Examining Our Current and Future Carbon Footprints through Student Drawings

Nurcan ÖZKAN[1]

[1]Prof. Dr., Trakya University, Education Faculty, Mathematics and Science Education Department, nurcanozkan@hotmail.com, ORCID: 0000-0001-5045-6186

Abstract: A footprint is the mark left by a person's foot on the ground. A carbon footprint, on the other hand, is the carbon footprint we leave behind in nature. The total carbon produced by all our activities, such as transportation, heating, and food and drink, as well as the products we produce and consume, constitutes our carbon footprint. A carbon footprint is a measure of an individual's personal contribution to global warming. Carbon footprint is the share of greenhouse gas emissions from an individual, organization, or product in the overall total. It encompasses the activities of all individuals, societies, governments, firms, organizations, processes, industrial sectors—in short, everyone. Every energy-consuming activity has a carbon cost. Sometimes this carbon cost is clearly visible, such as the exhaust fumes from our vehicles on the way to work. Sometimes, however, it is not so clear and distinct. The carbon footprint left behind is becoming increasingly important. Therefore, in this study, students studying in the Science Education Department of the Faculty of Education at Trakya University were asked to draw and explain their thoughts on the carbon footprint that humans leave and will leave on nature today and in the future. The students' opinions on what can be done as humans to reduce their carbon footprint were also examined. Based on the data obtained from the students, it was revealed that today, humans are damaging nature primarily through fossil fuels and the destruction of green areas, and that for the future, these damaged areas should be restored to create a more sustainable environment.

Key Words: Carbon Footprint, Global Warming, Humanity, the Present and the Future

1. INTRODUCTION

There is a very strong and essential bond between humanity and the Earth, which constitutes its living space. However, with the civilizations it has built and the progress it has made, humanity is weakening this bond, reinforcing the idea of its superior species that it owns the planet, in line with an anthropocentric mindset. Humanity, a supposedly superior and modern society, forgets that the existence of the resources it uses depends on the planet's continued existence. Overwhelmed by consumption, exploiting resources as it pleases, and viewing the concept of sustainability primarily from an economic perspective, humanity is on the verge of almost completely severing its connection with nature. But without this connection, it too will not be able to survive. Both human existence and the planet's habitability will be lost. Humanity, along with other living species, is a product of the natural balance and the planet's habitability that it is disrupting. A planet that has lost its habitability will no longer be able to serve as a habitat for species (Demirel, 2022).

Historically, it is assumed that consumption increased with the production increases achieved through the industrial revolution. This process involves a need for a consumer base. The resulting economic development, along with increases in individuals' incomes, also increases their consumption (Güneş, 2019). This targeted and created social structure is called a consumer society. Odabaşı (2017) emphasizes that the development of societies can only be achieved by people who can meet their needs and thus be happy, and that this society is described as a consumer society. A consumer society describes a community that uses and discards objects quickly, characterized by waste (Williams, 1999; Zorlu, 2016). The most fundamental characteristic of this society is that, parallel to industrialization, manufactured goods are distributed rapidly and widely, constantly encouraging, and even forcing, its members to consume more (Öztunalı Kayır, 2003). The economic approach that contributes to consumer society on Earth is largely responsible for the damage done to the planet's resources, which are shared by all of humanity (Durning, 1998).

Durning (1992) states that overpopulation, rapid technological development, and consumption are the fundamental sources of the planet's problems. Increased consumption exacerbates environmental problems. Consumption pressures on the planet's natural resources lead to environmental problems, primarily global climate change and waste pollution. Humanity, rapidly affected by environmental problems, is driving the planet towards irreversible destruction as a consumer (Güneş, 2019). If humanity's consumption pressure on resources continues to increase rapidly at today's rates, three planets will be needed to meet humanity's needs (Biner, 2014). The three planets mentioned here represent a situation where one planet possesses three times the resources of another. The significance of these resources is emphasized by assuming that such a level of ownership is currently impossible. Although it has been scientifically proven that the pressure of consumption

on resources is exceeding the planet's limits, humanity continues to increase its consumption based on wants and needs. Thus, in a sense, it is destroying and consuming the planet through consumption (Güneş, 2019).

Consumer society extracts minerals from the Earth's crust; timber from forests; grains and meat from farms; and drinking water from surface and underground resources. An individual living in an industrialized country consumes approximately three times more drinking water, ten times more energy, and nineteen times more aluminum than an individual living in a developing country. Therefore, the problem is more than just one created by densely populated and rapidly growing underdeveloped/developing countries. The fundamental problem in developed countries, which have lower population growth rates compared to underdeveloped/developing countries and thus contribute less to the planet's population, is that their per capita consumption rates are incomparably higher than those of other countries. In short, the fact that per capita consumption demands are as high as, or even higher than, the large population constitutes a significant part of the problem. Furthermore, the negative ecological impacts of consumption driven by high demand reach even the local environments of poor communities (Durning, 1998).

The limits that are attempted to be defined regarding the planet are expressed in terms of the planet's carrying capacity. Carrying capacity is defined as the maximum population of a particular species that can indefinitely support a habitat without causing permanent damage to the productivity of that habitat. However, it is clear that in the Anthropocene era, humanity has not paid attention to the planet's carrying capacity, has exploited nature, and has left permanent damage on the ecological balance. Human population and average consumption are increasing, while productive land and natural capital stocks remain constant or decrease (Rees and Wackernagel, 1996; Yaşar and Kazancı, 2025). In this situation, it is impossible to talk about sustainability. Declining carrying capacity is becoming one of the most important problems humanity will face (Mızık and Yiğit Avdan, 2020).

