Remarks such as “Because it is well protected” (P14) and “It stays clean if everyone pays attention and follows the rules” (P25) highlight the importance of robust protection strategies.

3.3 Theme 2.1. Children’s conception of dirty forest

This study aimed to explore students’ perspectives on polluted forests by posing the question, “What is a polluted forest?” The analysis revealed that thirty-four students attributed forest pollution to littering, one to sewage disposal, one to fallen leaves and mud, one to monsters, one to witches, and one to water scarcity. The findings and relevant quotations are summarised in [Table 4](#).

Understanding 5- to 6-year olds’ on polluted forests is essential for understanding their awareness of environmental pollution and forest health. These children often express environmental issues and clean-up actions in a simple and concrete manner. Research on children’s perceptions of polluted forests has shown the following.

Children usually identify littering as a primary cause of forest pollution. For instance, statements like “Garbage was thrown away and the trees dried up” (C16) and “People throw garbage while having picnics and the forest gets polluted” (C24) reveal that children associate forest pollution with the act of littering. They see garbage as a direct source of pollution, which leads to the drying of trees.

The statement “The water is dirty because the trees have dried up” (C2) suggests that children believe water pollution is linked to the condition of forest trees, indicating that they see water pollution as affecting the forest’s health. Similarly, “The manhole pipe flowed into the forest” (C6) implies that children recognise sewage systems as pollution sources, showing their understanding of various pollution origins. Additionally, comments like “Rain made the dirt, water made the mud” (C18) reflect children’s basic grasp of the impact of natural phenomena on forest pollution, viewing rain and mud as natural pollution causes.

Children often attribute magical or imaginary aspects to pollution, as seen in statements like “Monsters poison the trees” (C23) and “Witches pollute the forest” (C31). This suggests that they use creative explanations to understand environmental issues and extend their imaginations beyond real pollution sources. Furthermore, the observation “There is no water, so they could not clean it’ (C37) highlights the impact of water scarcity on forest cleanliness. Children recognise the role of water in maintaining cleanliness and acknowledge that its scarcity can lead to pollution.

Children’s understanding of polluted forests primarily arises from direct observation. They usually identify garbage dumping as

TABLE 4 Children’s views on the dirty forest.

Theme	Sub theme	Sample comments
Cause of pollution	For littering (C1, C3, C4, C5, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C19, C20, C21, C22, C24, C25, C26, C27, C28, C29, C30, C32, C33, C34, C35, C36, C38, C39, C40)	Garbage was thrown away. The trees are dry. There are broken robots. The police car is in bad shape (C4).
		Garbage was thrown away, leaves fell from trees, because the garbage bin overturned. Pet bottles were thrown away (C8).
		Because we throw away garbage, because the tree dries up (C16).
		Because when people have picnics, they throw garbage on the ground and the forest becomes polluted (C24).
	Because the water is polluted (C2)	Because everyone (children, adults, brothers, sisters) throw garbage. For example, they throw chips and cola garbage (C32).
		Because they throw garbage in the forest (C38).
	Because of sewage (C6)	The water is polluted because the trees have dried up (C2).
		Sewer pipe flowed into the forest. There are harmful flower seeds (C6).
	Leaves and muds (C18)	Because it was not cleaned. The rain has made it dirty. The water made mud. It is dirty because its leaves fall to the ground (C18).
		Monsters poison the trees. They have something like water and pour it into the forest (C23).
Witches pollute (C31)	Because witches pollute. They throw mud, sand, garbage into the forest and pollute it (C31).	
	Because there is no water there, they could not wash it (C37).	

the main cause of forest pollution, demonstrating a clear understanding of environmental issues. They are also aware that water pollution and wastewater pipes are sources of pollution, which broadens their understanding. Additionally, they attributed pollution to natural phenomena, such as rain and mud, and imaginative elements, such as monsters and witches, indicating an attempt to comprehend environmental issues both realistically and imaginatively.

3.4 Theme 2.2. Parents' conception of dirty forest

To better understand parents' perspectives on polluted forests, the question "What is a polluted forest?" was posed. Analysis of the responses revealed that 14 parents attributed it to "people leaving waste in the forest," 10 cited "people being unconscious," 10 mentioned "picnickers leaving their garbage in the forest," 1 referenced "fossil fuels," 1 mentioned "fires," 3 highlighted "forests not being well protected," and one suggested that "the forest is dirty because of human density." The themes, sub-themes, and quotes are summarised in [Table 5](#).

Parents' perspectives on forest contamination offer insight into their children's ecological understanding and environmental awareness. The parents' statements highlight various subthemes that explain the causes of forest pollution. A scientific analysis of these perceptions showed that parents blame individuals for their lack of awareness and irresponsibility. For example, comments like "Forests are contaminated due to people's unintentional actions" (P29) and "Garbage is thrown into the forest, and the forest becomes polluted because people do not consider the environment" (P38) indicate that environmental pollution stems from personal irresponsibility and insufficient awareness. This underscores the need for individuals to recognise their environmental impact and heighten their environmental consciousness.