Gilman (1992) defines sustainability as the ability of a society, ecosystem, or any ongoing system to continue functioning indefinitely without depleting its essential resources. According to Ruckelshaus (1989), it is "the doctrine that economic growth and development within the broadest limits of ecology will be achieved and maintained over time through mutual interaction." The concept of sustainability envisions a change in mindset without causing a decline in quality of life. This shift in thinking, based on breaking away from consumer society patterns, proposes international (global) solidarity, environmental management, social responsibility, and economic solutions (Özmehmet, 2008).

Sustainable development aims to achieve economic development in solidarity with future generations, without neglecting the environment. Therefore, the conservation of available resources and the control of waste generated as a result of resource use are indispensable elements of the sustainable development concept. To solve today's environmental problems, sustainable development encompasses equality, justice, social responsibility, democracy, human needs, and environmental values (Torunoğlu, 2003). However, the concept of sustainable development has deviated from its defined purpose and transformed into an economic growth model that targets sustainable resources for the sake of maximizing profits (Minibaş, 2003). The criticism arises that the concept, which is qualified by the adjective "sustainable" in the adjective phrase formed by the words that make up the concept, is actually about development, which is what is being attempted to be made sustainable. The emphasis on sustainability is attributed entirely to development, rather than to solidarity with future generations or the preservation of environmental values during development. Thus, ecological sustainability is linked to the prerequisite of sustainable development. Moreover, the concept of development is being filled with the concept of growth. To prevent this, the United Nations Sustainable Development Commission (UNSCD) has created economic, ecological, social, and institutional sustainability indicators (Özmehmet, 2008).

Carbon footprint is calculated by determining the amount of CO_2 a person releases into the environment in a year. The amount of carbon generated as a result of activities such as transportation, heating, eating, drinking, etc., and the products produced and consumed, determines the carbon footprint. The carbon footprint measures a person's contribution to global warming. In other words, a carbon footprint is the percentage of greenhouse gases released into the environment by an individual, institution, or any product within the overall total. Carbon footprint calculations include many parameters such as the total distance traveled by vehicles, the amount of energy used for heating, etc. Therefore, care must be taken when determining the primary and secondary carbon footprints. Carbon footprint consists of two parts: direct (primary) and indirect (secondary). The primary footprint is used to determine CO_2 emissions that may occur from household energy consumption, transportation, and fossil fuel use, while the secondary footprint is used to determine the CO_2 released into the

atmosphere throughout our lives, from the manufacturing of products we use to their final disposal (Kaypak, 2013; Kumaş et al., 2019).

This study examines university students' thoughts on carbon footprint for the present and future, and their opinions on what individuals can do to reduce their carbon footprint.

2. MATERIAL AND METHODS

The research was conducted phenomenologically. The study included students' drawings and explanations of their carbon footprints for the present and future. It also evaluated people's views on how they can reduce their carbon footprint. For this purpose, data were collected from final-year students of the Science Education Department at Trakya University during the fall semester of the 2025-2026 academic year, in an environmental education course. Fourteen students voluntarily participated in the study, and each student was assigned a code between 1 and 14. Students with codes S6 and S9 are male. Students were asked to express their views by drawing on A4 size paper, using a pen of their own choosing, and then writing down their drawings. This resulted in more concrete data. Afterwards, they were asked to explain an open-ended question about reducing their carbon footprint. Questions: “(1) Draw and explain your thoughts on the carbon footprint caused by humans in the present and future?”, “(2) Explain what people can do in general to reduce their carbon footprints.” The data was then analyzed using content analysis techniques (Cohen and Manion, 1994).

3. RESULT AND DISCUSSION

This section discusses students' drawings and explanations of the current and future impacts of carbon footprint, as well as their views on how individuals can change their daily behaviors to reduce their carbon footprint.

3.1. Student Drawings and Comments

This section includes drawings and explanations of drawings made by 14 students regarding the current and future effects of carbon footprint.

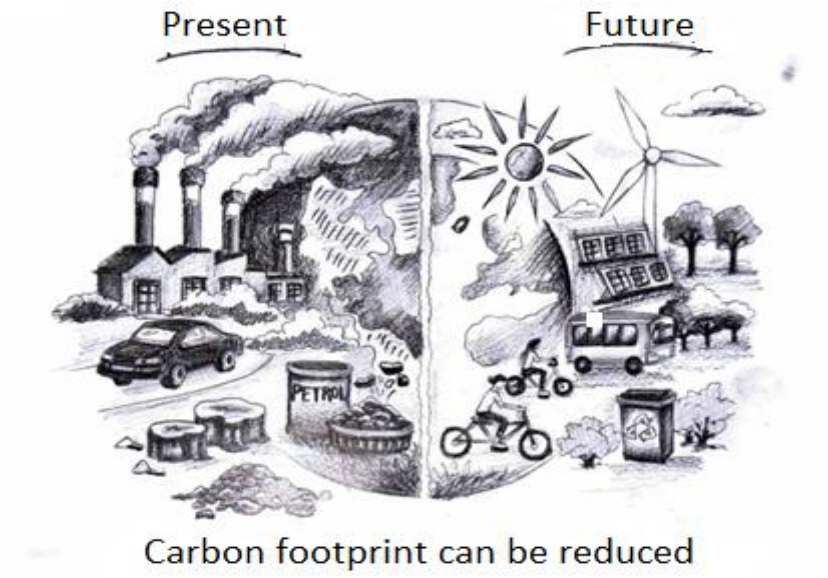
The student drawing coded S1 expresses the idea that our future depends on our present and that individuals should exhibit responsible behavior (Figure 1): “The left side of the drawing represents the present. This section includes thick smoke coming from factory chimneys, private vehicles using fossil fuels, felled trees, and oil barrels. These elements symbolize the damage that industrialization, unplanned urbanization, excessive consumption, and reliance on fossil fuels inflict on nature. Air pollution, deforestation, and the indiscriminate consumption of natural resources increase carbon emissions and grow the carbon footprint. This is one of the main causes of environmental problems such as global warming and climate change.

The right side of the drawing reflects the future and a sustainable way of life. This section features renewable energy sources such as solar panels and wind turbines, public transportation, people riding bicycles, recycling bins, and green spaces. These elements represent environmentally conscious individuals, energy conservation, and living in harmony with nature. Carbon emissions are reduced and the natural balance is preserved through the use of renewable energy and eco-friendly transportation.

The phrase "carbon footprint can be reduced" at the bottom of the illustration emphasizes that people can reduce their negative impact on the environment by making conscious choices. This message shows that the future depends on our actions today and that individual responsibility is of paramount importance.

In conclusion, this drawing illustrates how people can create a cleaner, healthier, and more livable world if they change their habits that harm nature. Reducing carbon footprint is of great importance not only for the environment but also for the right to life of future generations.”

Figure 1. Since our future depends on the present, individuals must exhibit responsible behavior



The student with code S2 emphasizes in their statements that daily life choices affect carbon footprint and therefore environmentally friendly choices should be made (Figure 2): "In my drawing, I tried to reflect the increasing impact of the carbon footprint that people leave on the environment. By dividing the world in two, I tried to express how our world would look if we had a green environment, recycling, and more conscious carbon consumption, and how it would look if we did the exact opposite.

The left side of the image represents a sustainable world created by environmentally conscious individuals. The green spaces, trees, and living creatures in this section demonstrate the balance of nature. Wind turbines and solar panels symbolize renewable energy sources, aiming to reduce fossil fuel consumption. The green footprint represents a low carbon footprint. The right side of the image depicts what the Earth might look like if human activities continue unchecked. Dehydrated lands, industrial facilities, exhaust fumes, dead fish, and radioactive leaks indicate a disruption of the natural balance. The black footprint represents an excessive carbon footprint.

With the hourglass at the bottom, I wanted to emphasize that our time is running out and that our choices determine our future. In short, with this image, I highlighted that individuals' daily energy consumption, transportation, and consumption choices directly affect their carbon footprint. We can live in a sustainable world with environmentally friendly choices."

Figure 2. Since our daily lifestyle choices affect our carbon footprint, it is necessary to make environmentally friendly choices

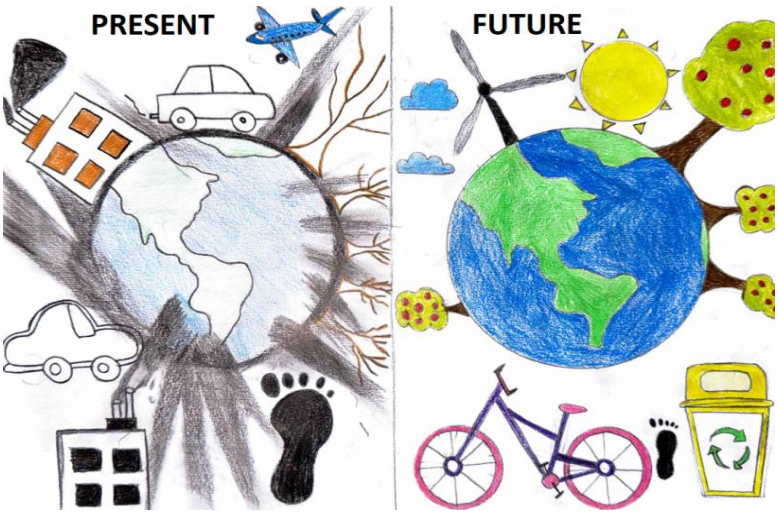
Student S3's drawing focuses on the impact of humans on the environment: "My drawing depicts two different situations. On one side, it shows air pollution due to high carbon emissions, damaged nature, and environmental problems. On the other hand, a future is depicted where the carbon footprint is reduced, and nature is cleaner and more livable. With this drawing, I emphasized that people can negatively or positively affect the environment with their daily choices." (Figure 3).

Figure 3. Human impacts on the environment

The student drawing coded S4 emphasizes the need to protect the environment through sustainable practices to mitigate damage (Figure 4): "This drawing comparatively examines the environmental impacts of carbon footprint in terms of the present and the future. The "Present Day" section of the drawing depicts the Earth as we know it today. This section highlights elements such as fossil fuel-based industries, motor vehicles, airplanes, and dense urbanization. Smoke from factory chimneys, motor vehicles, and footprint figures symbolizing carbon footprints represent greenhouse gases released into the atmosphere as a result of human activities and their negative impacts on the environment. The dark shading around the globe highlights the consequences of carbon emissions, such as climate change, environmental degradation, and disruption of the natural balance.