Parents often stress the importance of avoiding littering, especially during outdoor events, as this can lead to woodland contamination. Phrases such as "Litter left behind by picnickers can pollute the forest" (P2) and "Barbecue coals and alcohol bottles discarded in the forest contribute to pollution" (P23), highlighting the harmful effects of littering on the environment. Recognising the impact of social events on forest health is therefore essential.

Statements that link garbage to forest pollution emphasise the consequences of direct waste disposal in wooded areas. For example, "The environment becomes polluted as a result of garbage" (P3) and "Individuals throw their garbage into the forest after consuming their meals" (P21) underscore the need for effective waste management and the importance of considering waste's impact on forest health.

Industrial activities and infrastructure have led to increased pollution and decreased groundwater resources (reference P6), indicating that factories and fossil fuel use contribute significantly to forest pollution. Fires and waste are major pollutants (reference P9) that cause both physical damage and contamination. Statements such as "It is dirty because of protection" (reference P26) and "It is a bad smelling, neglected forest" (reference P27) highlight the consequences of inadequate forest protection. In addition, high human density exacerbates forest pollution (reference P16), underscoring the impact of human activity on forest ecosystems.

Parents' perceptions of polluted forests provide insights into several factors and their impact. They identified human behavior and environmental insensitivity as the primary causes of pollution, citing littering habits, unconscious use, and improper garbage management during social events such as picnics. Industrial activities, fossil fuels, and fires are the major contributors to the need for environmental management and conservation strategies. Poor forest protection and high human density exacerbate pollution, highlighting the need to maintain forest health.

Parents' perspectives on polluted woodlands are influenced by their educational attainment and socioeconomic status. Certain highly educated parents provide more comprehensive explanations of ecological issues (P1, P2, P3, P6, P7, P13, P16, P38), resulting in their children developing a more nuanced understanding (C1, C3, C7, C13, C38). Conversely, a family's economic and social positions shape how its offspring conceptualise pollution. Children from more affluent backgrounds tend to offer more detailed and environmentally relevant justifications, whereas those from less privileged backgrounds often present simpler and more imaginative explanations (C22, C23, C31, C36, C37).

3.5 Theme 3.1. Children's conception of transforming a dirty forest into a clean forest

To understand students' perspectives on transforming a dirty forest into a clean one, the question "How can a dirty forest be transformed into a clean forest?" was asked. The analysis revealed that 18 students advocated for "collecting garbage and cleaning the forest," 16 students emphasized "not throwing garbage in the forest," 2 students recommended "placing garbage bins in the forest," 2 students suggested "doing hocus pocus," 1 student proposed "using potions," and 1 student believed "washing with water" would suffice. The [Table 6](#) presents the themes, subthemes, and the corresponding quotes.

The perspectives of 5-6-year-olds on transforming a polluted forest into a clean one reveal their understanding of environmental problem solving and nature conservation. This age group typically offers simple, concrete solutions but can also generate imaginative ideas. A scientific analysis of children's views on cleaning up polluted forests showed the following.

Children believe that the simplest way to clean a polluted forest is to pick up litter and clean an area. Statements like "Let us clean up the garbage and plant trees" (C28) and "Let us put the garbage in the bin and plant trees" (C34) illustrate that they view cleaning up and planting trees as essential for restoring the forest. This indicates that children prioritise practical and direct methods for addressing environmental problems.

Children also emphasise the importance of proper garbage disposal in preserving forests. Comments such as "Let us put the garbage in the recycling bin" (C30) and "Let us not throw our garbage on the ground during picnics, let us put it in the bin" (C36) show that they understand the significance of proper garbage disposal habits and efficient waste management. This suggests that children recognise the importance of cleaning and waste management practices in enhancing their environmental awareness.

TABLE 5 Parents' views on the dirty forest.