The "Future" section of the drawing explores the concept of the future. This section highlights environmentally friendly modes of transportation (bicycles), recycling practices, renewable energy sources (wind and solar energy), and green spaces. The Earth figure, drawn with more vibrant colors, expresses how environmental sustainability can be achieved and natural ecosystems protected by reducing the carbon footprint. The smaller footprint symbol in this section indicates that the carbon footprint can be reduced over time. Trees and clean energy sources reduce carbon emissions."

Figure 4. Protecting the environment through sustainable practices is essential to mitigate harm



The student drawing coded S5 demonstrates that it is possible to transition to a restorative future by giving back to nature more than we take from it: "What I drew is a comparison and transformation that addresses humanity's

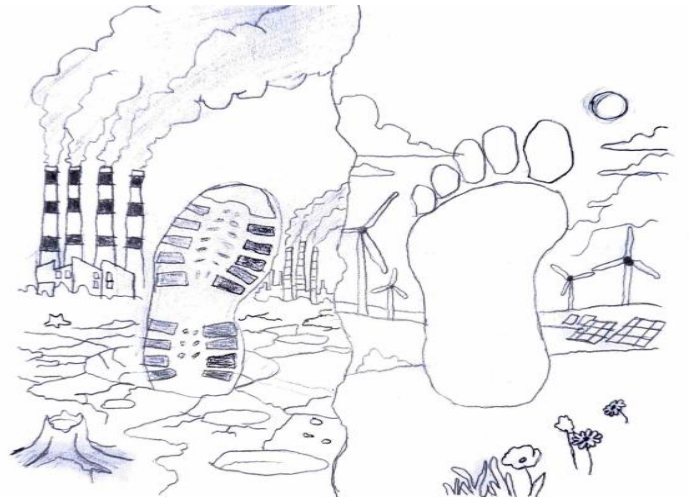
impact on nature from two different perspectives. I visualized the concept of "Carbon Footprint" not just as a term, but as a concrete way of life. The factories beneath our feet, the smoking chimneys, industrialization, the deforestation—these are dark images illustrating how every waste we consume leaves a deep, gray mark on nature. The smoke in the sky, the polar bear on the melting ice—they represent the inevitable consequences of air pollution and global warming.

The world beyond our footprint offers hope and shows how we can transform our "carbon footprint" into a "life footprint." The wind turbines and solar panels you see in the image represent the transition to renewable, clean energy. Abundant greenery, trees, clean streams, and animals represent a livable environment. Reducing our carbon footprint is not just about cutting consumption, but also about giving back more to the world than we take, arguing that a transition to a restorative future for nature is possible." (Figure 5).

Figure 5. A transition to a restorative future is possible by giving back to nature more than we take from it

In the drawing coded S6, the student highlights the effects of fossil fuels and renewable energy on the carbon footprint (Figure 6): "In my drawing, I tried to make a comparison. On the left side, I tried to explain the world that would result from the unbalanced use of fossil fuels. I also touched upon the negative consequences of excessive industrialization. On the right side, I've drawn a world that uses renewable energy sources and is "living." One of these two possibilities will definitely happen in our world, but the choice is ours."

Figure 6. The effects of fossil fuels and renewable energy on carbon footprint



The student drawing coded S7 states that an ecosystem in harmony with nature can be built through our current choices (Figure 7): "Carbon footprint is a measure of the environmental damage caused by an individual, an

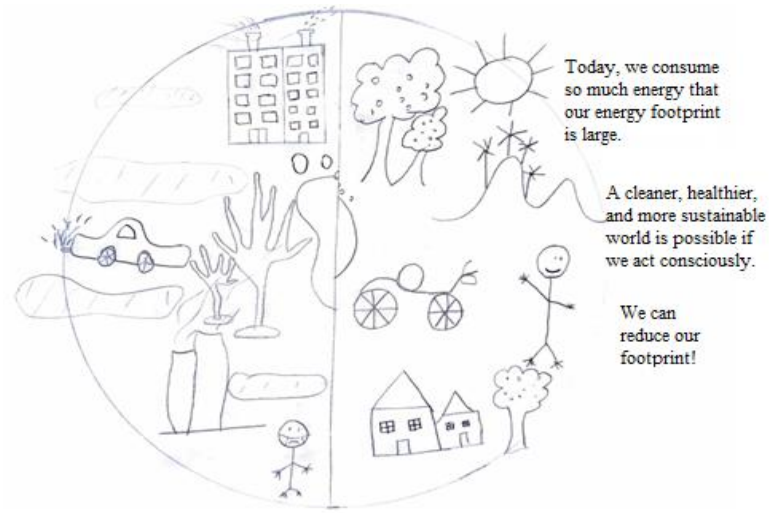
institution, or an activity through the amount of greenhouse gases released into the atmosphere. In my drawing, this concept is concretized through two footprints and two different scenarios are established.