Theme	Sub theme	Sample comments
Dirty forest	Unconscious people (P1, P5, P7, P10, P11, P12, P19, P24, P29, P38)	Climate change from unconscious, bad people, because of the coal we burn (P1).
		If trees are cut down unconsciously, if garbage is thrown on the ground every time there is a picnic, if fires are not extinguished, our forests will be dirty and bad looking (P7).
		Because of people's unconscious use. Forests get polluted from this. We should respect the environment and the living things there and keep our forests clean. The forest gets polluted because unnecessary waste and garbage are thrown away (P29).
		It is dirty. Because we throw our garbage on the ground, we are careless. We leave it dirty because we do not think about the people living in the forest (P38).
	Picnickers littering (P2, P4, P13, P18, P23, P30, P31, P33, P37, P39)	People throwing garbage, picnickers leaving garbage in areas where picnics are forbidden (P2).
		Forest pollution is caused entirely by humans. Plastic garbage thrown away; garbage left after picnics (P13).
		Because garbage is thrown away, the coals from barbecues are thrown on the ground. There are liquor bottles on the ground, polluting the forest (P23).
		If we do not pick up our garbage when we go to barbecue and leave it on the ground, the forest will be polluted (P39).
	Due to waste (P3, P8, P15, P17, P20, P21, P22, P25, P28, P32, P34, P35, P36, P40)	The environment is polluted due to waste dumping (P3).
		It is polluted because people do not pay attention to what they eat and drink and throw it on the ground and cut down our trees (P21).
		It is polluted because people use it unbalanced and throw the food they eat and drink on the ground (P32).
	Fossil fuels (P6)	Big factories and buildings, people's filth, lack of rain when pollution increases, high nitrogen content in the air, decrease in ground water (P6).
	Fires (P9)	Fires and garbage pollute (P9).
	Unprotected (P14, P26, P27)	It is dirty due to lack of care and attention. Because people do not keep it clean and do not pay attention (P26).
A dirty forest is a place that is neglected, smells bad, where there are no people or animals, and the trees are unhappy (P27).		
Human density (P16)	The forest where people are concentrated is polluted (P16).	

Children have proposed placing rubbish bins to maintain forest cleanliness, as indicated by remarks like “Let us put bins, collect rubbish” (C7) and “Putting bins, collecting rubbish” (C8). These suggestions reflect the understanding of how social and environmental regulations affect cleanliness. Additionally, children’s creative solutions, such as “Let us do hocus pocus, let us clean the forest” (C22) and “Let us clean it with potion, the forest will be beautiful” (C23), show their imaginative approach to problem-solving. Furthermore, comments like “We should wash the forest” (C37) reveal their awareness of water’s role in cleaning and environmental protection.

Children’s perspectives on forest cleanup provide crucial insights into fostering environmental consciousness and teaching nature conservation techniques. Three main aspects emerge from their input: (1) Kids view waste collection and management as key methods to clean up polluted forests, emphasising the importance of foundational education in environmental hygiene and sustainability. (2) Children’s imaginative solutions demonstrate the role of creativity in addressing ecological issues, offering a fun and effective approach for elevating environmental awareness. (3) The idea of using water for cleaning highlights the children’s understanding of the role of water in cleaning and its incorporation into environmental preservation strategies.

Tables 1, 6 indicate that parental education and socioeconomic status may impact children’s creativity and the proposed strategies for rehabilitating polluted forests. Offspring of highly educated parents tend to suggest more practical and comprehensive restoration methods, whereas those with less formally educated parents often present more innovative solutions (C5-P5, C7-P7, C8-P8).

3.6 Theme 3.2. Parents’ conception of transforming a dirty forest into a clean forest

To evaluate parents’ perspectives on transforming a polluted forest into a pristine one, the question ‘How may a polluted forest be transformed into a clean forest?’ was asked. Responses revealed that 18 parents believed ‘promoting public awareness’ was the solution, 8 parents suggested ‘organizing garbage collection activities,’ 6 parents recommended ‘collecting litter from picnickers,’ 4 parents proposed ‘regularly cleaning the forests,’ 3 parents advocated for ‘restricting public access to forest areas,’ and 1 parent mentioned ‘tending to the trees.’ The Table 7 presents the findings, including the themes, subthemes, and relevant quotations.

Parents of 5-6-year-olds provide valuable insights into transforming a polluted forest, suggesting practical strategies for environmental protection and public awareness enhancement. They emphasise fostering environmental education and awareness, recommending initiatives such as launching campaigns, and organising workshops involving parents, educators, and local authorities (P1, P7). This approach underscores the need to educate both children and the public on environmental issues and the impact of individual actions on forest cleanups. Parents advocated increasing environmental education and publicity in schools and public places (P11), indicating that public awareness and educational programs are vital for addressing environmental challenges. By educating and informing the public, individuals can better fulfil their environmental responsibilities. Additionally, parents proposed organising rubbish collection and cleaning activities (P4, P5, and P9), enabling active

TABLE 6 Children’s views on the transformation of dirty forest into clean forest.

Theme	Sub theme	Sample comments
Transformation methods	Garbage collection and cleaning (C2, C4, C6, C9, C10, C12, C13, C15, C17, C18, C24, C28, C31, C32, C33, C34, C38, C40)	Let us clean. Let us sweep. We grow beautiful apples. We plant beautiful trees. Then the air and the sun will come (C4). Garbage is cleaned, when the forest is closed, people cannot enter. If people do not throw garbage on the ground, it will be clean (C15). We clean up. We throw garbage in the garbage bin. We plant trees (C28).
	No littering (C1, C3, C5, C11, C14, C16, C19, C20, C2, C25, C26, C27, C29, C30, C36, C39)	By throwing garbage in the trash. By placing the animals. We will collect dirty toys in the forest and clean them. Clean the trees and plant trees (C5). We should not litter. We should collect the garbage. We should wash the forest with a hose (C14).
	Put garbage bin (C7, C8)	We throw garbage into recycling bins. Garbage that is recycled turns into new things (C30). When we go on a picnic, we should not throw our garbage on the ground, we should throw it in garbage bins (C36). We put a garbage bin. We collect the garbage (C7).
	Do hocus pocus (C22, C35)	By collecting garbage, planting trees and flowers, putting garbage bins (C8). We hocus pocus and transform them (C22).
	Transform with potion (C23)	We can do hocus pocus. We clean it with water. We wash it with a hose (C35). We transform it with a potion. We pour the potion into the forest. The forest will be beautiful (C23).
	Wash (C37)	It needs to be washed (C37).

TABLE 7 Parents' views on the transformation of dirty forest into clean forest.

Theme	Sub theme	Sample comments
Transformation methods	Raising awareness (P1, P3, P6, P7, P10, P11, P16, P17, P18, P19, P21, P26, P27, P28, P35, P36, P37, P38)	Our people also need to be conscious and clean. Our forests are important for us. Forests are our source of oxygen. Projects should be organized for people to be conscious, and we should inform people (P1).
		The most prominent issue starts with parents. It starts with the way we educate children. If we raise a vicious, irresponsible, unconscious child; if we do not give information about our world, our environment, our mountains, our forests, our children throw garbage on the ground and pollute the forests. They break the branches of trees and pollute nature. Municipalities can organize events and seminars on this subject. Schools can teach lessons on this subject. Our guidance teachers can make our children aware of this issue. Watchtowers can be increased in our forests. Inspections can be carried out in picnic areas and coastal areas (P7).
		To make people more aware. Such as providing compulsory trainings in schools and out of school, creating public service announcements everywhere. We also have our own duties. Such as taking a bag and collecting the waste in the forests we visit, driving less, educating our children in the family environment first. Preferring public transportation (P11).
		First, people should pay attention and act more consciously in the forest. Trees should be protected and plenty of saplings should be planted (P21).
	Picknickers collecting garbage (P2, P24, P31, P33, P34, P40)	It can be kept clean. When we go on a picnic, we should not throw our garbage on the ground (P24).
		People can clean up together. They plant trees while collecting garbage. Since they go to the forest and have a picnic, they should not leave their garbage in the forest (P33).
	Garbage collection activities (P4, P5, P8, P9, P14, P20, P39)	Forest trips can be organized, and garbage collection activities can be carried out, and if conscious and educated children are raised, this pollution will not happen (P5).
		It needs to be cleaned; garbage needs to be collected (P9).
		We should clean up voluntarily. We should pick it up and throw it where it needs to be thrown away (P20).
	Restricting access to forest (P13, P30, P32)	There should be deterrent penalties. People should be allowed to enter certain parts of forests. Such measures can be taken (P13).
		If people work together and collect garbage, they can turn a dirty forest into a clean forest (P30).
		New saplings can be planted. They can be protected from people (P32).
	Clearing forests (P22, P23, P25, P29)	There should be garbage bins in forests. When we collect the garbage in the forest, it will be clean (P23).
		Municipalities need to clean up. People should be a little more sensitive and not pollute the forest (P29).
Tree care (P15)	Tree maintenance, garbage collection (P15).	

participation from both children and adults. These events provided practical solutions and promoted social engagement.

Picnickers should maintain forest cleanliness by collecting waste, promoting individual environmental responsibility, and fostering community-wide cleanliness habits (P24, P33). Additionally, restricting access to certain forest areas and imposing penalties are advised (P13, P30) to protect forests and prevent their misuse. These measures, including access limitations and inspections, should be included in the environmental protection initiatives.

Moreover, removing debris and planting new saplings while preserving existing trees are recommended (P15). This involves clearing the forest floor, taking steps to rejuvenate it, and ensuring long-term sustainability of the forest ecosystem. Appropriate tree care is essential to the health of forest ecosystems.

Finally, the placement of rubbish bins and conducting cleaning activities by municipality were suggested (P22, P23). These practical measures ensure that forests are routinely cleaned, and litter management is improved. Municipalities play a crucial role in maintaining public spaces.

Parents' ideas on forest clean-up and preservation include: (1) Environmental Education and Awareness: Enhancing environmental awareness and implementing educational programs are crucial for long-term solutions (P1, P7, P11). (2) Community Involvement and Litter Pick-up: Encouraging community participation through organised clean-up events (P5, P9, P20). (3) Monitoring and Restrictions: Limiting access and conducting inspections to protect forests and minimise misuse (P13, P30, and P32). (4) Tree Care and Rejuvenation: Preserving existing trees, planting new saplings, and providing appropriate care (P15).