On the left side of my image, you can see how the dark, dominant, and polluting carbon footprint created by today's heavy industry and fossil fuel use is drying up and cracking our world, plunging it into a grey darkness. But on the other side, there is a hopeful future where this footprint is mitigated, and technology and lifestyles evolve towards sustainable energy sources. This transformation symbolizes that the world can breathe again when we reduce our carbon footprint, and that a green, nature-friendly ecosystem can only be built through our choices today."

Figure 7. We can build an ecosystem in harmony with nature through our current choices

Student S8 expresses their desire for a sustainable future through their drawing (Figure 8): "In my drawing, I depicted the environment we currently live in and the environment we envision. Factors that increase our carbon footprint—exhaust fumes, factories, fossil fuel use, insufficient reforestation, and the unconscious use of our resources—all affect the environment we live in. It threatens life. On the other hand, in my imagination, I've drawn an environment with a small carbon footprint. Bicycles and public transport should be used instead of private cars; renewable energy should be used instead of fossil fuels. Extensive afforestation will reduce our footprint and provide us with the healthy environment we desire."

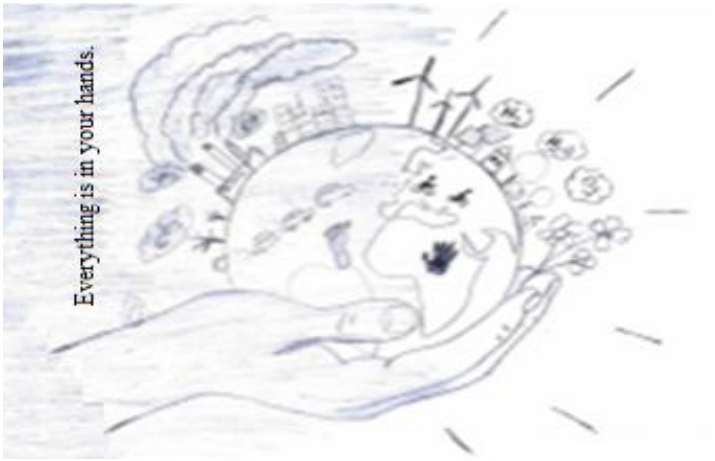
Figure 8. A desire to move away from fossil fuels and embrace a sustainable future



In the student drawing coded S9, the left side represents people's unconscious behaviors, while the right side expresses hope for the future (Figure 9). "This drawing depicts two different faces of the world. The section drawn in dark and subdued tones (left section) represents the increasing carbon footprint resulting from people's unconscious consumption, fossil fuel use, and damage to nature today. Factory fumes, exhaust fumes, and destroyed green areas symbolize environmental pollution and global warming.

The other section (the right section), drawn in lighter and brighter tones, reflects a hope for the future. It shows that a cleaner world is possible thanks to renewable energy sources, green spaces, and environmentally conscious lifestyles. The human hand touching the world emphasizes that the fate of the planet will be determined by the decisions people make and the environmental awareness they demonstrate."

Figure 9. The left side represents people's unconscious behaviors, while the right side represents hope for the future



The student with code S10 expresses that every individual and society leaves a trace in nature (Figure 10): "Main Symbol: Foot-Shaped House: Represents the Carbon Footprint that humans leave on the environment. Transforming this foot into a house emphasizes that our daily lifestyle, housing and consumption habits have a direct impact on nature."

Negative Impacts: Factory and Smoke: The factory in the background symbolizes the carbon dioxide released into the atmosphere by industrial activities and fossil fuels. CO_2 on the Roof: The grass growing on the roof of the house in the form of "CO_2" shows that even our living spaces carry a carbon load.

Positive Solutions: Solar panels and wind turbine: Using renewable energy sources reduces dependence on fossil fuels, thereby reducing the carbon footprint. Net: Represents the effort to clean up atmospheric pollution. Greenery and Trees: The lawns and trees on and around the house highlight the importance of protecting nature and increasing vegetation in absorbing carbon.

Every individual and society leaves a mark on nature. If we obtain our energy from clean sources and protect nature, we can transform this heavy and polluting footprint into a lighter, greener, and more sustainable structure.

Figure 10. Every individual or society leaves a mark on nature

Student code S11 emphasizes that the environment is being damaged by many factors today, but that a beautiful world can be lived in through sustainable behaviors (Figure 11): "This drawing compares the present and the future. Today, the use of fossil fuels, vehicle exhaust, airplanes, and plastic waste are increasing our carbon

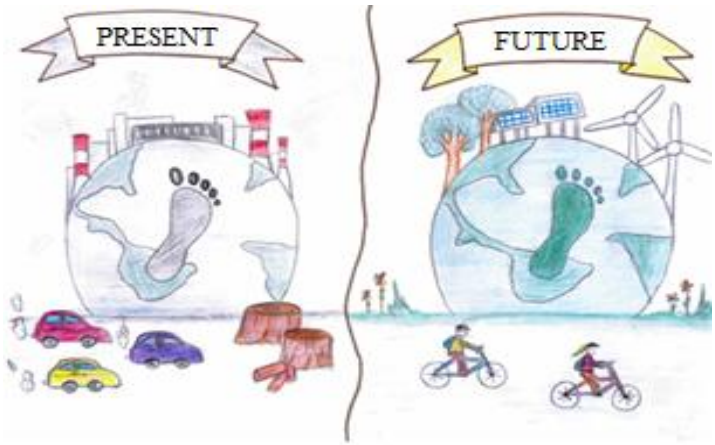
footprint, causing environmental pollution and harming living beings. As a result, the world is becoming a dirtier and more difficult place to live. In the future, the goal is to reduce the carbon footprint by using renewable energy sources, increasing recycling, and preferring environmentally friendly modes of transportation such as bicycles. In this way, a cleaner, greener, and healthier world will be possible."