The environmental clean-up and restoration strategies proposed by certain children were influenced by their parents' educational attainment and socioeconomic status. Highly educated parents tended to offer more systematic and knowledge-oriented solutions, while those with less educated parents often suggested more rudimentary and innovative approaches. Similarly, children from more affluent backgrounds presented more comprehensive and integrated proposals, whereas those from less-privileged backgrounds developed more pragmatic and task-oriented recommendations.

3.7 Theme 4. Comparative findings

According to both the children and parents, human intervention affects forest cleanliness. Children believe that forests remain clean because of the absence of litter or pollution, while parents assert that forests are clean only if humans avoid polluting them. Both groups recognised the human impact of forest clearing. They also acknowledge natural disasters such as wind, rain, and snow as sources of forest pollution. Children often attribute pollution to supernatural causes, whereas parents cite it as chemical waste, fossil fuels, hunters, and miners. Children tend to use supernatural explanations such as hocus pocus and potions, whereas parents rely on scientific reasons.

Children often view forests as being affected by the presence of water, whereas parents attribute forest degradation to pollution from chemical waste and fossil fuels. This indicates that children's understanding of environmental processes is based on simpler concepts, rather than observations. Parents believe that forests can remain clean with protection or become polluted because of human

activities, a perspective that is not shared by children. Children's views focused on natural forest characteristics and specific situations, whereas parents offered systematic thoughts about conservation.

Individuals with higher education levels, including parents and children, tend to develop complex and conscious perceptions of forest cleanliness (P1, P3, P6, P7, P10, P13, P16, P17, P18, P19, P35, P36, P38). While children consider abstract ideas such as supernatural powers and fossil fuels (C8, C17, C23, C33), parents emphasise awareness and protective measures (P1, P3, P6, P7, P10, P11, P13, P16, P17, P18, P19, P35, P36, P38). Conversely, those with lower education levels focus on tangible factors such as garbage and natural disasters (C9, C12, C25, C34; P9, P26, P28). People from higher socioeconomic backgrounds link forest cleanliness to conscious behaviors and conservation (P1, P3, P6, P7, P10, P11, P14, P16, P17, P18, P19, P38, P39) whereas those from lower backgrounds associate it with pollution factors (P12, P27, P35).

Additionally, the children's perceptions were influenced by their parents' educational level and socioeconomic status. The children of highly educated parents often exhibit a broader understanding of environmental education (C3, C5, C7, C11, C13, C15, C16, C17, C19, C23, C24, C33, C39). Similarly, children from affluent families tend to have more practical perspectives on environmental conservation (C2, C4, C6, C10, C13, C15, C17, C18, C24, C33, C38). By contrast, children from lower socioeconomic backgrounds typically show a narrower understanding of environmental education, concentrating mainly on practical cleaning methods (C22, C37).

Children and adults share similar and differing views on forest cleanliness, respectively. Both recognise the human impact on deforestation, but children often blame supernatural forces and natural processes, while adults emphasise scientific factors. These differences stem from their varying developmental stages and life experiences in terms of their understanding of environmental issues.

Table 8 demonstrates a significant alignment between children's and parents' views on clean forests, especially within the same household. This is illustrated by the consistent perspectives on specific themes and issues seen in parent-child pairs, such as C11 and P11. These results indicate that children and parents hold similar opinions on environmental topics or that family interactions shape their perceptions.

The observed similarities suggest that household discussions and education shaped the environmental views of both children and parents. The research found that shared viewpoints were primarily among family members living together, indicating that shared experiences and knowledge within the family significantly influence environmental perceptions.

4 Discussion

This study offers key insights into young children's and parents' views on forest cleanliness and pollution, highlighting the notable differences between their cognitive and experiential perspectives.

4.1 Understanding of Forest cleanliness among preschool children

Research shows that preschool-aged children, particularly those aged five and six, equate a clean forest to the absence of visible rubbish

TABLE 8 Comparative findings on children's and parents' perception of clean forests.

Grouping themes	Specific question/theme		Parents—children
	Children's perception	Parent's perception	
People	People do not throw garbage	People's level of consciousness	C3*, C4, C5, C7*, C9, C11*, C12, C13*, C15, C16*, C17*, C19*, C23, C24, C25, C27*, C28*, C32, C33, C34, C39; P1, P3*, P6, P7*, P10, P11*, P13*, P16*, P17*, P18, P19*, P21, P26, P27*, P28*, P35, P36, P37, P38, P40 *: The numbers show that children and parents are from the same household
Natural disasters	Natural disasters	Natural disasters	C3*, C16, C18*, C20*; P2, P3*, P7, P9, P14, P15, P17, P18*, P19, P20*, P26, P28, P33
Supernatural forces and human activity	Witches and monsters	Human intervention	C23, C31, C33*; P2, P3, P5, P8, P15, P17, P20, P21, P22, P25, P26, P28, P32, P33*, P34, P35, P36, P40
Pristine natural environment	Clean air and green environment	Natural environment	C2, C6*; P6*, P11, P9, P16
Fossil fuel use	Gases released from oil and factory chimneys	Fossil fuels and air pollution	C8, C17; P6, P35
Animals	Effects of animals on cleanliness and pollution	–	C10, C22, C23, C24, C36, C40
Water	Water clears the forest	–	C2, C14, C29, C37
Maintenance and protection of forests	Showing interest in forests	Maintenance and protection of forests	C1, C3, C5, C7, C8, C10, C11*, C14*, C16*, C19, C20, C21, C25*, C26*, C27*, C29*, C30*, C36, C39*; P11*, P14*, P16*, P25*, P26*, P27*, P29*, P30*, P39*
Chemical waste	–	Chemical waste	P8, P10, P12, P27
Mining operations	–	Mining operations	P38

(Ober, 2019). Their remarks, such as “Because there is no rubbish” (Table 2; C11) and “Because dirty things are not thrown away,” (Table 2; C19) reflect this understanding, linking cleanliness to waste management. This perception indicates that young children primarily view cleanliness through the visible waste.

Additionally, children recognise human involvement in forest clean-up, as seen in statements like “Because the garbage was collected, the child cleaned it up” (Table 2, C20) and “Because the children made the forest clean. They picked up the garbage with their hands and threw it in the trash” (Table 2, C26), indicating a growing sense of environmental responsibility where they view themselves and others as active participants in maintaining cleanliness (Sedawi et al., 2020). Say et al. (2022) found that children in forest schools, where lessons are conducted in a forest environment, develop habits of working together using materials found in their natural surroundings, and that their tendency for collaboration increases. This result supports the views of preschool students regarding people cleaning up trash together or throwing it into trash bins during forest clean-ups.

Furthermore, children consider water a crucial element in forest cleaning, as responses such as “Washed with water” (Table 2; C14) and “Because it is cleaned with water.” (Table 2; C29). These findings concur with Postila (2022), who noted that preschool students acquired more concrete and realistic knowledge about the importance of water, its cleanliness, and its cleansing properties through various experimental practices. This insight can guide the creation of educational programmes that highlight the role of water conservation in environmental protection.

The importance of animals and water in forests is essential for shaping children's understanding of healthy environments. Statements like “Because in a clean forest there is a lion, there is a tiger, there is a river” (Table 2; C22) reflect their perception of a thriving ecosystem and biodiversity's role. While some children's ideas, such as “Chickens clean the forest” (Table 2; C36) and are imaginative but scientifically inaccurate, they underscore the need for problem-solving skills in education, alongside accurate scientific information. Tekerci et al. (2023) found that children aged 5–6 often have misconceptions about cloud formation, underscoring the need for precise scientific knowledge.

Some children attribute forest pollution to unrealistic scenarios, such as monsters or magic, influenced by cartoons and their imagined worlds. To foster positive forest perceptions, adult education is crucial. Habib and Soliman (2015) noted that cartoons impact children's mental responses and behaviors both positively and negatively. Ada and Erdaş Kartal (2019, p. 325) found that 80% of girls and 91% of boys view cartoon characters as role models for environmental sustainability, indicating cartoons' influence on children's behavior. Thus, creating and promoting cartoons that advocate forest conservation and cleanliness can positively shape children's views of forests.

4.2 Perspectives of parents on forest cleanliness

Parents' attitudes and beliefs about forest cleanliness mirror those of their children, highlighting the significance of environmental

awareness and responsible behavior in maintaining pristine forests. Many parents believe that conscious actions result in well-maintained forests, as shown by statements such as “People take good care of forests. Using the air cleanly, not burning fire in the forest, not throwing garbage” (Table 3; P36) and “Forest cleanliness reflects people’s care,” (Table 3; P32) emphasising the need for environmental education and personal responsibility (Kahriman Pamuk, 2020).

Waste management is a common theme in parents’ responses, focusing on avoiding litter and regular cleaning, which aligns with children’s perceptions but also suggests a deeper understanding of forest conservation issues. Statements such as “It is clean because we do not throw garbage on the ground” (Table 3; P23) and “It remains clean if people keep it clean. It depends on people. If people keep their surroundings clean when they go on picnics, forests will remain clean (P30)” (Table 3; P30) underscores that lasting cleanliness requires continuous effort and responsible behavior. Parvatiyar and Sheth (2023) highlight the strong link between sustainable consumption and individual responsibility.