Figure 11. Today, the environment is being harmed by many factors, but it is possible to live in a beautiful world through sustainable practices

Student S12 emphasizes that a more livable environment can be created by reducing carbon footprint (Figure 12): "This drawing shows that today, people have a large carbon footprint due to the use of fossil fuels, overconsumption, and environmentally insensitive behavior. Factory fumes and heavy traffic increase the amount of carbon released into the air.

The future section explains how the carbon footprint can be reduced through the use of renewable energy sources, preferring public transportation and cycling, and increasing reforestation efforts. This means a cleaner environment and a more livable world."

Figure 12. Reducing our carbon footprint can create a more livable environment



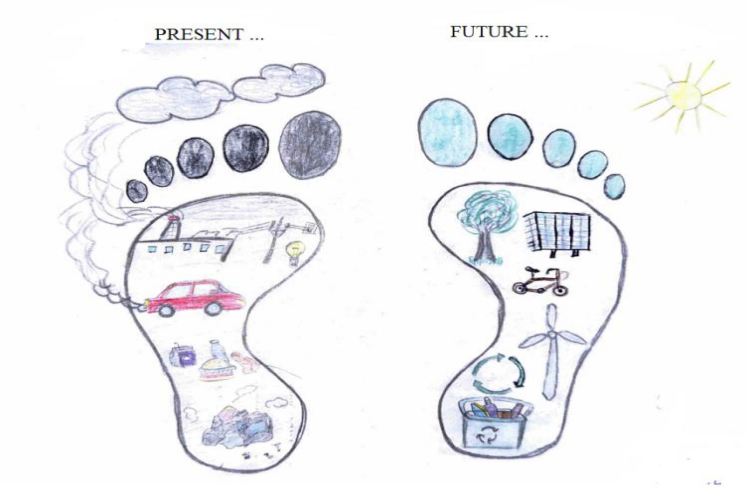
Student S13 states that while people are increasing their carbon footprints today, it's possible to reduce them through conscious action (Figure 13): "This drawing uses two different footprints to symbolically illustrate the impact of humans on nature. The dark, large footprint on the left represents the damage people are causing to the environment today. This footprint includes symbols such as a hamburger, crumpled packaging, a factory chimney, an airplane, and plastic bottles. These symbols represent overconsumption, industrial air pollution,

fossil fuel use, and the problem of plastic waste. The large, dark footprint emphasizes the heavy and lasting impact this has on nature. The smaller, greener footprint on the left represents an environmentally conscious, sustainable, and nature-friendly lifestyle. This footprint includes images of leaves, water droplets, bicycle wheels, and vegetables. These symbolize protecting nature, conserving water, choosing eco-friendly modes of transportation like bicycles, and adopting a healthy, plant-based diet. Having a small and green footprint shows that damage to nature can be reduced and that individual choices can make a difference for a more livable future. This drawing illustrates that people are increasing their carbon footprints with their current behaviors, but that it is possible to reduce this footprint through conscious choices."

Figure 13. Today, people are increasing their carbon footprints, but this can only be reduced through conscious actions

Student S14 emphasizes that making the right choices will lead to a more livable environment (Figure 14): "I see that carbon footprint is related to the choices people make in their daily lives. Today, factory fumes, vehicles using fossil fuels, unconscious consumption and incomplete recycling activities increase our carbon footprint and negatively affect the environment. On the other hand, I think that the carbon footprint can be reduced in the future through the use of renewable energy, environmentally friendly vehicles such as bicycles, afforestation and recycling. This drawing shows me that every step we take leaves a mark on nature. It convinces me that a cleaner and more livable world is possible when the right choices are made."

Figure 14. Making the right choices leads to a more livable environment



3.2. According to Science Students, What Can People Do to Reduce Their Carbon Footprint?

This section evaluates students' statements in Table 1 regarding what people should pay attention to in order to reduce their carbon footprint. The measures that can be taken are grouped into 28 categories.

Table 1: General measures people can take to reduce their carbon footprint, according to students

Precautions to be taken	Participant codes
Choosing public transport, cycling, and walking.	1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14
Reducing the use of private vehicles.	1, 10, 13, 14
Choosing electric or hybrid models when buying a vehicle.	7, 14
If we are going to use our own vehicle, we should go with our friends who are on the same route.	6
Reducing flights unless absolutely necessary.	6, 13, 14
Using renewable energy sources.	1, 2, 5, 7, 8, 9, 10, 11, 13, 14
Unplugging unused electronics.	5, 6, 7, 9, 10, 12, 14
Avoiding unnecessary electricity usage.	6, 8, 9, 11, 12, 13, 14
Choosing energy-efficient appliances.	1, 2, 3, 4 , 5, 6, 7, 9, 10, 11, 12, 13
Recycling and reducing waste.	1,2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
Returning organic waste to the soil.	10
Trying to prevent greenhouse gas emissions from landfills.	5
Avoiding unnecessary consumption.	1,2, 4, 7, 8, 9, 14
Using reusable bags instead of single-use plastic bags.	6, 7, 10, 11, 12, 13
Consuming consciously	3, 7, 8, 9, 11 13, 14
To plant trees and reforest in place of those that have been cut down and destroyed.	5
Participating in reforestation efforts.	1, 7, 8, 9, 11, 12, 14
Donating saplings.	7
Preventing food waste.	2, 7, 10
To consume less meat.	10, 13, 14
Keeping shower time short.	2, 9, 11
Saving paper.	10
Avoid washing clothes at high temperatures.	10
Avoid unnecessary water consumption.	5, 8, 10, 11, 14
Using rainwater to water the garden.	2
Keeping the environment clean.	2, 9, 10
Avoiding habits that harm nature.	3, 4, 8, 9, 12, 14
Consuming local and seasonal products.	1, 10, 12, 13, 14