Parents recognise the importance of natural factors such as plant coverage and water supply in maintaining a clean forest. Comments such as “Trees, everything being natural” and “Plenty of water” (Table 3; P5) Plenty of water highlight the role of natural elements. This emphasises the need to understand the interplay between human activities and natural processes for environmental preservation. Furthermore, parents noted that forests with less human activity are generally cleaner, as seen in remarks like “Forests with less human traffic are cleaner.” This underscores how human actions affect forest cleanliness, and the necessity of managing human influence in conservation strategies. Birben et al. (2018) in Türkiye found that people factor mainly associate forests with trees, greenery, and picnics, which may explain the focus of children and parents on picnics in our study. Other studies have indicated a positive relationship between the frequency of forest visits and activities and forest conservation (Hägström, 2019; Darboe et al., 2023).

4.3 Comparative views and implications

Research has shown that children’s and parents’ perceptions of environmental issues differ in their understanding. Children typically focus on visible cleanliness aspects, such as rubbish and water, while parents take a broader view that includes behavioral and ecological factors. Thus, educational interventions should be age-specific and aligned with developmental stages. For example, preschoolers can benefit from learning basic concepts about waste management, the role of water, and the importance of animals in the ecosystem through interactive and hands-on activities such as cleanup projects and nature education to build a strong foundation for environmental awareness. Conversely, parents should be encouraged to understand the impact of their behaviors on environmental health and adopt broader conservation strategies, thereby playing a crucial role in maintaining a clean environment (Scheithauer et al., 2022; Garner and Yogman, 2021). In her 2021 study, Filiz emphasizes that individuals are influenced by the actions and lifestyles of other members living within the family, arguing that family members with significant first-degree closeness, such as mothers, fathers, or individuals themselves, can serve as role models throughout a person’s life, particularly in relation to the effects of television and TikTok on the Turkish family structure (Filiz, 2021). In our study, factors such as the family communication

of children and parents with mismatched perceptions of a clean forest, whether the parents are working families, the communication status of the parents with the child, and whether the child is cared for by a caregiver, among others, may have played a role (Ögel-Balaban and Altan, 2020).

Research indicates that socioeconomic factors and parental education significantly influence children’s environmental perceptions. Parents with higher education levels typically possess a more thorough understanding of environmental issues, while socioeconomic status affects the focus of conservation efforts. Children from affluent backgrounds and educated parents are more likely to have informed views on forest pollution, and broader environmental and systemic connections. Conversely, children from lower socioeconomic backgrounds and their parents tend to focus on immediate, observable issues, such as litter and natural disasters. Mónus (2022) supports this finding, finding that socioeconomic background, residence, and parental education impact environmental attitudes and behaviors in schools.

Wold et al. (2023, p. 13) discovered that Norwegian preschoolers’ views on wild animals and habitats are shaped by prior experiences, with parental engagement in early childhood fostering positive attitudes towards nature. However, Euser et al. (2021) noted a lack of consensus among researchers on the impact of parental education and guidance on children’s cognitive development.

In the United Kingdom, the educational system offers a preschool program for children aged 0–6, supporting cognitive, emotional, social, and physical development. This program caters to each child’s specific needs and developmental stages, which are typically provided in nurseries and kindergartens. The curriculum focuses on enhancing fundamental skills in areas such as cognitive development (problem solving, memory, attention, language), social and emotional development (social skills, emotional awareness, empathy), motor development (large and small muscle skills, hand-eye coordination), art and creativity (activities showcasing creativity and artistic skills), and physical education (physical activities and games promoting health and endurance). The Department of Education has established standards and guidelines based on research on child development and international standards. Programs are frequently revised based on pilot implementations, feedback, and educators’ input regarding their applicability and suitability for children’s needs [Ministry of National Education (MoNE), 2024]. In their study on forest schools in Turkey during the Covid-19 period, Say et al. (2022) emphasized that the pedagogy of forest schools, where students spend time immersed in nature and thus in forests, supports children’s decision-making and problem-solving processes as well as their exploration skills.

The preschool curriculum and environmental education aim to foster children’s appreciation of nature and instilling environmental responsibility. According to the Ministry of National Education (MoNE) (2024), this education is organised into three main areas: (1) Environmental Awareness, where children learn about plants and animals and the importance of environmental protection; (2) Sustainable Living, which covers eco-friendly behaviors such as recycling and energy conservation; and (3) Hands-on Experiences, encouraging activities such as nature walks, gardening, and observation. While Turkish preschool education aims to support holistic child development, environmental education is crucial for fostering early awareness and contributing to environmental sustainability. However, studies indicate that obstacles such as teacher quality, socioeconomic conditions, and family education levels hinder

the program's success (Bulut, 2020). This highlights the need for tailored educational programs and community initiatives that address these factors to meet diverse needs and perspectives effectively.

4.4 Implications for environmental education

This study highlights the importance of incorporating waste management, water conservation, and ecological balance into educational programs for children and parents. Raising awareness of these issues may enhance environmental stewardship and help to preserve healthy forest ecosystems. Studies show that frequent nature exposure during preschool years increases environmental responsibility, suggesting that regular nature-based experiences in early education foster a stronger connection to the natural world (Chawla, 2020; Savolainen, 2021). Further research is needed to explore how perceptions change with age and to identify effective educational strategies that balance creative and scientific understanding of environmental challenges. These developmental insights could improve methods for cultivating environmental consciousness from an early age.

This study explores the diverse views on forest cleanliness and contamination among children and their guardians, reflecting their developmental stages and ecological awareness. Parental environmental behavior significantly influences children's ecological perspectives. When parents actively engage in forest preservation and cleanliness, their children may adopt similar attitudes (Wong et al., 2019; Singh et al., 2020; Sarrasin et al., 2022; Guan and Geng, 2024). Parents' environmental habits and actions can enhance their children's ecological awareness and motivate them to emulate such behaviors (Zerinou et al., 2020; Harris, 2021). Activities like forest walks, environmental clean-up initiatives, or recycling efforts can reinforce children's understanding (Sageidet et al., 2019; Jia and Yu, 2021). Tailoring educational strategies to these perceptions can enhance environmental literacy, fostering responsible conservation practices. Future studies should examine long-term changes in environmental comprehension and evaluate the efficacy of educational programmes in promoting eco-friendly behaviors.

The study's sample was drawn exclusively from two pre-schools in a large city in southwestern Türkiye, one attended by children from affluent backgrounds and the other by children from low socioeconomic backgrounds. Conducted over one year, the study could not assess long-term effects. Its findings are relevant only to children aged 5–6 years and their parents and not to other age groups. Therefore, it is crucial to implement educational activities in forested areas and environmental education programmes for children. Schools, administrators, and teachers should inform children about forest and environmental protection and provide opportunities to apply this knowledge. Future research should examine environmental perceptions across various age groups and parents to enhance the program's effectiveness. Long-term studies can track changes in children's perceptions of the forests. These insights could help to develop strategies to strengthen children's connections to real-world experiences and nature. Educational and practical activities should increase the knowledge and awareness of forest cleanliness, and practices such as organic farming in school gardens should be encouraged. Children require opportunities to develop environmental knowledge and responsibilities through real-world activities in forests and natural settings.

5 Conclusion

This research evaluated the perspectives of 5–6-year-old children and their parents regarding woodland cleanliness. The findings revealed significant differences influenced by educational and socioeconomic background. Children's perceptions focused on visible litter, polluted water, and animal presence, often linking forest pollution to human actions, natural disasters, fossil fuel use, and occasionally imaginative elements such as monsters and magical spells, likely influenced by the media. Conversely, parents had a more complex view, attributing cleanliness to environmentally conscious behaviors and proper waste disposal. They stressed on effective waste management, limited visitor numbers, and conservation measures. Parents associated forest pollution with air pollution, chemical waste, hunting, and mining, reflecting a deeper understanding of environmental issues. Highly educated parents, such as university graduates and professionals, emphasised practical and systemic solutions such as raising awareness, organising litter collection, and restricting forest access. In contrast, parents with lower educational levels focused more on the immediate and observable aspects of cleanliness without as much emphasis on broader environmental policies. Socioeconomic status also influences perceptions and the proposed solutions. Parents from higher socioeconomic backgrounds generally offer more practical and informed conservation solutions, whereas those from lower socioeconomic backgrounds may be less aware of and propose fewer practical remedies. This trend also appears in their children: those from higher socioeconomic backgrounds suggest more realistic solutions, whereas those from lower socioeconomic backgrounds propose more imaginative and idealistic remedies. Regardless of educational or socioeconomic status, this study revealed a lack of comprehensive understanding of sustainable forest management practices among both children and parents. This highlights the need for targeted educational interventions to bridge knowledge gaps and promote practical understanding of forest conservation. Such actions could enhance environmental awareness and support the development and implementation of effective, actionable solutions for sustainable forest management, whilst encouraging responsible and sustainable tourism activities that benefit both the environment and local communities, while minimizing negative impacts.

Data availability statement

The original contributions presented in the study are included in the article/[Supplementary material](#), further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by Akdeniz University Social Sciences and Humanities Scientific Research and Publication Ethics Committee Document Date and Number: 23.11.2022-510608 Social and Human Sciences Scientific Research and Publication Ethics Board decision. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided

by the participants' legal guardians/next of kin. Written informed consent was obtained from the minor(s)' legal guardian/next of kin for the publication of any potentially identifiable images or data included in this article.

Author contributions

HiD: Writing – original draft, Formal analysis, Supervision, Methodology. AK: Writing – review & editing, Software, Visualization. SS: Conceptualization, Supervision, Writing – review & editing. HüD: Formal analysis, Supervision, Writing – review & editing. AM: Methodology, Visualization, Writing – review & editing. GG: Software, Writing – review & editing, Resources. MG: Resources, Supervision, Validation, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/ffgc.2024.1427353/full#supplementary-material>

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