4. CONCLUSION

In the study, university students believe that the carbon footprint in today's world is quite high. The most significant factors increasing carbon footprint, as seen in the drawings, are the use of fossil fuels and the reduction of green areas (Figures 3, 5, 11, etc.). It is evident from the students' drawings that they are hopeful for the future. For this to happen, people need to become more environmentally conscious starting today.

Students made a total of 28 suggestions for people to reduce their carbon footprint (Table 1). Activities such as prioritizing public transportation, cycling and walking, using renewable energy sources, choosing energy-efficient household appliances, recycling and waste reduction were most frequently highlighted by the students.

When carbon footprint exceeds biological capacity, it leads to ecological deficits. Progress towards sustainability goals is only possible by making the value of ecological resources measurable and traceable, thereby minimizing risks. A sustainable future requires eliminating ecological gaps. An ecological balance must be achieved between carbon footprint and biological capacity by either reducing the ecological footprint or increasing biological capacity (Bektaş, 2021).

The carbon footprint is the sum of areas that compete with each other to provide the ecological services demanded by humanity. Biological capacity is also included in this calculation. The largest component of the carbon footprint is carbon gas released by the burning of fossil fuels. Carbon gas emissions, which have been ongoing for nearly half a century, are steadily increasing. Carbon, which accounted for 36% of the total ecological

footprint in 1961, increased to 53% in 2010. Advances in technology and agricultural production, along with increases in per-hectare productivity, particularly in agricultural areas, have led to a rise in total biological capacity from 9.9 billion kha to 12 billion kha between 1961 and 2010. However, during the same period, population growth led to a decrease in per capita biological capacity from 3.2 kha to 1.7 kha. It is possible to speak of a population increase that occurred much faster than the increase in resource production. Population projections for the world indicate a population of 9.6 billion in 2050 and 11 billion in 2100. Given these growth rates, it is not difficult to predict that per capita biological capacity will gradually decline. Furthermore, the increasing demands of a growing population, which put increasing pressure on resources, are also increasing the carbon footprint. Therefore, if the current situation continues, the balance sought between carbon footprint and biological capacity will continue to be disrupted to the detriment of biological capacity. For nearly half a century, humanity's demand for natural resources has exceeded biological capacity (WWF, 2014).

This situation, where the pressure placed on resources far exceeds their renewable capacity, is the work of humanity, which cuts down trees before they mature, consumes more seafood than the seas can provide, and releases far more carbon into the atmosphere than forests and oceans can absorb. Every time a limit is exceeded, it means moving further away from the vision of a sustainable future (WWF, 2018).

Recognizing that the planet has limits and living within those limits without exceeding them will create a safe space for human activities and the sustainability of life. Solidarity with the future and sustainability can only be achieved in this way. However, humanity has primarily exploited nature frequently and with increasing intensity during its last ten thousand years of existence. Humanity must accept that the planet has limits and understand that the future sustainability of the resources it uses as if they were limitless depends on what it does today (WWF, 2014).

The community formed by humanity, which is defined as today's consumer society, uses the planet's resources without any concern for the future or any regard for the planet's limits. However, since the late 1980s, the concept of development has been enhanced with adjectives such as "sustainable," "green," and "circular," emphasizing the concern humanity should have for the future. The planet's life-sustaining ecosystems, or in other words, its biological capacity, must survive to ensure the sustainability of future generations. It should be emphasized that consumer society, particularly its consumption patterns, must make fundamental changes to ensure solidarity for the future (WWF, 2018).

With only one planet available, how is humanity using the capacity of 1.5 planets? Just as withdrawing more money from a bank account than the interest it generates is possible, renewable resources are being consumed faster than they are being regenerated. In a forest, more trees can be cut down each year than will regenerate, and more fish can be caught each year than will reproduce. However, this is only possible for a limited time; resources will eventually be depleted. Similarly, CO2 emissions can exceed the amount that forests and other ecosystems can hold. This means that additional planets would be needed to capture all emissions. Humanity must assume responsibility for standing by the environment, which also sustains its own existence (Durning, 1998; Kumaş et al., 2019).

To prevent exceeding ecological limits, students should act as indicated in Table 1;

1. We must change our development strategies. The use of natural resources that does not exceed ecological limits is part of the effort to find development strategies that will allow us to live in harmony with nature.

2. We need to increase our protected areas. At least 15% of the Earth's surface should be set aside for the conservation of biodiversity and ecosystem services.

3. We need to increase energy efficiency and change our eating habits (our meat consumption). Food and energy are the two most important issues to focus on in the future.

4. We need to define new tools and processes to manage competing land demands. It is becoming increasingly important to appropriately allocate and plan the use of land so that we can produce enough food, animal feed, and fuel, while protecting biodiversity and ecosystem services.

5. We must ensure the fair sharing of limited resources and prevent inequality. Equitable access to and distribution of energy, water, and food must be guaranteed among countries and societies.

6. Businesses and governments should take a leading role in reducing the ecological footprint. Decision-makers and market mechanisms are crucial in adopting approaches that value nature and allocate resources in a way that creates societal wealth (URL 1).

REFERENCES

Bektaş, M. (2021). Ekolojik ayak izi ve biyolojik kapasite nedir? 28 Ocak 2025 tarihinde https://www.gidabilgi.com/Makale/Detay/ekolojik-ayakizi-ve-biyolojik-kapasite-nedir--130f5d adresinden erişildi.

Biner, N. (2014). Tüketicilerin yeşil ürün satın alma davranışlarının incelenmesi. (Yüksek lisans tezi), Trakya Üniversitesi Sosyal Bilimler Enstitüsü, Edirne.

Cohen, L., & Manison, L. (1994). Research methods in education. London: Routledge.

Demirel, M. (2022) Ecologic footprint makes history: Earth overshoot day. Journal of Economics and Administrative Sciences, 23(4), 963- 980.

Durning, A. T. (1992). How much is enough? London: Earthscan.

Durning, A. T. (1998). Ne kadar yeterli? Tüketim toplumu ve dünyanın geleceği. İstanbul: TÜBİTAK-TEMA Yayınları.

Gilman, R. (1992). Sustainability by Robert Gilmanfrom the 1992 UIA/AIA call for sustainable community solutions. 18 Nisan2024 tarihinde https://www.context.org/about/ definitions/#sustainability adresinden erişildi.

Güneş, V. (2019). Çevreci tüketim davranışının belirleyicilerinin görece etkilerinin incelenmesi. (Yayımlanmamış doktora tezi), Sakarya Üniversitesi İşletme Enstitüsü, Sakarya.

Kaypak, Ş. (2013). Ekolojik ayak izinden çevre barışına bakmak. Türk Bilimsel Derlemeler Dergisi, 6(1), 154-159.

Kumaş, K., Akyüz, A., Zaman, M., & Güngör, A. (2019). Sürdürülebilir bir çevre için karbon ayak izi tespiti: MAKÜ Bucak Sağlık Yüksekokulu örneği. El-Cezerî Fen ve Mühendislik Dergisi, 6(1), 108-117. Doi: 10.31202/ecjse.459478

Mızık, E. T., & Yiğit Avdan, Z. (2020). Sürdürülebilirliğin temel taşı: Ekolojik ayak izi. Doğal Afetler ve Çevre Dergisi, 6(2), 451-467. Doi: 10.21324/dacd.630825

Minibas, T. (2003). Sürdürülebilir kalkınma ve etkileri. Ankara: TÜBİTAK

Odabaşı, Y. (2017). Tüketim kültürü yetinen toplumun tüketen topluma dönüşümü. 5. Basım. İstanbul: Sistem Yayıncılık.

Özmehmet, D. E. (2008). Dünyada ve Türkiye'de sürdürülebilir kalkınma yaklaşımları. Yaşar Üniversitesi E-Dergisi, 3(12), 1853-1876.

Öztunalı Kayır, G. (2003). Doğaya dönüş: Topluma ekolojik bakış. İstanbul: Bağlam Yayınları.

Rees, W. E., & Wackernagel, M. (1996). Our ecological footprint: Reducing human impact on the earth. Gabriola Island BC: New Society Publishers.

Ruckelshaus, W. D. (1989). Toward a sustainable world. Scientific American, 261(3), 66-175.

Torunoğlu, E. (2003). TÜBİTAK vizyon 2023: Panel için notlar: Sürdürülebilir kalkınma paradigması üzerine ön notlar, Ankara: TÜBİTAK

URL 1. Ekolojik ayak izi. 18 Haziran 2026 tarihinde https://obi.bilkent.edu.tr/ekookul/pdf/ekolojikayakizi.pdf adresinden erişildi.

Williams, R. (1999). Consumer society in American history: A reader. New York: Cornell University Press.

WWF (2014). WWF yaşayan gezegen raporu 2014 özet. 22 Şubat 2023 tarihinde http://awsassets.wwftr.panda.org/downloads/ygr_2014_ ozet.pdf adresinden erişildi.

WWF (2018). Yaşayan gezegenler raporu. 11 Haziran 2026 tarihinde http://www.wwf.org.tr/basin_bultenleri/raporlar/?8160/ Yasayan-gezegen-raporu-2018 adresinden erişildi.

Yaşar, l., & Kazancı, B. A. (2025). An evaluation of the global climate crisis and carbon footprint: The case of Kırıkkale Unıversıty. AL FARABI 14th Internatiıonal Scientific Research And Innovation Congress, April 25-26, 2025 / Beyşehir, Konya, Türkiye.

Zorlu, A. (2016). Üretim ve tüketim teorileri. 1. Baskı, Ankara: Altınordu Yayınları.